FROM THE OUTSIDE IN: A MULTIVARIATE CORRELATIONAL ANALYSIS OF EFFECTIVENESS

IN COMMUNITIES OF PRACTICE

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Online communities of practice (CoPs) provide social spaces for people to connect, learn, and engage with one another around shared interests and passions. CoPs are innovatively employed within industry and education for their inherent knowledge management characteristics and as a means of improving professional practice. Measuring the success of a CoP is a challenge researchers are examining through various strategies. Recent literature supports measuring community effectiveness through the perceptions of its members; however, evaluating a community by means of member perception introduces complicating factors from outside the community. In order to gain insight into the importance of external factors, this quantitative study examined the influence of factors in the professional lives of educators on their perceptions of their CoP experience. Through an empirical examination of CoPs employed to connect educators and advance their professional learning, canonical correlation analysis was used to examine correlations between factors believed to be influential on the experiences of community members.

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Rarely are our achievements truly ours alone. We build upon the shoulders of those who have gone before us, we are supported by those around us, and we are guided by the One in whom all things hold together. I write this today because of the strength of those who prepared the way for me. Three generations before me, my great-grandmother's education culminated in third grade. My grandmother, Lucile Woodrum, dropped out of high school because of the expenses required to attend. Later in life as an adult who had raised her children, she returned to school and earned her GED. She impressed upon her children and grandchildren the importance of education and hard work, teaching us that your character and education are who you are no matter where you come from or what you have, and they cannot be taken away. Her strength and values laid a foundation built upon by my mother, the first in her family to earn a college degree. I am exceedingly grateful to my parents, Nick and Suzanne Hulbert, who built upon that foundation encouraging and supporting me from an early age to grow, learn, and not be afraid of a challenge. Their sacrifice and dedication to seeing their children succeed laid a foundation for me today and their support through this particular endeavor was critical to its success. Thank you both for your unyielding belief in your children and for encouraging us to grow, learn, and do whatever we put our hands to – our successes are a direct result of the investment of yourselves in us. Riley, your "little brother" is leaving home!

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CHAPTER 1

INTRODUCTION

Ancient graffiti hidden in the recesses of the Pyramids at Giza points to labor groups

engaged in competition, and even a bit of levity, while building the ancient monuments of

Egypt. These groups of laborers, called phyles, tagged the foundations and internal structure of

the monuments with group identities, such as "the Friends of Khufu Gang" and "the Drunkards

of Menkaure", that suggest a light-hearted comradery existed among the teams. Scholars

believe these tags also imply competition between phyles as competing tags have been found

marking their work on opposite sides of monuments and pyramids (Lehner, 1997). However

these labor teams were organized and whoever these laborers might have been, these tags

suggest a sense of shared endeavor, pride in their work, and a spirit of connection between

members.

History confirms that people come together around the things that they know and do.

Whether out of a desire to engage socially with others around a shared passion or because of

the simple fact that man's efforts are made greater when more than one person is at work,

people come together around what they know and do (MacBeth, 1996). In the Middle Ages,

guilds brought artisans and craftsmen together to develop their craft and train others in the

skill. The social networks that developed from these guilds developed collective identity and

cohesion among the members of these communities, which eventually afforded political and

economic power to the community as well (Stabel, 2004). Social relationships form around

knowing and doing and as a result, knowing and doing are often improved through the social

exchange around them.

Leveraging the power of improving knowledge and ability through social exchange is a history lesson many in the professional world today are eager to apply. The opportunity to engage workers and learners around common ground in a way that not only improves what they know and do, but also builds community and cohesion among them is a model of learning growing in its appeal and application. The Community of Practice model exists as it has throughout history in business, education, and the labor force at large (Wenger & Snyder, 2000). Now, today, it exists virtually as well and is increasingly applied in the online context as a method for connecting and growing as people engaged with others – professionals like those laborers, artisans, and craftsmen of history – around what people know and do.

Statement of the Problem

Online Communities of Practice (CoPs) provide social spaces for people to connect, learn, and engage with one another around shared interests and passions. Examples of these communities abound as CoPs form organically in online social spaces or are created by business and industry to capitalize on members' shared interests. In recent years, CoPs are being innovatively employed within industry for their inherent knowledge management characteristics (Chindgren, 2005; Hemmasi & Csanda, 2009) and in educational spheres as a means of improving professional practice (Admiraal, Lockhorst, & van der Pol, 2012; Booth, 2012; Dalgarno & Colgan, 2007; Hur & Brush, 2009). Measuring the success of a CoP is a challenge researchers are examining through various strategies including case studies (Booth, 2012; Hodkinson & Hodkinson, 2003), expert studies (Admiraal, Lockhorst, & van der Pol, 2012), and through quantifying member participation within the community in terms of discussion

thread postings, resources shared, and messages sent (El-Hani & Greca, 2013; Preece, 2001; Prestridge, 2010).

Rather than quantify activity and participation, recent literature supports measuring community effectiveness through the perceptions of its members (Admiraal, Lockhorst, & van der Pol, 2012; Chiu, Wang, Shih, & Fan, 2011; Lin, 2006; Hemmasi & Csanda, 2009; Preece, Nonnecke, & Andrews, 2004). However, evaluating a community by means of member perception introduces complicating factors from outside the community. It is important to consider various external factors stemming from outside the online community that may alter or influence the member's perception of their community experience. While the literature suggests the importance of external factors on community members' perceived experience (Admiraal & Lockhorst, 2011; Glazer & Hannafin, 2006; Hodkinson & Hodkinson, 2003), this researcher was unable to identify a study that empirically establishes the influence of these factors while measuring members' perceptions of community effectiveness. Further, despite the number of communities in the literature, the number of empirical studies examining community effectiveness and satisfaction as perceived by members is limited (Bourhis & Dube, 2012; Cheung & Lee, 2009; Hemmasi & Csanda, 2009). These challenges, namely, establishing a measure of online CoP effectiveness and the lack of research empirically examining community effectiveness and the influence of external factors on community members' perceptions, create a need for further research to empirically examine this problem.

The remainder of this chapter details the purpose for this study, provides definitions for terms used, and establishes the assumptions, limitations, and significance of this study.

Purpose of the Study

This research study examines the relationship of both 1) internal CoP characteristics, and 2) external factors in the professional lives of educators and their effects on the educators' perceptions of community effectiveness and satisfaction with their CoP experience. While the literature provides a number of examples attempting to measure the success of a CoP, few of these methods stand out as replicated methodologies that provide a clear measurement of success and effectiveness (Admiraal, Lockhorst, & van der Pol, 2012; Cadiz, Sawyer, & Griffith, 2009). Moreover, other researchers in the field of education suggest that when examining implementations of the CoP model, researchers should take into account potential contributing factors in the professional lives of educators that may influence their community experience (Hodkinson & Hodkinson, 2003). Even Wenger, who is credited with developing the CoP model, states that a CoP should not be considered in isolation (Wenger E. , 1998). However, current research on the CoP model does not account for Wenger's early statement since CoPs are examined consistently in the literature according to characteristics and features solely existing within the CoP.

The purpose of this study is to examine an online network of Communities of Practice established for the use of educators and, first, discover whether the members perceive characteristics related to the shared domain, community, and shared practice as evidence that they are experiencing a CoP (Wenger, McDermott, & Snyder, 2002). Second, this study seeks to investigate whether community members similarly confirm the effect of internal factors within the CoP and the members' perceptions of community effectiveness and satisfaction with their community experience, as previously established in CoP research (Hemmasi & Csanda, 2009).

And third, this study will seek to determine how external factors in the lives of teachers, namely the school culture, professional isolation, and their own personal dispositions toward professional learning relate to their perceptions of community effectiveness and satisfaction with the community experience.

Research Questions

Measuring community success through the perceptions of effectiveness and satisfaction with the community experience by members is recommended in the literature (Bone, 2013; Hemmasi & Csanda, 2009; Preece, 2001). These studies recognize the highly social environment of a CoP and support evaluating the social experience through the affective response of members. Examining the social and psychological experience of a community provides significant insight into understanding not only the actual community activity, but the impact of the experience on its members (Cheung & Lee, 2009; Chiu, Wang, Shih, & Fan, 2011; Hemmasi & Csanda, 2009; Lin, 2006; Preece, Nonnecke, & Andrews, 2004). Establishing how influences from the daily professional lives of educators impact their perceptions of their experience within a CoP further broadens researchers' knowledge of CoPs and offers guidance for developing and maintaining CoPs for educators in the future. As such, this research study is guided by three primary questions:

1. To what extent are members experiencing a Community of practice as evidenced through their perception of CoP characteristics related to the shared domain of interest, community, and shared practice of the community?

2. To what extent do community characteristics related to the member's sense of trust, community leadership, connections with community members, sense of member commitment to the community, and perceived impact on the member's job relate to member perceptions of community effectiveness and satisfaction with the community experience?

3. To what extent do external factors in the professional lives of members, specifically the member's sense of professional isolation, his/her personal disposition toward learning, and the awareness of his/her school cultures' valuation of professional growth as perceived in peers and administration, relate to member perceptions of community effectiveness and satisfaction with the community experience?

These questions are explored through the study of K-12 educators participating in a network of online CoPs. Educators in the network represent approximately 3,000 U.S. private schools, varying in school size from smaller schools with fewer than 20 faculty members to larger schools with more than 150 faculty members on staff.

Significance of the Study

Understanding the characteristics of CoPs and member experience factors that improve their value and contribute to their success also helps those responsible for CoPs to optimize the development and maintenance of the community experience for its members. When CoPs are developed intentionally, whether in industry or education, the developers do so with a specific purpose or objective. Knowing how and why a CoP succeeds provides these stakeholders with a greater understanding of how to develop the CoP and knowledgeably invest in it (whether

with time, finances, or staffing). However, understanding the inner-workings of a CoP is only part of the picture. Recognizing how influences from outside the CoP impact participants and potentially influence their perceptions of the experience also provides a key to understanding the success or failure of a CoP. This study provides a unique opportunity to confirm the findings of previous research on community characteristics that relate to member perceptions of effectiveness and satisfaction, while also examining the external influences existing in teachers' professional lives on their perceptions of the community experience.

Definition of Terms

The following terms are germane to the research examined and a clear definition of how these terms are used in this study is essential for the reader's understanding.

Community of practice (CoP). Communities of Practice are not new—rather they have existed for as long as humans have gathered together. Wenger, McDermott and Snyder (2002) provide a clear explanation of a community of practice at its most fundamental level, "communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p.4). At this fundamental level it seems reasonable to expect that a community of practice, or CoP, might organically arise out of social environs. In further exploration of this social phenomenon, Wenger, McDermott and Snyder state that the CoP is comprised of "three fundamental elements: a *domain* of knowledge, which defines a set of issues; a *community* of people who care about this domain; and the shared *practice* that they are developing to be effective in their domain" (p.27). This set of elements provides the key to

identifying a CoP and are the structural elements that guide the understanding of a CoP here. Where a CoP is said to exist, these three elements must be present.

Online community of practice (online CoP). The terms 'online CoP' or 'virtual CoP' are used interchangeably within this study. Both terms are used to refer to a CoP in which members participate within the community through communication and interaction "supported by collaborative technologies in order to bridge time and/or geographical distances" (Von Wartburg, Rost, & Teichert, 2006, Introduction section, ¶1). However, the existence of online communication and interaction does not dictate the existence of a CoP. The three aforementioned defining elements of a CoP (domain, community, and shared practice) must exist for the online community to be considered an online CoP (Wenger, McDermott, & Snyder, 2002).

Network of CoPs. For the purposes of this research, this term defines a system of CoPs where communities function individually as their own contained CoP but exist within a software platform that supports multiple co-existing CoPs. As an example, the CoPs sampled in this study are part of a larger network, ConNEXUS. ConNEXUS provides a single platform supporting multiple CoPs accessible to its members. The use of the term within this study is not to be confused with the terms *network of practice* or *informal network* which derive from network analysis and describe a social grouping less formalized than a CoP (Wenger, McDermott, & Snyder, 2002).

Professional learning community (PLC). Within educational spheres, the term PLC has been widely used and largely misunderstood. This definition is included here to clarify the relationship (or lack of relationship) between a PLC and CoP. The PLC model refers to a school

community whose staff are committed to school improvement through a collaborative approach that is dedicated to student learning (as opposed to students being *taught*) and a focus on results established through assessment and evidence of student achievement and school improvement (DuFour, 2004). Implementing PLCs within a school can often result in the formation of one or many CoPs within the school; however, a PLC does not necessarily exhibit the defining elements of a CoP and cannot be assumed to exist and function as a CoP.

 Legitimate peripheral participation. The concept of legitimate peripheral participation comes from Lave and Wenger's early work which continued and later developed the CoP model. As communities develop around shared interests and, through their social exchange, develop a shared practice, Lave and Wenger (1991) found that members participate in community interaction to varying degrees. Often, newer members do not participate as intensively as more experienced members as they are not as familiar (in general) with the social norms, activities, and practices of the group. As these members grow in their understanding of the community norms, activities, and practices they will grow in their identification with the group and their interaction will also grow in intensity. Moving through a less intensive, peripheral membership to a more intensive, full membership is a learning trajectory by which members learn through social negotiation within a community. When a member is located on the periphery of the community and is less actively engaged with the group, this form of membership is no less legitimate than a member with intensive activity and full membership within the community. Thus, peripheral participation is a legitimate form of membership within a CoP and is a necessary part of the learning process (Lave & Wenger, 1991).

School culture. School culture tells the members of the school 'how things are done'. It defines what is normal and moral and what is valued and believed by the group. Within a school setting, culture is the personality of the school and is much deeper than a set of school policies. School culture dictates how members act and what they value —and is a powerful force within a school (Gruenert & Whitaker, 2015).

Limitations

This quantitative study examining the factors that influence perceptions of community effectiveness and satisfaction measures the affective response of members to their online CoP experience. The scope of this study does not address CoP characteristics impacted by the collaborative technologies used to support the community nor does it address CoP experiences in face-to-face or blended interactions between members. Furthermore, the sample for this study is limited to a CoP of educators within the United States teaching in schools that are members of the Association of Christian Schools International (ACSI). The external influences examined in this study are all related to characteristics of educators' professional lives within a school and, therefore, are not generalizable to CoPs outside of education. However, the results of this study and, more specifically, the findings related to the influence of external factors on perceptions of CoP experience may underscore the importance of considering these factors within the study of CoPs and necessitate further research with a sample population more professionally diverse.

Summary of the Study

This quantitative research study seeks to add to the body of research empirically examining the effectiveness of CoPs as perceived by its members. In this study, the researcher seeks to confirm the influence of characteristics within the CoP on member perceptions of efficacy and their satisfaction with the CoP experience as established in previous research. Further, the influence of external factors existing outside of the CoP but present in the professional lives of community members, specifically the members' sense of professional isolation, their personal dispositions toward learning, and the awareness of their school cultures' valuation of professional growth as perceived in peers and administration, is examined to advance understanding of CoP effectiveness and member satisfaction. This study will contribute to the body of research on CoP effectiveness and seeks to fill a gap identified in the literature on research that seeks to 1) measure the effectiveness of a CoP from the perceptions of members, and 2) examine the influence of factors existing outside of the CoP and in the lives of CoP members.

CHAPTER 2

LITERATURE REVIEW

Introduction to the Literature Review

One of the distinguishing traits of a profession is the expectation that members of the

profession will continue to learn and grow as they practice. Across trades, associations and

varying bodies of professionals, one commonality is the need to continue learning and stay

current in best practices. How this is achieved varies across professions; it is interesting to note

that many of these professions (e.g. doctors, teachers, plumbers) require an element of "on the

job training" before one is considered a professional. Doctors must complete residencies,

teachers engage in student teaching, and plumbers spend time in apprenticeships before any of

these workers are licensed and considered professionals. This requirement seems to stem from

beliefs about how these professionals become immersed in and identify with the profession –

that some degree of professional practice is learned in context – and that this contextualized

learning process is both a social and participatory one.

Recent research in learning theory emphasizes learning as a social and participatory

enterprise and recognizes learning as a byproduct of social interaction (Lave & Wenger, 1991).

As modern learning theory, particularly workplace and organizational learning, shifts

perspective from a more traditional view of learning as knowledge acquisition to a view of

learning as social participation, called social learning theory, a parallel shift is occurring in

practice (Hodkinson & Hodkinson, 2003; Lave & Wenger, 1991; Putnam & Borko, 2000). The

past two decades have increasingly seen social learning initiatives in business as a response to

changing conditions in the workplace - economic pressures, downsizing, globalization,

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competition, and technology – driving them to explore methods of managing organizational knowledge and providing social spaces for professionals to learn and engage socially around professional practice (Chindgren, 2005; Hemmasi & Csanda, 2009). The business and corporate world are not alone in this endeavor, as educational examples describe institutions of learning responding to similar drivers and pressures within the educational system (Admiraal, Lockhorst, & van der Pol, 2012; Booth, 2012; Dalgarno & Colgan, 2007; Hur & Brush, 2009).

Assertions from scholars and researchers on the value of social learning for managing and dispersing organizational knowledge fuel initiatives throughout the professional world to implement social learning theories through communities of practice (Wenger, McDermott, & Snyder, 2002). These assertions, and the recognition that communities of practice (CoPs) are uniquely well-suited to meet distinct challenges in educator professional development, guide this research. This study originated from the observation of an online network of CoPs for educators and the researcher's premise that factors contributing to how users viewed the success and efficacy of the community are not limited to only those factors existing within the community. In formative discussions on CoPs, Wenger (1998) states, "communities of practice cannot be considered in isolation from the rest of the world, or understood independently of other practices" (p. 103). The objective of this study is to explore implementations of CoPs for educators to determine how characteristics within and external to the community impact users' perceptions of the CoP, namely, its effectiveness as a means of professional community.

The remainder of this literature review provides a theoretical foundation for this study. This review will examine the foundation that social learning theory provides for the CoP framework as a construct of learning in community, next an examination of the CoP model will

give light to the structural elements of a CoP which later will be shown to complement educator

professional development as well-fitted solutions to its challenges. A review of CoP

applications provides insight into how industry and education have sought to improve

knowledge management and professional learning by connecting professionals within CoPs and

provides specific examples of CoP in professional practice.

A Community of Practice Framework

The term "community of practice" first appears in Lave and Wenger's (1991) exploration

of learning from a situated perspective. From this perspective they view learning as an

exchange that occurs through social participation. When individuals actively participate in a

social environment where they form relationships and exchange information around a common

interest, their participation in this context results in learning and identity formation. From this

perspective, knowing and learning is situated within physical and social contexts, it is social in

its exchange, and it is distributed across people and through the tools and resources they use

and create (Lave & Wenger, 1991; Putnam & Borko, 2000).

Situated Learning

Formalized learning —whether in an institution dedicated to the pursuit or in a

professional learning capacity—often occurs outside of the context where the learned

knowledge will be used or applied and is primarily a solitary pursuit. Wenger (1998) writes:

> Our institutions, to the extent that they address issues of learning explicitly, are largely
> based on the assumption that learning is an individual process, that it has a beginning
> and an end, that it is best separated from the rest of our activities, and that it is the
> result of teaching…To assess learning we use tests with which students struggle in one-
> on-one combat, where knowledge must be demonstrated out of context,
> and where collaborating is considered cheating (p. 3).

In contrast to the assumption that learning is the transmission of knowledge from one individual to another, Lave and Wenger (1991) reframe learning as "an integral and inseparable aspect of social practice" (p. 31). Rather than a transactional exchange, they identify learning as a component of engaging in social practice. Through their study of apprenticeship and situated learning, Lave and Wenger (1991) further assert that learning is not simply contextualized in social practice but rather it is integral to social practice and an individual's participation in a community with which they engage.

Grounded in the construct of knowing as: situated in context, social, and distributed (Putnam & Borko, 2000), the foundation of the community of practice (CoP) model is built on the assertion that learners engage socially in communities and that their participation in these communities leads them to construct and renegotiate their identity in relationship to the community. As a learner engages with other community members, they exchange information and knowledge around interests that bring them together as a community. This exchange leads members to continuously negotiate their identity within the community as they move about it (Lave & Wenger, 1991; Wenger, 1998).

A community member may begin their "membership" in the community with shared interest but little knowledge or understanding of the shared practice within the community. Continued involvement and social participation within the community leads the member to a greater understanding of the shared knowledge and practices around the community's interests. This movement from marginal knowledge and understanding toward a more fully realized understanding and involvement in the community's negotiation of practice and a strengthened sense of identity with the community constitutes learning through social

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engagement. Lave and Wenger term this movement and negotiation of identity within the community as legitimate peripheral participation which moves toward full participation within the community (Lave & Wenger, 1991; Wenger, 1998).

In contrast to what one might assume, a community does not exist around a center of participation; rather, a community is comprised of members who participate across a continuum of engagement from peripheral to full participation within community activities. To say that a community member is peripheral does not imply a lack of connection, membership, or interest but that the member's level of participation in community activities is less than the community-defined levels of fully participating members. The social exchanges between members which develop identity and distribute knowledge among them move members along the continuum of participation in the community and exist as a learning trajectory that changes the shared practice of members (Barab, Barnett, & Squire, 2002). As members learn and develop relationships within the community they move across the continuum of engagement from legitimate peripheral participants to full participants (Barab, Barnett, & Squire, 2002; Lave & Wenger, 1991).

A Community of Practice Model

As social beings, humans naturally engage in communities with others around something that they hold in common. Realistically, CoPs have existed for as long as people have gathered together. According to Wenger, McDermott and Snyder (2002) "they were our first knowledge-based social structures…" through which people shared, innovated and solved the problems of the day (p. 5). There is a difference between a group of people with a common interest and a CoP, however. This difference is found in the shared purpose and a sense held by

community members that their efforts are "about" something. Their shared interest prompts active involvement with one another and the degree to which they care about this interest develops a commitment, both to their interest and one another, shaping their individual and group identity and setting the community apart from a less cohesive and purposeful group or network of relationships. The differences between a CoP and an ambiguous group are the key elements in the structure of a CoP (Snyder, Wenger, & Briggs, 2004; Wenger, McDermott, & Snyder, 2002).

CoPs are identified through three structural elements: domain of interest, community (relationships), and shared practice (Wenger E. , 1998). As structural elements of a CoP, the domain, community and shared practice help to define the community for members and non-members alike. These elements are also instrumental to the success of implementing CoPs within professional contexts for learning and knowledge management.

The domain of interest defines common ground for members and gives their community purpose and value with which members can identify (Wenger, McDermott, & Snyder, 2002). Cadiz, Sawyer, & Griffith (2009) add to this definition of domain with the notion that the domain may also include a shared vocabulary among members further establishing a sense of identification with the community and domain, while also delineating community boundaries between members and non-members. Individuals are initially drawn into a community by their concern for the domain and are sustained by the cohesion and sense of purpose it provides to the community (Gray, 2004; Wenger, McDermott, & Snyder, 2002).

Community pertains to the relationships formed between members that allow them to interact around the domain. As community strengthens, the sense of trust and mutuality

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between members allows for increased knowledge sharing and learning from one another

through vulnerability and belonging (Wenger, McDermott & Snyder, 2002). Open

communication is key to community building through the interaction of members and is built

upon notions of trust (Cadiz, Sawyer, & Griffith, 2009; Hoy & Tschannen-Moran, 1999; Usoro,

Sharratt, Tsui, & Shekhar, 2007).

Shared practice, the exchange of knowledge, information, ideas and resources around

the topic of the domain, comprises the body of knowledge that is developed and maintained

through social interaction within the community about the domain (Admiraal, Lockhorst, & van

der Pol, 2012; Wenger, 1998). As community members join and move within the community

this sharing of practice takes on various forms: members engaging with new information may

develop new methods of practice, tools and resources or solutions to problems experienced by

members of the community (Wenger E. , 1998). New members may benefit from an exchange

of best practices from older members who remember and share previous lessons learned

within the community (Cadiz, Sawyer, & Griffith, 2009). Through community interaction

members improve their practice and grow in knowledge of the domain and it is this strength of

the community that identifies CoPs as useful for learning and knowledge management

(Chindgren, 2005; Baran & Cagiltay, 2006; Snyder, Wenger, & Briggs, 2004).

Implementing Communities of Practice

Industry and education are similarly drawn to CoPs as solutions to challenges of

knowledge management and learning within the workforce. While entities within industry and

education may have different business purposes, their implementations of CoPs frequently

address similar issues of knowledge management and learning within their respective professions. As such, this review of CoPs bridges industry and education including examples of CoP implementations from both to gain a richer understanding of CoPs in general; following a more general exploration, this review delves more specifically into educational CoP implementation and the more specific characteristics of CoPs within the educational context.

One of the challenges within a workforce is the ability to manage the knowledge held by the corporation, school, or other entity collectively – but residing within the individual employees. While some of the employees' knowledge can be codified into documents and resources through which others may learn, tacit knowledge is elusive in that it is unable to be codified and communicated easily (Droege & Hoobler, 2003). Tacit knowledge is 'embodied expertise' and shared through less formal processes of storytelling and conversation and through the relational exchange between coaches, mentors and apprentices (Wenger, McDermott, & Snyder, 2002). This tacit information commodity is often the more valuable aspect of knowledge and the one most frequently lost through employee turnover. Recognizing this weakness, many employers are turning to CoPs to help reduce the loss of expertise they experience from an aging workforce reaching retirement and an increasingly transient and distributed workforce.

When faced with a transitioning workforce, supervisors and human resources personnel must consider how they might transfer the accumulated knowledge and expertise of a retiring workforce to new, less experienced workers. Fortunately, research provides examples of CoPs implemented for the distinct purpose of overcoming knowledge management and labor issues. For example, NASA implemented a CoP (although they did not specifically identify it as such)

through their *Academy of Program and Project Leadership* (APPL). This effort sought to distribute the expertise and problem solving capabilities of NASA's aging workforce who had developed significant expertise through recent decades of investment in NASA's programs. This CoP took shape in face-to-face meetings and forums for story-telling and reflection – as well as interviews with project leaders – in an effort to pass on this expertise to the rising leaders within the agency and preserve the agency's collective knowledge capital (Chindgren, 2005).

State Farm Insurance Companies also sought the benefit of a CoP to help connect their distributed workforce. With employees across the country, State Farm recognized the company's inability to efficiently distribute best practice and expertise across the organization due to the isolation of its employees. By implementing a network of CoPs through the use of technology, members are able to share practice - exchanging knowledge and providing support – through technology-enabled activities like document sharing, web conferencing, and email (Hemmasi & Csanda, 2009). By connecting employees, State Farm is able to increase each individual's capacity for knowledge and experience about their practice.

Each of these examples demonstrates common knowledge management issues that may be addressed by implementing CoPs. Each of these instances evidenced the three key structural elements of community, despite the fact that the actual methods for implementing the CoP were quite different – particularly in regard to their physicality. Knowledge sharing and connecting community members is not limited to physical spaces and can readily expanded through online platforms and social technology.

The introduction of the CoPs framework in the early 1990's was timely in that it coincided with the rapid growth of technology and specifically, the Internet. The Internet and

its networking of computers and devices has left very little in modern culture untouched, having been adopted into the fabric of daily life for much of the world through computers and personal electronic devices, such as iPhones. As such, CoPs have similarly assimilated technology into their practice – or have been assimilated by it – and the benefits of such adoption are powerful (Snyder, Wenger, & Briggs, 2004). In the examples above, both NASA and State Farm endeavored to distribute knowledge among employees. In NASA's face-to-face implementation, much of the knowledge shared through storytelling and discussion was limited to listeners who were physically present. While this enabled knowledge sharing among employees in the same physical location, that knowledge was limited in its distribution both in time and space – it was passed down but remains embodied in the employees, rather than technologically archived for other employees in a variety of locations across time. With State Farm's implementation through technology, information was distributed among a geographically dispersed community but it was also captured through the technology making the information available beyond the limitations of time and space (Hemmasi & Csanda, 2009). The advantages brought by communities connected through technology are significant as they enable knowledge sharing to be made available to the organization-at-large across time and space.

Just as CoPs have naturally and spontaneously formed with the gatherings of practitioners around their shared interest throughout time in a face-to-face context, they have also spontaneously arisen online when groups of people gather through technology to mutually engage and share around a common interest. Barab, MaKinster, and Scheckler (2003) provide a definition of online CoPs that relates well to Wenger's earlier 1998 definition but is also well

adapted to describe current examples of online CoPs; a CoP is "a persistent, sustained social network of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history and experiences focused on a common practice and/or mutual enterprise" (p.238). In the current online environment, this definition provides a clear point of distinction between a community that forms online around mutual enterprise and the loose connections formed by individuals simply seeking resources or solutions who become loosely connected through intersecting activity on a website or online forum. It is the collaborative activities occurring between peers that build their practice – skills, knowledge and resources – and that uniquely form their identity as a community (Schlager & Fusco, 2003; Snyder, Wenger, & Briggs, 2004).

Preece (2001) describes some of the earliest online communities forming on the internet through UseNet groups, bulletin boards, chats and list servers. Online CoPs have advanced along with technology in the sophistication with which the members connect. However, the structural elements identifying CoPs - domain, community, and shared practice - are found even in these earliest examples (Preece, Nonnecke, & Andrews, 2004). The literature provides many examples of communities forming online around their unique interest domain and these communities are being studied to gain a greater understanding of how the communities interact and the behaviors and qualities they exhibit for the purposes of community, learning, and support. From understanding the factors that determine the usability and sociability of the diverse networks of communities in Microsoft Network's (MSN) bulletin board communities (Preece, Nonnecke, & Andrews, 2004) and studying the reasons that users participate in similar high ranking virtual communities in Taiwan (Lin, 2006), to exploring the

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reasons users continue to participate in the task-oriented communities forming in the last

decade through Amazon's Mechanical Turk in the US and China's Taskcn.com (Sun, Fang, & Lim,

2012), each of these communities connects individuals around a domain and through their

practice, and evidences the structural elements of CoPs. Through the study of these

communities, researchers gain greater insight into how communities form and the factors

involved in their success.

Industry and the Internet provide a number of examples of CoPs that came to exist

intentionally through planning and implementation or spontaneously through the serendipitous

connections made by practitioners. Similar examples of intentional and spontaneous CoPs exist

in the field of education. The literature provides a number of CoP examples within education

occurring in face-to-face contexts as well as online – and even blended communities with

interaction that incorporates both components of face-to-face and online engagement.

Within the school setting, teachers frequently engage in collegial relationships formed

through the structure or hierarchy of the school. Teachers are grouped in grade level teams,

departments, and even subject areas depending on the age level and instructional approach of

the school. These groupings can function as CoPs; however, the imposed hierarchical structure

of the school which facilitates these groupings does not necessarily predict or ensure that a CoP

will naturally form (Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012). While a shared

domain of interest may exist around a subject area or the age of students taught and the

proximity of their daily work forms greater and lesser degrees of collegial relationship, without

mutual engagement in shared practice to improve skills and knowledge, a CoP does not take

shape. Thus, in a single school there may be highly active CoPs in certain departments or grade

levels, while others fail to coalesce (Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012; Hodkinson & Hodkinson, 2003).

A significant challenge for teachers, ironic as it may be, is the isolation they experience within a classroom filled with students. Many teachers feel isolated from their peers due to the limited time they have to engage with colleagues (Darling-Hammond & Ball, 1997). Similar to the 'silo effect' that occurs in industry across a geographically distributed corporation, teacher isolation prevents teachers from sharing practice – engaging in knowledge sharing that would not only bring about improved practice but also pass on the tacit knowledge of more experienced and master teachers to new and less experienced teachers in the same school (Hartocollis, 2000). Increasingly, leaders in education are exploring CoPs in an effort to connect and expand the learning opportunities of teachers.

In recent years, Professional Learning Communities (PLCs) have become increasingly popular as methods for establishing CoPs focused on the professional growth of teachers (Snow-Gerono, 2005; Wood, 2007). With time limitations in a teacher's day, much of a teacher's professional learning occurs outside of the school day – from a situated perspective on learning, this is less than ideal (Hodkinson & Hodkinson, 2003). PLCs seek to re-contextualize teacher learning by bringing teachers together within the school to engage in analysis and discussion of practice (Hodkinson & Hodkinson, 2003; Snow-Gerono, 2005). Many PLCs exist as CoPs in face-to-face implementations within a school setting; however, other PLC/CoP initiatives combine elements of face-to-face engagement with the advantages of technology-supported communities –a blended CoP– in an effort to benefit from the advantages of both. Vavasseur and MacGregor (2008) studied middle school teachers engaged

in a blended form of community. These teachers participated in both face-to-face bi-weekly training sessions as teacher teams and an online CoP provided to encourage collaboration and support as they engaged in professional learning. The results of this study showed that within the two contexts that formed this CoP, face-to-face and online, teachers engaged in shared practice and community building – developing new ideas and problem solving as well as encouraging and supporting their peers. Similar implementation and results are found in a blended community for pre-service teachers (Goos & Bennison, 2008).

Online or virtual CoPs pervade the literature and provide numerous opportunities for researchers to explore CoPs. University researchers concerned with improving science education in Brazil formed a virtual CoP involving biology teachers and biology education researchers intent upon building relationships between the participants and thereby bridging the research to practice gap in science education (El-Hani & Greca, 2013). Other examples demonstrate the various implementations across educational domains and practitioners. Briefly these examples include online CoPs implemented for novice elementary math teachers (Dalgarno & Colgan, 2007), a large and mature online network for teacher support and resource sharing (Schlager, Farooq, Fusco, Schank, & Dwyer, 2009), a biology-focused community to bridge the gap between science teachers and researchers in Brazil (El-Hani & Greca, 2013), online communities supporting teachers in Australia (Duncan-Howell, 2010), a community supporting the professional growth of teachers engaged in an Information and Communication Technologies (ICT) program (Prestridge, 2010), a teacher electronic mailing list (Hew & Hara, 2007), three self-generated online communities for teachers (Hur & Brush, 2009), and other seemingly successful online teacher communities (Booth, 2012; Lin, Lin, & Huang, 2008). As

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CoPs in education, these online examples provide similar benefits as those CoPs implemented online in industry for knowledge sharing and exchange of best practice. The literature provides a growing body of knowledge as to the specific advantages gained in education through these implementations (Booth, 2012).

<div style="text-align:center">Educators' Professional Development in Communities of Practice</div>

Increasingly, scholars and researchers claim the value of CoPs in education. Research literature detailing the impact of educational implementations of CoPs provides insight into how the challenges of education can be addressed for educators in community (Piazza, McNeill, & Hittinger, 2009). These claims assert the merits of CoPs for contributing to and supporting the professional development of teachers and advancing the educational objectives of the school through improved teaching practice (Admiraal, Lockhorst, & van der Pol, 2012).

For many years in the field of education, educators have engaged in professional learning or professional development through conferences, workshops and in-service trainings (Schlager & Fusco, 2003). A significant criticism of these traditional methods for teacher professional development is that they instruct teachers in a context removed from their practice. When teacher instruction is decontextualized and the instruction is not tied specifically to pedagogy or student achievement, it is largely ineffective (Glazer & Hannafin, 2006; Swan, et al., 2002). These professional development efforts are often fragmented, focusing on content areas, rather than on teaching practice (El-Hani & Greca, 2013). It is an interesting paradox that teachers begin their career by learning in context – they must engage in apprentice-type learning through student teaching situated in the context of the school

classroom for, "learning about teaching is fundamentally different from learning through experiences of actual teaching" (Hung, Chee, Hedberg, & Seng, 2005). Yet once these teachers are licensed and considered professionals, their professional learning becomes decontextualized and they must struggle to remain connected and engaged with colleagues and fellow practitioners (Lave & Wenger, 1991).

In contrast to this form of professional development which removes teachers from their practice, forms of professional development that demonstrate effective learning are those that allow teachers to engage with one another through shared best practice and knowledge (Garet, Porter, Desimone, Birman, & Yoon, 2001; Hew & Hara, 2007). Teaching and learning benefit from teachers collectively analyzing their practice and examining new methods and ideas while mutually supporting one another's growth as professionals (Admiraal & Lockhorst, 2011; Poekert, 2012). These research-defined characteristics of effective professional development parallel the defining structural characteristics of CoP – the domain, community and shared practice (Wenger, 1998). Thus, teacher professional learning is effective when it allows teachers to engage with one another around teaching practice (domain), provides teachers with mutual support (community), and enables them to exchange best practices and examine new ideas in teaching (shared practice). CoPs, by their defining characteristics, inherently provide teachers with a foundation for building successful professional learning opportunities where teachers may engage in collaborative learning through shared experience, knowledge, and understanding (Little, 2002; Swan, et al., 2002; Wenger, 1998).

Teachers engaged in CoPs share knowledge about their practice and both formally and informally seek opportunities to share experience (Dalgarno & Colgan, 2007). Teachers often

engage in their own independent learning as they search for new strategies and ideas and improve their practice through engaging in practice, by "trial and error" (Hodkinson & Hodkinson, 2003). When these teachers are connected within a collaborative community however, their independent efforts of gathering new ideas and concepts gain new heights when they are shared within the community and given the benefit of applying experience, context, interpretation and the sustainment that is found for knowledge within a community (Baker-Doyle & Yoon, 2011). Communities that include practitioners with varying degrees of experience – from new teachers to experienced, master teachers – increase their knowledge base and draw upon a significant commodity as participants construct and interpret new knowledge within the community (Admiraal, Akkerman, & de Graff, 2012). When this shared knowledge is implemented within practice and creates change that becomes part of their practice, then the practitioner is partaking in valid professional development (Hadar & Brody, 2012).

By definition, professional development must cause change in practice for development to occur. Simply acquiring knowledge that does not lead to change is not sufficient development (Hadar & Brody, 2012). In this way, teachers advance their practice and grow individually and as a community. The support system provided through learning within a community can be instrumental to moving one through the learning process that transforms knowledge into changed practice (Wenger, McDermott, & Snyder, 2002). Hadar and Brody (2012) found that learners engaged in professional development move through four emotional stages, curiosity, withdrawal, awareness and change. In the initial curiosity stage, learners feel enthusiasm and anticipation for the learning and growth opportunity ahead. However, as new

ideas are presented learners often feel resistant to change and instead withdraw from the learning process. While some will persist in the withdrawal stage for a period, or indefinitely, others move into awareness where they recognize the value of the new ideas they originally encountered. Finally, as learners adopt the new ideas they result in changes of behavior and practice (Hadar & Brody, 2012). In these stages, the support of community can be the key to an individual's success of moving across the stages toward change (2012). Shulman and Shulman (2004) provide a distinct picture of the growing and developing teacher as one who is both teacher and learner and engaged in this type of collaborative learning… "an accomplished teacher is a member of a professional community who is ready, willing and able to teach and to learn his or her teaching experience" (p. 259). Research demonstrates that CoPs provide educators with contextualized learning through knowledge sharing – in the midst of practice – and with support from colleagues. The CoP empowers educators to engage with one another around their practice (domain) in a social form that supports the development of connection and engagement among them (community), and enables an exchange of knowledge from which they learn and grow (shared practice). Through their defining structural elements – domain, community, and shared practice – CoPs naturally give form to effective professional development.

Online Communities of Educators in Practice

As the previously provided examples of online CoPs for teachers might indicate, the benefits of CoPs – providing a space for contextualized, reflective learning and the exchange of new ideas in a mutually supportive professional community – in teacher professional development do not appear to dissipate in the online environment. Rather "social networking

technologies offer new opportunities for educators around the world to create and engage in online CoPs that, like face-to-face CoPs, can increase communication, collaboration and support among teachers" (Booth, 2012). Teachers engaging in online communities are responding to similar desires and interests as those engaged in face-to-face communities, that is, the opportunity to share professional knowledge and engage in discussion and mutual support within a community of like-minded practitioners (Duncan-Howell, 2010). The online context, however, provides particular advantages over face-to-face communities in their ability to connect practitioners to resources and colleagues in ways that overcome barriers to teacher isolation, time and financial resources.

Barriers to Educator's Professional Development: Isolation, Time, and Funding

Most teachers spend their working day isolated from colleagues and without opportunity to engage professionally with peers (Darling-Hammond & Ball, 1997). Even in large schools with high numbers of faculty and programs attempting to provide mentoring and connection among staff, the challenges of time and school-day schedules prevent significant advances in combatting isolation (Hartocollis, 2000). Developing practice requires teachers to engage in reflection and interaction with colleagues, however, when teachers become isolated, so too does their pedagogy. Isolated teachers become closed off to reflection and have limited opportunity to increase their knowledge, tools and resources – which further limits opportunity for innovation in the classroom (El-Hani & Greca, 2013). Riel and Becker (2000) found significant differences in teachers who were professionally connected and engaged in educational communities and those who engaged in "private practice" and remained professionally isolated. Professionally engaged teachers more frequently demonstrated

collaborative instructional strategies in their own classrooms compared to their isolated counterparts' direct instruction techniques. It would appear that the learning cultures teachers create in their classrooms is a direct reflection of their own approach to professional learning and their collegial relationships.

Online CoPs provide teachers with the opportunity to overcome isolation in their day-to-day practice by connecting with other educators online and in often-asynchronous contexts supporting their overburdened schedules (Gray, 2004). Teachers connecting online to find support and shared practice with other teachers find the online context not only provides connection, but provides it with immediacy, in the speed with which they receive responses and solutions to posed questions and discussion (Duncan-Howell, 2010; El-Hani & Greca, 2013). The connection found within these communities provides educators with access to resources that might otherwise be out of reach. These elusive resources may be the knowledge held by others; this was the case for practitioners and researchers connected through ComPratica for the purpose of bridging the research to practice gap in science education (El-Hani & Greca, 2013). Resources educators seek in online CoPs might also be tools and other artifacts that, due to geographic or financial limitations, would otherwise remain out of reach (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; Schlager, Farooq, Fusco, Schank, & Dwyer, 2009).

Booth (2012) suggests that the very purpose of online CoPs is to provide educators with access to the "content, resources, data, information, peers and expertise they need to be highly effective" (p. 2). Educators in CoPs demonstrate the behaviors of seeking out access to high quality expertise and resources within the community (Dalgarno & Colgan, 2007). The

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aforementioned speed at which they receive responses and solutions from the community (Duncan-Howell, 2010) allows them to engage in information seeking within the community on a "just-in-time" basis – seeking the information they need as the need is evidenced (Granger, Morbey, Lotherington, Owston, & Wideman, 2002). This information seeking behavior is in contrast to the previously mentioned approach to professional development which is decontextualized from practice and focused on content rather than practice that Hew and Hara term "just-in-case" information (2007). Granger, et al. find through their research that it is more useful for educators to engage in "just-in-time" informal learning (2002) and that these types of informal exchanges occurring in CoPs can be significant in empowering improved professional practice (Hew & Hara, 2007; Schlager & Fusco, 2003).

Informal sharing and particularly professional dialogue within communities increases teachers' feelings of community and extends their experience beyond their current context and experience (Duncan-Howell, 2010). Professional discourse is a key form of knowledge sharing exchanged in communities and is instrumental to improving practice and gaining new understandings through reflection (Snow-Gerono, 2005). It is important to recognize that this discourse also provides community members with an important element of emotional support which indicates a higher level of cohesion within the community (El-Hani & Greca, 2013). Informal teacher discourse often begins with teachers' sharing their feelings about daily school life (Routman, 2002). Hur and Brush (2009) assert that emotion and cognition are intricately linked and that their co-existence in a community is expected as teachers work through challenges and successes in practice – it may also be a contributing factor to why teachers participate in CoPs.

The value of this type of emotional sharing within a community might be more fully realized when viewed from the social perspective adopted by Admiraal et al. (2012) which indicates that a community should meet the user's needs and be focused more on the social value of the community as opposed to its "professional output." They conclude that building community can be a significant element of teacher professional development. Dialogue that supports knowledge sharing and emotional support within a community also contributes to the community's exploration of their shared practice and the developing sense of professional identity. This sense of community derived from members' commitment to, and concern for, the domain, provides cohesion within the community and a sense of belonging to its members (Gray, 2004; Wenger, McDermott, & Snyder, 2002).

Connection and professional learning obtained through CoPs are significant benefits of educators' use of such communities and again, the strength of online CoPs extends these benefits beyond those realized in face-to-face communities. It was previously mentioned that traditional professional development methods (in-services, workshops, etc.) remove teachers from the context of their practice and while this is a barrier to learning in its own right – it is significant that these methods of professional learning also remove teachers from practice, literally. For teachers to attend workshops and in-service trainings, they must leave the classroom. Many teachers are reluctant to miss class-time due to the demands of curriculum timelines and the planning required for them to be absent. Administrators are similarly reluctant to lose instructional days and to increase the financial burden of paying for substitute teachers. Similar concerns exist for administrators' financial limitations of funding professional development from budgets tied to school improvement plans and without means of funding

teachers' self-directed professional development goals. For these reasons, much of teachers'

professional learning is relegated to their free time – evenings, weekends, and holidays – and

often to their own personal budgets (Hodkinson & Hodkinson, 2003).

CoPs, by the very definition of their structural elements, lend themselves to effective

professional development for educators as it empowers them to engage with one another

around teaching practice (domain), provides educators with mutual support (community), and

enables them to exchange best practices and examine new ideas in teaching (shared practice)

(Little, 2002; Swan, et al., 2002; Wenger, 1998). In online contexts, the benefits of CoPs are

extended and amplified as they create exponentially greater opportunity for teacher

connection and access while overcoming barriers of isolation, time, and funding (Gray, 2004;

Hodkinson & Hodkinson, 2003). Barab, Barnett, and Squire (2002) provide a poetic description

of professional learning within CoPs,

> …meaningful learning brings together theory and practice, doing and reflection, the
> individual and community, in a manner that transforms all components. In the context
> of COT [a community of teachers], it is difficult to speak of meaning without speaking of
> practice, to speak of identity development without community development,
> or to speak of community involvement without speaking of learning (p. 530).

CoPs provide an advantageous environment where theory and practice reciprocally

contextualize one another (Barab, Barnett, & Squire, 2002) and where educators are provided

the opportunity to engage professionally in an environment that overcomes the challenges they

face in professional development.

Factors Affecting Communities of Practice and Educator Experience

Implementing CoPs within education frequently demonstrates successful platforms for teachers to successfully engage in professional development and mutual support through community (Booth, 2012; Hodkinson & Hodkinson, 2003; Snow-Gerono, 2005; Wood, 2007). However, not all communities provide the same degree of community engagement or clearly evidence the structural elements defining CoPs. Indeed, some communities fail to thrive for reasons that are convoluted and diverse (Farooq, Schank, Harris, Fusco, & Schlager, 2007; Ke & Hoadley, 2009). Some challenges to community development are more evident than others but within CoPs the issues of participation, knowledge sharing, and trust play important roles in the success of the community (Granger, Morbey, Lotherington, Owston, & Wideman, 2002; Lin , 2006).

Participation in Communities of Practice Over Time

Barab, MaKinster, and Scheckler (2003) define an online community as "a persistent, sustained social network of individuals who share…" (p. 238). For a community to exist there must be members who engage in that community and who persist in their engagement across time (Barab, MaKinster, & Scheckler, 2003). Certainly, there is a natural 'life-cycle' for CoPs, it is unreasonable to assume that a CoP once founded will continue without end (Wenger, McDermott, & Snyder, 2002). Wenger, McDermott and Snyder (2002) define this natural cycle of CoP development in five stages: potential, coalescing, maturing, stewardship, and transformation. Each stage is defined by the degrees to which members participate and the depth of knowledge shared between members. Taking into account that CoPs have a natural life-cycle, there are still questions as to why the natural lives of some CoPs persist for long

periods of time while others meet much earlier ends. Clearly, member participation is a necessary component to the life of a CoP and understanding the factors that encourage or discourage participation is important to understanding how to sustain a CoP.

Many studies seek to understand the characteristics of participation and factors that drive members to participate or not. While understanding the complexity of these factors and their impact on participation is challenging, each study provides its own contribution to identifying potential motivators and barriers to participation (Ke & Hoadley, 2009; Lin, 2006; Sun, Fang, & Lim, 2012). Research suggests that while community members may initially be drawn to a community out of interest and concern for the CoP's domain (Wenger, McDermott, & Snyder, 2002), members' initial reasons for participating in a community are not the same reasons that cause them to continue participating (Sun, Fang, & Lim, 2012). For example, an initial reason for participating in an early literacy CoP might be to improve practice in teaching young English learners; however, after being involved in the community for a time, this educator may find that their knowledge base now exceeds the knowledge shared within the community. The educator may continue to participate in the CoP now out of a sense of reciprocity and giving back to the community as opposed to the original desire to grow in their knowledge of early literacy (domain). Participation is also impacted by whether or not it is voluntary on the part of the member (Snyder, Wenger, & Briggs, 2004) and to the degree that members are able to pursue their own professional objectives within the community (Goos & Bennison, 2008). Despite the fact that online CoPs are able to overcome educator's time barriers to professional development, time is also indicated by some as a challenge to their participation in a CoP (Gray, 2004). There is strong support for the idea that a participant's

beliefs about their participation in the community (Bishop, 2007) and their attitudes toward

and perceptions about the CoP are predictors of participation (Lin, 2006). Similarly,

participatory experiences within the CoP also impact whether or not they will continue to

participate. CoP experiences that encourage the member's feelings of self-worth, autonomy,

and self-efficacy increase the likelihood that they will continue to participate (Granger, Morbey,

Lotherington, Owston, & Wideman, 2002; Lin , 2006; Sun, Fang, & Lim, 2012). Similarly,

negative experiences within the community, such as frustration with other members or

difficulty gaining access, are additional factors that discourage members from continuing to

participate (Wasko & Faraj, 2000).

Discouraging factors and their impact on member participation in CoPs are a tension

that CoP leaders and/or creators must manage in order for a CoP to be sustained and thrive. A

CoP cannot simply be established – one cannot build an online CoP and expect it to thrive – the

dynamics of participation are significant contributors to its success (Bishop, 2007; Booth, 2012).

While research is currently exploring the factors that impact participation dynamics, further

research is also needed to understand how to ensure a thriving community that meets the

needs of its members (Bishop, 2007; Matzat, 2013; Preece, Nonnecke, & Andrews, 2004; Tseng

& Kuo, 2014).

Knowledge Sharing and Trust in Communities of Practice

While participation is certainly a factor in the success or failure of a CoP, it is not the

only issue that affects the sustainment of a CoP. Returning to the definition of an online

community proposed by Barab, MaKinster and Sheckler (2003), an online community must have

sustained participation of individuals "who share and develop an overlapping knowledge base,

set of beliefs, values, history, and experiences focused on a common practice and/or mutual enterprise" (p. 238). Thus, knowledge sharing is elemental to the participatory activities of members in a CoP. If knowledge sharing ceases within a community, the CoP will decline and die out (Ardichvili, 2008); as such, fostering and sustaining knowledge sharing is a crucial challenge to sustaining CoPs (Hsu, Ju, Yen, & Chang, 2007; Prestridge, 2010).

As an aspect of shared practice, knowledge sharing is embedded in one of the defining structural elements of a CoP (Wenger E. , 1998). Recalling the examples of CoPs implemented in industry by NASA and State Farm, one of the identified strengths of a CoP in knowledge management initiatives like these, is its inherent ability to support tacit knowledge exchange between members. The CoP's ability to support the transmission of tacit knowledge - that is, knowledge that is highly intuitive, difficult to express and gained through experience - is a significant factor in the success of CoPs for powerfully enabling improved teacher practice (Droege & Hoobler, 2003; Granger, Morbey, Lotherington, Owston, & Wideman, 2002; Schlager & Fusco, 2003). By connecting members with shared interests, the CoP enables tacit knowledge sharing through "interaction and informal learning processes such as storytelling, conversation, coaching and apprenticeship" (Wenger, McDermott, & Snyder, 2002, p. 9). As community members engage in knowledge sharing and produce new understandings, tools and procedures, these ideas and artifacts can only be applied by those who also share in the tacit knowledge that existed around their production. Without the shared understanding of the explicit and implicit knowledge stemming from the needs of the members, these produced artifacts have limited use. CoPs enable meaningful practice through community activity

because they connect members who understand the "knowledge that" and "knowledge how" that produces it (El-Hani & Greca, 2013; Wenger, McDermott, & Snyder, 2002).

Understanding the factors that impact sustained knowledge sharing in CoPs is the subject of current CoP research which provides some insight into how and why it occurs. Bishop (2007) suggests that members participate in knowledge sharing within a CoP out of a desire to give to a community and this is mediated by their beliefs about their involvement with the community. Beliefs about knowledge as a commodity also seem to predicate its exchange within a CoP and determine whether individuals are motivated to share out of moral obligation or from an expectation of return (Wasko & Faraj, 2000). Baker, Doyle and Yoon (2010) found that whether or not a particular member is sought out for their knowledge is dependent more upon their mentoring qualities as opposed to their content knowledge. While these factors certainly play a role in knowledge sharing within a community, factors such as trust and connection between members may be even more significant (Tschannen-Moran, 2009).

Studies show that trust is an important facilitator and an integral component for knowledge sharing in CoPs. The notion of trust speaks to "a party's willingness to be vulnerable to another party based on the confidence that the latter party is benevolent, honest, open, reliable, and competent" (Tschannen-Moran, 2009, p. 233). Trust and knowledge sharing within a CoP form a reciprocal process through which they mutually reinforce one another (Ardichvilli, 2008; Booth, 2012; Lin, 2006; Usoro, Sharratt, Tsui, & Shekhar, 2007). As members engage in knowledge exchange within a CoP over time they develop social identities within the community and, informally, take on roles that establish an environment of knowledge sharing and trust (Booth, 2012; Usoro, Sharratt, Tsui, & Shekhar, 2007). Trust is important to member

integration and establishing the competence of members – and also increases their willingness

to partake in knowledge sharing. Members are more likely to engage in vulnerable dialogue

when they believe that the environment is trustworthy and also more willing to engage in

exchanging tacit knowledge when they trust that the source is competent (Levin & Cross, 2004;

Snow-Gerono, 2005). Trust is the basis for developing cohesive connections and the confidence

between members that forms community (Booth, 2012; Hoy & Tschannen-Moran, 1999).

The strength of connections formed between members in CoPs can also influence the

knowledge sharing that occurs between them. Communities with strong connections between

members, who share similar beliefs and values and come to know each other well, may become

closed to new ideas and concepts in their community knowledge sharing (Baker-Doyle & Yoon,

2011). However, these strong connections formed through shared experiences and beliefs also

provide members with a shared framework which enables them to process more complex

information and a social support system to adapt new ideas, make them useful to their context,

and sustain change in their practice (Baker-Doyle & Yoon, 2011; Hansen, 1999; Levin & Cross,

2004). When community members have weaker connections they are more likely to encounter

new, different ideas and resources, but without strong ties to assist in processing them they

may struggle to adapt them into practice ((Baker-Doyle & Yoon, 2011; Hansen, 1999). A CoP's

ability to process more complex nuanced information, based on the degree of member

connection, may provide some explanation for the ability of CoP members to engage in

knowledge sharing that moves beyond lower forms of reflective learning – often referred to as

sense-making – and into higher forms of critical reflective learning. CoPs demonstrating

members engaged in higher forms of critical reflection show promise that these communities

can engage in challenging their own previously held assumptions and analyzing their practices (Baker-Doyle & Yoon, 2011; El-Hani & Greca, 2013; Ng & Tan, 2009).

External Factors Affecting the Communities of Practice Experience

Wenger recognizes that "CoPs cannot be considered in isolation from the rest of the world or understood independently of other practices" (Wenger, 1998, p. 103). CoPs exist throughout society and are commonly found in the workplace (e.g., businesses, schools, and governmental agencies) such as those examples mentioned previously as CoP initiatives within State Farm and NASA. Research demonstrates numerous CoPs in education, occurring both intentionally and spontaneously in the lives of educators, physically within the school, and online (Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012; Hodkinson & Hodkinson, 2003). A CoP then must be considered within its context, recognizing that members participate, sharing knowledge and negotiating identity both which shape the CoP, in constellations of CoPs which often overlap in various (sometimes elusive) ways. The overlap between CoPs often includes shared members, artifacts, and discourses (Schlager & Fusco, 2003; Wenger, 1998). When community members participate concurrently in CoPs, these "interactions among local communities can affect their practices without an explicit sense of participation in a constellation" of multiple, overlapping CoPs (Wenger, 1998, p. 128). The effect of constellations of CoPs which "negotiate their place within the various constellations they are involved in…" (Wenger, 1998, p. 128) suggests that external factors such as culture, authority, and individual dispositions be considered in a broader examination of CoPs (Hodkinson & Hodkinson, 2003) to gain a better understanding of how these factors might affect the CoP member's experience.

Several studies in the literature suggest that the school culture in which a teacher is immersed daily, and which may function in its own right as a CoP, can significantly influence the educators' identity, beliefs, perceptions, and practice (Blumenfeld, Fishman, Krajcik, Marx, & Soloway, 2000; Glazer & Hannafin, 2006; Hodkinson & Hodkinson, 2003). Educators' perceptions of their peers will influence their engagement in collaborative learning (Glazer & Hannafin, 2006) while their perceptions of workplace learning conditions account for differences in the outcomes of their learning and engagement in learning activities (Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009). Similarly, school cultures that support professionalism, opportunities for sharing, and open communication are more likely to engage in collaborative, social learning endeavors and succeed in school reform (Ardichvilli, 2008; Blumenfeld, Fishman, Krajcik, Marx, & Soloway, 2000). School culture also impacts a teacher's dedication, effectiveness and sense of well-being and commitment (Drago-Severson, 2012). Hodkinson and Hodkinson (2003) found that a school with a highly collaborative working culture will also have a learning culture. These studies suggest that an educators' sense of the culture in which they work impacts their beliefs and actions and more specifically their engagement in learning and collaboration and is a considerable influence on the educator as a professional (Admiraal & Lockhorst, 2011).

While school culture influences teachers, the school administration's influence on school culture is also significant. According to the literature, principals are credited with the successful development of school cultures that support collaboration and reflection in the development of educators (Drago-Severson, 2012; Vavasseur & MacGregor, 2008). The leadership style of principals, and the degree to which they lead with an authoritarian style

(characterized by micromanaging behaviors, rigid procedures, prolific rules, centralized control and power in the administration) impacts the professionalism educators report in their colleagues and the trust they place in the principal (Tschannen-Moran, 2009). Perhaps most significant is the influence made by principals who model learning in their leadership (Drago-Severson, 2012) and who encourage teachers to engage in their own learning (Granger, Morbey, Lotherington, Owston, & Wideman, 2002) and their positive impact on the school culture for supporting teacher learning. Vavasseur and MacGregor (2008) found evidence through their study that principals not only influence school culture but that school culture similarly influences the online participation of teachers. This study extends the impact of culture and the influence of the principal beyond the context of the school and supports the need for further research of the wider contextual influences on a CoP (Hodkinson & Hodkinson, 2003).

A third factor to consider in how it may impact a CoP and the experiences of its members, is the impact of a member's personal dispositions. The literature has shown that members are shaped within the CoP through their experiences of knowledge sharing, trust, (Ardichvilli, 2008; Booth, 2012; Lin, 2006; Usoro, Sharratt, Tsui, & Shekhar, 2007) and their connections with members within the CoP (Baker-Doyle & Yoon, 2011; Hansen, 1999; Levin & Cross, 2004). However, CoP members engaged in negotiating practice and identity within the community (Lave & Wenger, 1991; Wenger, 1998) bring their own personal dispositions formed outside of the community with them as well. The literature suggests that these individual-related factors may include a member's beliefs and expectations of learning (Hodkinson & Hodkinson, 2003; Piazza, McNeill, & Hittinger, 2009), sense of self-efficacy (Hsu, Ju, Yen, &

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Chang, 2007; Vavasseur & MacGregor, 2008) and self-worth (Hur & Brush, 2009; Sun, Fang, &

Lim, 2012), attitudes and dispositions toward learning, and opportunities for learning (Bloomer

& Hodkinson, 2000; Riel & Becker, 2000) dispositions toward teaching (Hadar & Brody, 2012),

and for online CoPs an individual's proficiency with technology and attitudes about it

(Ardichvili, 2008).

The challenge in examining these dispositional factors lies in how intricately they relate

to CoP experience within the CoP but also how they are shaped and formed outside the CoP of

interest. The possibility also exists that an individual's dispositions are being influenced by an

overlapping CoP in which a member is concurrently participating (Wenger, 1998). Factors

impacting the educators' experience in a CoP are as complex and varied as the reasons why

some CoPs succeed and others do not (Ke & Hoadley, 2009). Understanding how external and

internal factors contribute to both member experience and CoP success will help communities

plan and implement measures for community success and sustainment. In turn, thriving and

successful CoPs will also advance educational practice advancing the efforts of educators

engaged in CoPs for professional development.

Measuring the Effectiveness and Success of Communities of Practice

Perhaps the most provocative statement in the discussion around measuring the

success and efficacy of CoPs comes from Preece in 2001 (p. 354), when she asks, "From whose

perspective is success being judged?" This question strikes at the heart of the debate over how

to measure CoPs – whether they are measured by externally quantifiable methods like products

and behaviors (Iaquinto, Ison, & Faggian, 2010; Preece, 2001) or by evaluating the less tangible

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effects of members like feelings of satisfaction and perceptions of efficacy (Cheung & Lee, 2009; Chiu, Wang, Shih, & Fan, 2011; Hemmasi & Csanda, 2009; Lin, 2006; Preece, Nonnecke, & Andrews, 2004). There are also those who assert that success must be measured by both the affective values of members' feelings and perceptions as well as evidences of behavior within the CoP (Admiraal, Lockhorst, & van der Pol, 2012; Bourhis & Dube, 2012; Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012). Early measures of success in online CoPs sought to establish engagement and the CoPs ability to serve its purpose by quantifying the messages between members and the depth of threads (Preece, 2001); however, most examples of current CoP research have moved away from these early methods recognizing that such simplistic quantification reveals little about member interaction practices (Lin, Lin, & Huang, 2008).

Researchers who favor measuring CoPs through both affective values and quantifiable behavior typically quantify behavior through products within the CoP that demonstrate the structural elements of a CoP – namely, activities that show knowledge sharing and community such as discussions where challenges are resolved through knowledge exchange, emotional support is provided to the member facing the challenge, and resources are shared to assist in the resolution (Admiraal, Lockhorst, & van der Pol, 2012; Bourhis & Dube, 2012; Brouwer, Brekelmans, Nieuwenhuis, & Simons, 2012). While it is reasonable to expect that member perceptions of efficacy and satisfaction with the CoP experience would be corroborated by behavioral evidence, an expert panel concluded that while they would expect both measures to exist in a successful CoP, they could not reach consensus on whether a CoPs success must be defined by both measures (Admiraal, Lockhorst, & van der Pol, 2012). In their measurement of

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a CoP using both the affective and behavioral measures, Brouwer, Brekelmans, Nieuwenhuis, & Simons (2012) found that the results of both measures were similar.

Those who believe the affective measures of CoP are valid means of assessment would also argue that the aforementioned expert panel stated that whether a CoP fulfills user needs is an indicator of its effectiveness and that these effective CoPs should be experienced as rewarding – both measures which can be perceived affectively (Admiraal, Lockhorst, & van der Pol, 2012). Adding to these claims, are the findings of Iaquinto, Ison, and Faggian (2010) that members of a CoP's openness about its shortcomings suggested their ability to honestly assess their community. Further, research indicates that member satisfaction has a significant impact on members' intention to continue participating in the CoP and recommend the experience to others (Cheung & Lee, 2009). These findings supporting the use of affective measures of CoP success and efficacy contribute to the growing number of CoP studies employing such methods (Cheung & Lee, 2009; Chiu, Wang, Shih, & Fan, 2011; Hemmasi & Csanda, 2009; Lin, 2006; Matzat, 2013; Preece, Nonnecke, & Andrews, 2004; Tseng & Kuo, 2014).

Summary

As professionals, there is an expectation that educators will continue to grow and learn in their professional knowledge and incorporate their learning as improvements in practice. However, educators' professional development efforts are frequently complicated by a number of barriers including isolation (Hartocollis, 2000), time (Gray, 2004), and funding (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; Schlager, Farooq, Fusco, Schank, & Dwyer, 2009). Rather than engaging in traditional forms of professional development complicated by

these barriers, removed from the context of teaching, and largely ineffective at transforming practice (Glazer & Hannafin, 2006; Schlager & Fusco, 2003; Swan, et al., 2002), implementations of CoPs provide promising professional development solutions for educators (Admiraal, Lockhorst, & van der Pol, 2012; El-Hani & Greca, 2013; Glazer & Hannafin, 2006; Hung, Chee, Hedberg, & Seng, 2005; Piazza, McNeill, & Hittinger, 2009; Schlager & Fusco, 2003; Swan, et al., 2002). The framework of the CoP model is well-suited to meeting the professional development needs of educators as the defining structural elements of the CoP, namely the domain, shared practice and community (Wenger, McDermott, & Snyder, 2002) parallel with the challenges to educators' professional development and provide solutions to their educational needs. CoPs capacity to support professional learning is inherent in the theoretical underpinnings of social learning theory that ground it (Lave & Wenger, 1991; Wenger, McDermott, & Snyder, 2002).

The degree to which a CoP for educator professional development succeeds in effectively maximizing knowledge sharing and trust (Ardichvili, 2008; Booth, 2012; Lin, 2006; Usoro, Sharratt, Tsui, & Shekhar, 2007) through the connections made between community members is influenced by factors within the community (Baker-Doyle & Yoon, 2011; Booth, 2012; Hansen, 1999; Hoy & Tschannen-Moran, 1999; Levin & Cross, 2004), such as participation (Ke & Hoadley, 2009; Lin, 2006; Sun, Fang, & Lim, 2012), as well as factors external to the immediate community – such as school culture (Admiraal & Lockhorst, 2011), administration (Drago-Severson, 2012; Vavasseur & MacGregor, 2008), and individual dispositions (Ardichvilli, 2008; Bloomer & Hodkinson, 2000; Hadar & Brody, 2012; Hodkinson & Hodkinson, 2003; Piazza,

McNeill, & Hittinger, 2009; Riel & Becker, 2000) - and may significantly influence the effectiveness of the community.

The literature calls for further research that would provide better understandings of successful communities – as evaluated from the perspective of members - and with continuous revision of the evaluation criteria as understanding of them grows (Ke & Hoadley, 2009; Preece, Nonnecke, & Andrews, 2004). Research is also needed to further explore a broader examination of the CoP with specific attention to the external context and influences – the significance of the individual members' dispositions and the influence of administrative authority are both, as yet, not understood (Glazer & Hannafin, 2006; Hodkinson & Hodkinson, 2003). Finally, much of the research exploring CoPs provides anecdotal case studies; researchers suggest that further systematic empirical studies are needed (Hemmasi & Csanda, 2009). A systematic, empirical study of an educator CoP which engages in an examination of the influences of individual disposition, professional isolation, school culture and perceptions of administrators will contribute to the literature and what is known about CoPs.

CHAPTER 3

METHODS

Introduction to the Research Methods

The focus of this research is to examine the relationship between internal CoP characteristics and external factors in the professional lives of educators on the educators' perceptions of community effectiveness and satisfaction with their CoP experience. This focus directs the examination of an online network of Communities of Practice for educators, to examine the following research questions.

> *Research Question 1: to what extent are members experiencing a community of practice as evidenced through their identification of CoP characteristics related to the shared domain of interest, community, and shared practice within the community (Wenger, McDermott, & Snyder, 2002)?*
>
> *Research Question 2: to what extent do community characteristics related to the member's sense of trust, community leadership, connections with community members, sense of member commitment to the community, and perceived impact on the member's job relate to member perceptions of community effectiveness and satisfaction with the community experience as previously established in CoP research* (Hemmasi & Csanda, 2009)*?*
>
> *Research Question 3: to what extent do external factors in the professional lives of members, namely the member's sense of professional isolation, their personal disposition toward learning, and the awareness of their school cultures' valuation of professional growth as perceived in peers and administration, relate to member perceptions of community effectiveness and satisfaction with the community experience?*

This chapter provides detail and description for the methods used to conduct this study through three subsections: research design, research context, and data collection and analysis. The research design section provides the rationale for the survey methods employed. Following, a discussion of the research environment includes an explanation of the community network and provides specific details of the research setting. Finally, the data collection and

analysis section identifies the development of the survey instrument including the pilot study, the population and sample, variables of the research, data analysis, and validity measures.

Research Design

A post-positivist perspective asserts that it is necessary to observe and examine a phenomenon in an effort to better understand it. Examining the possible causes and influences for a particular effect provides a means for knowing about it more fully. While human behavior and actions are challenging to understand, observing the influences of behavior provides some insight into the phenomenon. Thus, post-positivist or quantitative empirical research that correlates possible influences to specific behaviors, requires the researcher to isolate potential factors believed most likely to be influential and then collect data to test for relationships or correlations (Creswell, 2003). This perspective, and the desire to better understand communities of practice and how characteristics within and external to a CoP influence members, generated the research questions which guide this study. Potentially influential factors were isolated through an examination of the literature surrounding CoPs, educators, and educator professional learning.

Correlational research examines the relationship between independent (predictor) variables and dependent (criterion) variables and can be measured using univariate, bivariate or multivariate statistical analysis methods as appropriate for the number of dependent variables being considered (Rosenthal & Rosnow, 1991). As the research questions in this study formed and potential influential factors emerged from the literature, it became evident that multiple independent and dependent variables exist forming a many-to-many relationship. With multiple dependent variables, multivariate methods of analysis are appropriate for

measuring the relationships between variables. Canonical Correlation Analysis (CCA) provides

the strongest method of analysis for this study given the many-to-many relationship between

variables and the researcher's desire to examine the influence or relationship between the

variables (Rosenthal & Rosnow, 1991; Salkind, 2004).

CCA has been used in various disciplines as a method to assess relationships between

sets of variables. These variable sets are described as independent (predictor) and dependent

(criterion) variables (Hair, Black, Babin, & Anderson, 2009; Sherry & Henson, 2005). While

these terms may seem to imply causation, this method of analysis tests only "the strengths and

directions of the relationships between the two sets of variables" (Abu-Bader, 2010, p.319). For

each set of variables a canonical variate is formed, one for the independent variables and one

for the dependent variables (See Figure 1). A canonical function is then developed which

maximizes the correlational coefficient between the two variates (Hair, Black, Babin, &

Anderson, 2009; Hardle & Simar, 2015). A new canonical function is created for each variable in

the smaller of the two sets of variables which describes a different relationship existing

between the variables and is independent from the other canonical functions (Hair, Black,

Babin, & Anderson, 2009; Sherry & Henson, 2005). The functions which significantly explain the

relationships between the original variables are retained for interpretation (Sherry & Henson,

2005).

There are several advantages to applying CCA within a study examining many possible

causes and effects. Sherry and Henson (2005) support the use of CCA in human behavior

research citing concern that "determining outcomes based on research that separately

examines singular causes and effects may distort the complex reality of human behavior and

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cognition…it is important to not only choose a statistical technique that is technically able to analyze the data but also a technique that is theoretically consistent with the purpose of the research (p.38)." For this study, examining multiple independent variables which may influence educators' perceptions of their experience in multiple ways, it is appropriate to analyze these relationships with a method that is congruent with the nature of the phenomenon itself. CCA is also advantageous given that it is more likely to find significant relationships within the data as compared to univariate methods. It is less likely to commit Type 1 errors which occur when a statistically significant relationship is found in the data in error. Finally, CCA allows the researcher to examine relationships between two sets of multiple variables and to test for various relationships within these variables without conducting multiple analyses (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009; Sherry & Henson, 2005).

To evaluate these influences on members of a CoP, the researcher will survey community members participating in communities within the network, ConNEXUS. The survey employed in this study includes 98 forced-response items (91 items related to the CoP and 7 demographic items). Data for the predictor and criterion variables were captured through a Likert-scale of 5-12 items each.
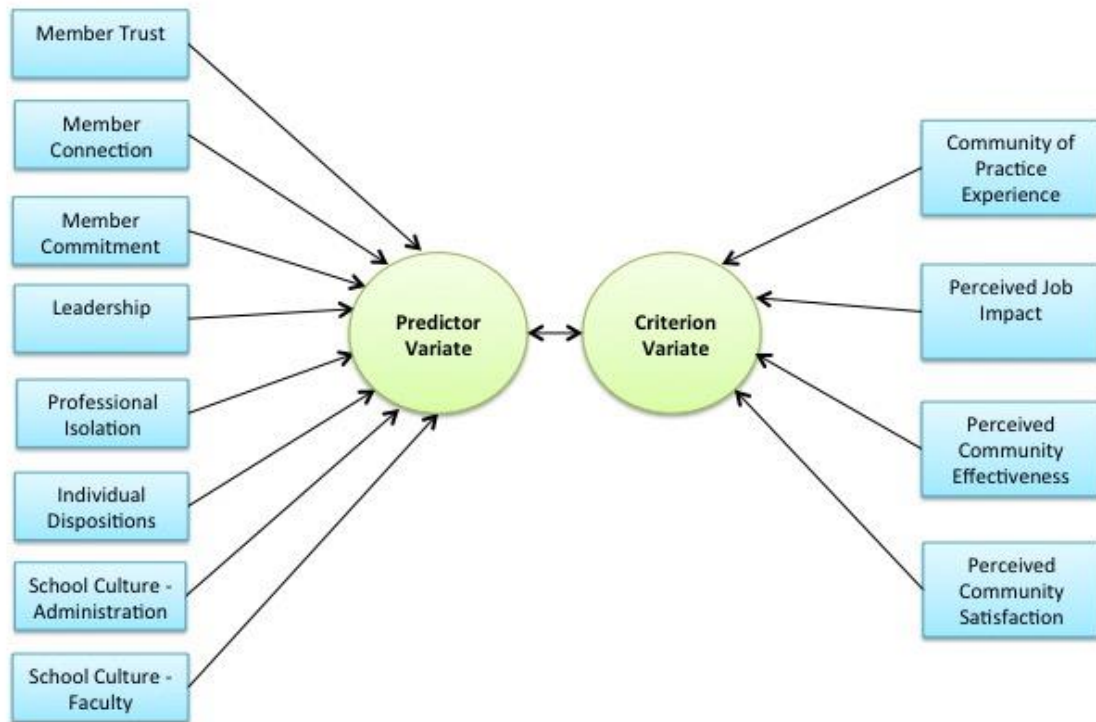
Figure 1. Graphic of the first canonical function in the canonical correlation analysis for this study with eight predictor variables and four criterion variables. Each set of variables is combined to develop a variate. These variates are then analyzed for correlation as representative of the variable sets from which they are derived.

Research Context

The study of CoPs focuses on examples of communities which arise out of particular conditions giving embodiment to learning and knowing within community. This embodiment of the CoP model can then be recognized and studied as a living instance of the framework from which researchers can develop a greater understanding of the phenomenon. The threat inherent in the research of a particular community in isolation is the unintentional implication

that communities exist in isolation and are free of influence from external factors. The

literature on CoPs provides many examples of communities measured and studied in isolation

from external factors (Barab, Barnett, & Squire, 2002; Baran & Cagiltay, 2006; Booth, 2012;

Chindgren, 2005; El-Hani & Greca, 2013; Goos & Bennison, 2008; Gray, 2004; Hemmasi &

Csanda, 2009; Iaquinto, Ison, & Faggian, 2010). These studies advance theoretical

understanding and the body of research, however, the research is incomplete if an

understanding of external influences is left unexplored.

Wenger (1998) recognized the artificiality of limiting an exploration of CoPs in isolation

and acknowledged that they cannot be fully understood without recognizing that their

boundaries are not rigid; through their members, communities are influenced and

interconnected with other communities and factors existing externally. This research

acknowledges the overlap of boundaries for community members and seeks to gain a greater

understanding of the relationship between these external influences and the perceptions of a

community by its members. The context of this study provides an opportunity to examine

instances of potential external influence.

The Association of Christian Schools International (ACSI) is the largest accrediting body

for evangelical Christian schools internationally. With more than 25,000 schools worldwide in

the association (with approximately 3000 within the United States and 22,000 outside the

United States), ACSI provides accreditation to schools, educator certification, legal resources

and consultation, textbook and resource options, and professional development. In 2011, and

in response to the changing climate of professional learning, specifically online-learning, ACSI

remodeled their delivery mechanism for professional development and incorporated online

communities of practice as one part of the model. As part of this reimagining of professional learning within the association, one objective was to overcome the geographic barrier of connecting Christian educators interspersed across the nation and the world through the development of online communities of practice.

As autonomous institutions, private Christian schools are uniquely able to operate free of the bureaucracy that often limits public institutions. Without districts that must approve programs and curricular adaptations, Christian and private schools are often able to adapt more rapidly to the changing educational climate (Evans, 2014). The challenge for an autonomous institution, however, is the isolation that can exist – particularly for educators – in a school not intimately connected with other similar schools. Where public institutions are connected through districts and state boards of education that unite schools and educators within geographic regions, Christian schools – already existing in smaller numbers within these same regions – are connected nationally through the association. In addition, because of the smaller number of Christian schools, many schools may be the only private Christian school in a town or region. Often, Christian school educators teach on small teaching teams with great distances between themselves and colleagues at similar schools. The autonomy of these schools can further complicate feelings of isolation when strong school cultures develop within a school that further close the school off from outside influence.

Recognizing the need to support professional connection between Christian educators and the sharing of best practices, ACSI established an online network of communities. Known as ConNEXUS ("connects-us"), the network provides a social media inspired platform for educators to connect with colleagues within groups of shared interest or practice. Over time,

these groups developed into their own communities within a community and are the focus of this research. Developing around shared interests or roles, the communities may be initiated organically by members of ConNEXUS or corporately by ACSI staff. As one might expect, those groups developed by ACSI corporately, are typically formed as a communication mechanism for the association and function around a particular service offered to schools (i.e. professional development, legal and legislative, regional offices, etc.). These groups generally serve as a means to distribute information to those interested in or connected to particular ACSI services and much of the knowledge sharing is one-directional from association to members. Groups formed organically by ConNEXUS members tend toward a more communal spirit of knowledge sharing between group members and benefiting participants in all directions of relationships.

Community Structure within ConNEXUS

ConNEXUS is generally viewed and spoken of as a single community by its users and founders at ACSI; however, in terms of the CoP Model and the defining characteristics of CoPs, it may be more accurately described as many CoPs co-existing within a network of CoPs. This distinction is not to be confused with Wenger's (1998) identification of CoP constellations as previously discussed. Rather, ConNEXUS provides a platform for multiple communities to exist simultaneously, each evidencing their own domain of interest, community, and shared practice (Wenger, McDermott, & Snyder, 2002). Each of these individual CoPs within the network ConNEXUS is referred to as a "group". The CoP groups within ConNEXUS are the focus of this study and the population of CoP members from which the sample will be selected.

ConNEXUS network. ACSI, its member schools and educators, tend to think of ConNEXUS in general as a community; however, for the purposes here we refer to ConNEXUS as a network

of CoPs. For example, the network includes interest groups for early childhood, early literacy, school administrators, art education, foreign language, legal and legislative issues, etc. Members see ConNEXUS as a place for educators to connect and support one another as colleagues around these special interest CoPs.

ACSI member schools within the United States and some participating regions outside the U.S. are members of ConNEXUS. (Outside the U.S., schools frequently encounter issues with internet connectivity, a significant barrier to online participation for many schools.) Educators in participating schools have access to the ConNEXUS network and are able to join ConNEXUS groups as they choose. Each network member has a profile page which serves as a communication tool within the network – tracking information on group activities for the member and allowing the member to communicate from their profile page as well. Each time a member enters the network they "land" on their profile page. At the top of the page a section identified as "Hot Topics" provides current news within the community including upcoming events and discussions that are currently trending (see Figure 2).

The profile page is similar to a profile page in Facebook where the user may share some personal information about who they are, where and what they teach, and personal interests. Members define notification settings for how they will be notified of group activity and this activity is updated on their page for groups and discussions in which they are participating. From the navigation bar on their page, members are able to search for new groups through the group directory, view groups of which they are members, or search for other members within the network.   The navigation bar also provides network members with access to view ACSI publications available within the network and to access a subscription based platform for

formal, on-demand professional development. Members find shortcuts to their groups and

resources which they have access to through their group participation on the right side of the

page. Finally, from their profile page, network members may direct message other members or

identify them as contacts similar to 'friending' in Facebook (see Figure 2).
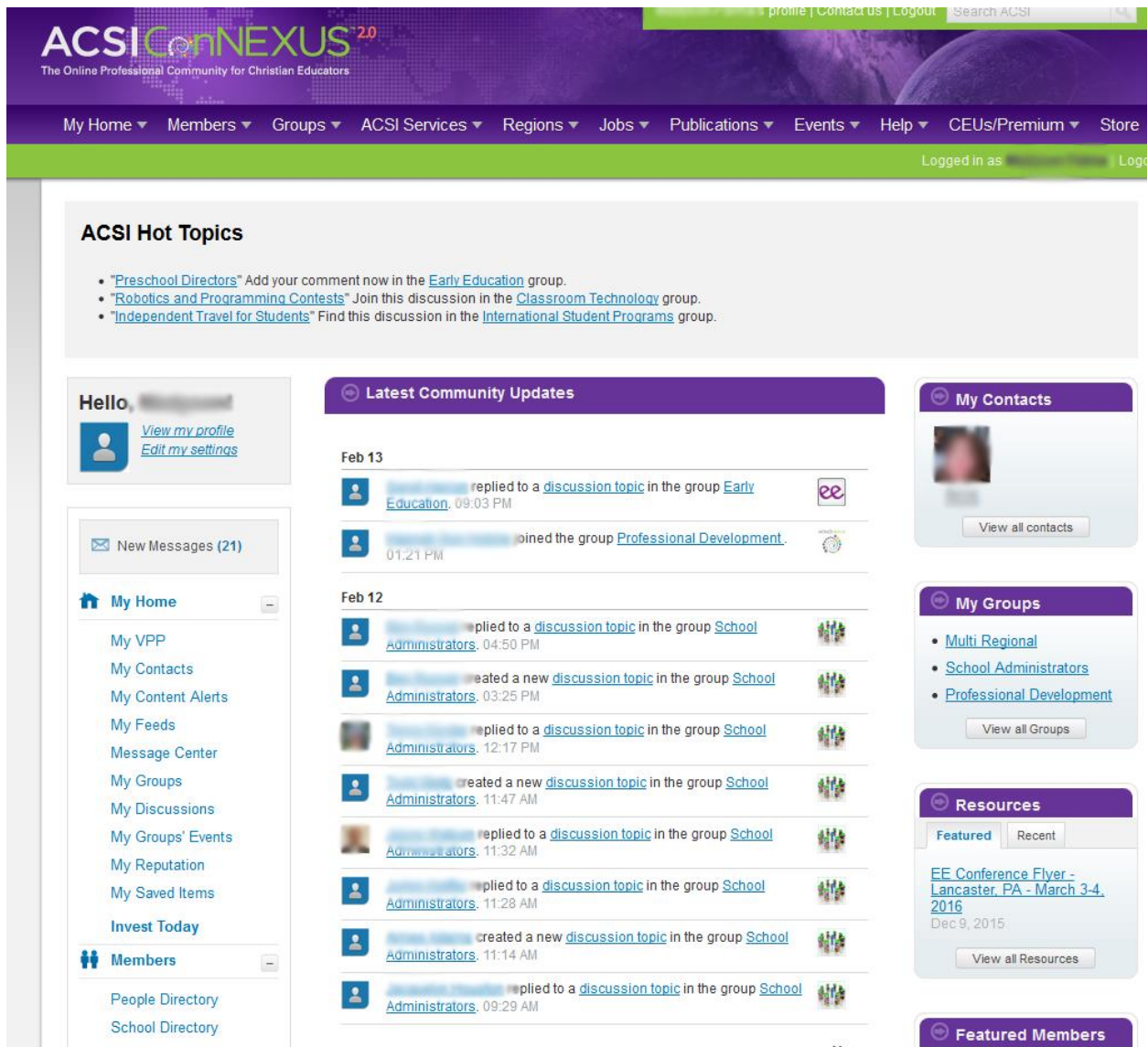

Figure 2. A screenshot of a ConNEXUS network member profile page showing the 'Hot Topic' news section at the top of the page. The navigation bar at the top provides links to the group and member directories, network resources for publications, and on-demand professional development. The body of the page provides group activity and

discussion notifications with shortcuts to groups, resources and contacts on the right side of the page.

ConNEXUS groups. Within ConNEXUS groups are formed by members or corporately by ACSI and identified within a directory by their name. Group names typically also identify their domain of interest (e.g., early education, foreign language, advanced placement). These groups generally function as communities of practice and are the focus of this study. A group directory provides members with a listing of all existing groups as shown through an excerpt in Figure 3. Consistent with the CoP model, ConNEXUS groups tend to form around a topic of interest (e.g., common core, curriculum development, education research) or a shared role (e.g., school administrators, science teachers, early education). Groups can be formed at any time by a network member contacting the network manager.

Groups may have open or closed membership as the group determines. A group with open membership allows any network member to join with the click of a "join link" button on the group page. A closed group provides a request link on their page through which a network member may request membership. This request is granted or denied by the group owner/moderator. While most ConNEXUS groups are generally open membership, those with more sensitive discussion topics tend to be closed. For example, the school administrators group is a closed group due to confidentiality reasons. Discussions in this group often include parent, student, and employee issues and while personally identifiable information is not shared, administrators would not want to have their faculty following the discussion.

Purposeful Design Spelling
Group | 13 members | 0 resources | 2 discussions | 0 events | 0 subgroups

This is a group for teachers and administrators currently using, or interested in, the Purposeful Design Spelling series. Come visit and share ideas, helpful hints and...

Reading Support
Group | 163 members | 3 resources | 6 discussions | 0 events | 0 subgroups

We are reading teachers/coaches

Response to Intervention (RTI)
Group | 79 members | 1 resource | 3 discussions | 0 events | 0 subgroups

We are teachers interested in supporting student achievement through Response to Intervention.

Rocky Mountain Region
Group | 2,607 members | 1 resource | 3 discussions | 2 events | 6 subgroups

Scroll down to find the horizontal line of tabs (Home, Announcements, Subgroups, Discussions, Resources, Events, More). Each of these tabs opens a collection of...

School Administrators
Group | 1,225 members | 319 resources | 1,272 discussion | 1 event | 3 subgroups

We are school administrators focusing on all levels of Christian schooling. Scroll down to find the horizontal line of tabs (Home, Announcements,...

Science Teachers
Group | 230 members | 11 resources | 30 discussions | 0 events | 1 subgroup

We are science teacher: Chemistry, Biology, Earth Science, Physical Science, Environmental Science, Physics

Figure 3. A screenshot excerpt of the group directory in ConNEXUS.

Within a ConNEXUS group, members find platform tools to help facilitate their participation. Upon entry into a group, the member finds the group heading which provides a synopsis of the group – either who the group members are or why the group exists – and a current total of all members belonging to the group. The owner/moderator is also identified

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here. Many group owners take advantage of this header area as a means for connecting group members to resources frequently accessed or important, timely information for group members. Use of this area for communication can be seen in Figure 4. An announcements area provides another method for communicating timely information to the group. The current announcement is displayed on the main page, but past announcements are kept chronologically under the announcements tab below (see Figure 5).

Group member activity within the groups, through which they share practice and connect around the identified domain, occurs most heavily within the discussion and resource sections of the group. Tabs beneath the announcement area identify the home area, announcements, subgroups, discussions, resources and the event calendar for the group as shown in Figure 5. Members engage in threaded discussions, responding to posted questions and comments, or directly messaging other members from the post (see Figures 6 and 7.) By sharing resources within the resource tab, resources can be collected for easy access and may be linked to for easy sharing between members in discussion (see Figure 8). Resources can also be marked as 'featured' which maintains the resource at the top of the list. An events tab on the page connects members to a group calendar where events pertinent to the group can be shared.

Through this platform, the ConNEXUS network provides Christian educators with community and connection to colleagues. Educators may freely join as many groups as they choose and have access to the resources and discussion within these groups which facilitate shared practice between members. Functioning as CoPs, the ConNEXUS groups are the focus of this study and provide the population of CoP members from which the study sample is drawn.

Early Education
Members: 5,049 Owner

ACSI Early Education Resources

We are a group of early educators focusing on childcare, preschool, and early education.

Scroll down to find the horizontal line of tabs (Home, Announcements, Subgroups, Discussions, Resources, Events, More). Each of these tabs opens a collection of valuable information!

Contact us at

Quick Links
Webinar Information:

- Live and Recorded Webinar Instructions
- Recorded Webinars from 2012-2014
- Recorded Webinars from 2014-2015
- Recorded Webinar from 2015-2016 (These recording will be available 4-6 weeks after the Live webinar.)

Live Webinars 2015-2016 - Please see Events tab below, for monthly webinars happening during this year.

Membership Information:

- 2015-2016 EE Program Membership Benefits
- Application

International Association of Christian Early Educators (IACEE)

- IACEE Benefits
- IACEE Application

Newsletters

- Early Education Newsletters 2015-2016

Reach 2.0 Documents

- Power Point from Webinar Training
- Webinar Recording from Webinar Training
- Documents

Early Education Legal Legislative Updates

- See list of articles here!

Figure 4. Screenshot of the ConNEXUS group title and page heading which provides quick communication and connection for group members with current and frequently accessed information.

Figure 5. Screenshot of a group announcement and group activity with tabs displayed for accessing various sections of the group, i.e. discussions, resources, events.

Figure 6. Screenshot of discussion topics in the Classroom Technology ConNEXUS group. Members may participate in discussion by clicking the thread title.

Figure 7. Screenshot of discussion threads in the Classroom Technology ConNEXUS group. Members may respond by posting to the thread, or may direct message other members by clicking their linked name in the thread.

Figure 8. Screenshot of the Resources shared within the Classroom Technology group. Members may share resources and link directly to the resource. Starred resources identify "featured resources" which remain at the top of the list. Resources may be rated and the number of downloads is clearly visible as an indicator of use.

Data Collection and Analysis

This study was approved by the University of North Texas Institutional Review Board and all data was collected under the permission of this board. Data for this study was collected during the spring of 2016.

Population and Sample

The population examined in this study were all members of the ConNEXUS network. A simple random sample from all ConNEXUS network members would potentially include members who are part of the network but not engaged in a ConNEXUS group for various reasons. These members may be unaware they have access to the network due to lack of communication within a school, may have participated in a group that has reached the end of its life cycle (Wenger, McDermott, & Snyder, 2002), or have left a member school and no longer have access but still be listed in the school roster. For these reasons, the list of ConNEXUS network members was not sufficiently accurate to provide access to members who were participating in CoP groups within the network. To overcome this issue, a multistage sampling of ConNEXUS groups which evidenced activity through either discussion postings or shared resources within a three month window from January to April 2016 comprise the sample frame for this study. Of the list of ConNEXUS groups evidencing activity, only those comprised of voluntary membership were selected. Some groups are created within ConNEXUS as a means of direct communication, within ACSI regions for example, and membership in these groups is forced based on geography. Groups with forced membership were removed from the sample frame, as were ACSI employees. From the remaining groups, a list of members were compiled and a sample randomly selected.

Most ConNEXUS network members are members of more than one ConNEXUS group and, as such, the sample frame included duplicate listings for members. Any duplicates that emerged in the list were removed so that every member of a group had an equal opportunity to be selected (Dillman, Smyth, & Christian, 2009). Sampled members were asked to respond to

the survey items in consideration of the group in which they participate most frequently (with frequency defined as either actively contributing to discussion or monitoring the discussion without publicly contributing to it) or the group with which they identify most strongly. The choice between frequency and identity provided members with an option to respond based on their sense of personal connection to the group. Some members may frequently participate within a group that is associated with coordinating activities within their region, but they may identify more readily with a group whose domain (shared interest) centers on the members' professional role (Wenger, McDermott, & Snyder, 2002). Members were asked to identify the name of the group to which their survey responses correspond. While members may be part of more than one group, they were limited to one survey response based on one group membership.

Recruiting Participants

Once a random sample of the population was identified, participants were invited to respond to the survey through an email invitation. The email provided an explanation of the study and included information on what respondents might expect with regard to the time required to complete it and the intent of the research study (see Appendix B). A link to the survey was included in the email as well as contact information for the researcher for any questions regarding the study. Before completing the survey, the IRB notice was provided and required the participant to agree before the survey could be completed (see Appendix C).

Instrument and Data Collection

The survey instrument used in this study captured data in four categories: the demographics of the respondent, constructs related to respondents' perceptions resulting from

the experience within the ConNEXUS group, perceptions of the ConNEXUS group, and

constructs related to potentially influential factors outside of the group. These categories of

data related to the independent and dependent variables and provided a means for measuring

influential factors within and outside of the CoPs (groups) examined, as well as the

respondents' perceptions of the CoP experience. As shown in Table 1, the survey included 98

survey items: 91 forced response Likert items and 7 forced response demographic items.

Survey items were measured using a 5-point Likert scale with 1 = *strongly disagree*, 2 =

disagree, 3 = *neither agree nor disagree*, 4 = *agree*, and 5 = *strongly agree* for all items with the

exception of eight items which were reverse coded. The demographic questions provided

categories from which the respondent made their selection.

The survey instrument used in this study was adapted from the survey instrument used

by Hemmasi and Csanda (2009) in their examination of effective communities of practice. In

their study, Hemmasi and Csanda (2009) examined variables that might predict effectiveness in

a CoP including trust, member connectedness, member commitment to the community,

leadership within the community, perceived impact on the member's job, perceived

effectiveness and member satisfaction with the experience. The results of this study indicated

that leadership in the community, member commitment and member connectedness had a

significant positive relationship with a member's perceived impact on their job. Community

effectiveness was found to be positively related to the predictor variables of perceived impact

on members' jobs, member connectedness, and community leadership. Finally, member

connectedness and perceived impact on the member's job were significantly, positively related

to satisfaction with the CoP experience. As predictors of effectiveness, these variables were

included in this study to examine whether these results are replicable in a different sample study and also to explore how these predictors and their effect might be augmented when additional variables are introduced from outside the CoP. The survey used by Hemmasi and Csanda (2009) provided a foundation for the instrument used in this survey and is used and adapted with permission (see Appendix D). The items measuring variables replicated from Hemmasi and Csanda's (2009) study were generally adopted in this survey with some adaptation as necessary to ensure that the item was applicable to the population studied here. Items measuring the additional variables introduced in this study were constructed from the literature and validated through the pilot study.

Table 1

Categories of Collected Data

Category	Objective	Number of Survey Items
Demographics	Construct a member profile	7 forced response items
Perceptions resulting from ConNEXUS (CoP) experience	Measure perceptions resulting from CoP experience Dependent/Criterion variable	31 forced response Likert items
Perceptions of Internal Factors within the ConNEXUS group (CoP)	Measure perceptions of member experience in CoP Independent/Predictor variable	22 forced response Likert items
External (to the CoP) Factors of Potential Influence	Measure the degree to which external factors exist	38 forced response Likert items

Independent/Predictor

variable

Demographics. Initial data collection through the survey obtained demographic

information. Respondents were asked to indicate their age, gender, highest degree attained,

and their job/role within their school. These items were captured as selection items. In

addition, respondents were asked to indicate whether they were participating in ConNEXUS

from within the United States or outside of the U.S. Respondents were instructed to respond

to the survey items based upon their experience as members in one ConNEXUS group and

asked to indicate the group upon which their responses were based by selecting from a drop-

down list of group names. Finally, respondents were asked to indicate approximately how long

they had been members of the particular group by selecting from a set of time ranges.

Perceptions resulting from CoP experience. Four constructs were examined which

measure respondent perceptions of their experience as a member in the ConNEXUS group

(CoP). These constructs and their related items are shown in Table 2. *Community of practice*

experience was measured through seven items which seek to measure the extent to which the

member experienced the structural components of a CoP as identified by Wenger, McDermott

and Snyder (2002), "a *domain* of knowledge, which defines a set of issues; a *community* of

people who care about this domain; and the shared *practice* that they are developing to be

effective in their domain" (p.27). The seven items used here and developed from the literature,

are comprised of items dedicated to assessing the sense of domain, shared practice, and

community experienced by the respondent in the CoP. *Perceived job impact* was measured

through eleven items adopted from the Hemmasi and Csanda (2009) survey with a minor adaptation of nomenclature changing the use of the term 'community' to the term 'group' for clarity within this population. In addition, three items were added to this construct developed from the literature to capture the respondent's sense of emotional support and sharing (Booth, 2012; Duncan-Howell, 2010; Hur & Brush, 2009; Routman, 2002; Vavasseur & MacGregor, 2008). Two items were also added to this construct to capture the respondent's sense of the group's impact on professional growth.

Perceived community effectiveness was measured by four items from the original Hemmasi and Csanda (2009) survey. Upon contacting Hemmasi and Csanda (2009) for permission to use their survey, Dr. Hemmasi granted permission and also provided an updated version of the survey. One item from the updated survey was added to this construct. Additionally, two items developed from the literature were included to capture elements of collaboration, reflection and professional growth occurring as elements of an effective CoP for educators. These elements are identified in the literature as significant in educator professional learning and specifically to learning within a community (Admiraal, Akkerman, & de Graff, 2012; Admiraal & Lockhorst, 2011; Booth, 2012; Duncan-Howell, 2010; Hodkinson & Hodkinson, 2003; Schlager & Fusco, 2003; Vavasseur & MacGregor, 2008).

Perceived community satisfaction was measured through five items from the original Hemmasi and Csanda survey and one item included from their updated survey (2009).

Table 2

Constructs and Survey Items for Perceptions Resulting from ConNEXUS Group (CoP) Experience

Construct (Variable)	Item
CoP Experience	1. Our group is uniquely able to relate to one another because we have similar roles and/or interests.*
	2. People outside our group might struggle to follow our discussions or activities because they do not have the same experiences and knowledge as our group.*
	3. Members of our group share knowledge, best practices, and resources to help one another.*
	4. Members of our group share real-world challenges and successes.*
	5. There is a sense of goodwill between members in our group.*
	6. Members in our group have a range of knowledge and experience with our shared interest.*
	7. A sense of community exists between members in our group.*
Perceived Job Impact	1. This group has enabled me to get information and ideas that I would not have received otherwise.
	2. This group has positively impacted my ability to share and gain knowledge.
	3. I have adopted a best practice or new ways of doing things in my work that others shared within the group.

4. I consider this group as valuable in improving my work.

5. Being involved in this group has changed my work processes in a positive manner.

6. I have become more innovative as a result of being involved in this group.

7. As a result of being involved in this group, I feel I have support to help me deal with challenges in my work.*

8. I have felt encouraged in my work as a result of being involved in this group.*

9. I feel that I have more collegial support for my work as a result of being involved in this group.*

10. This group has positively impacted my professional growth as an educator.*

11. This group has encouraged me to reflect on my own practice.*

Perceived Group Effectiveness

1. I believe that this group has been effective in fulfilling its purpose.**

2. I am comfortable using the technology necessary to be a part of this group.*

3. I would consider starting a group around a different subject.

4. I would recommend involvement in a group to others.

5. This group is meeting my expectations.

6. This group provides resources that were not previously

available to me.

7. This group has increased my ability to collaborate and share with like-minded professionals.*

Perceived Group
Satisfaction

1. I enjoy being a member of this group.

2. My experience in this group has been generally positive.**

3. I enjoy interacting with other members in the group.

4. My involvement in this group is voluntary.

5. I feel more satisfied with my work as a result of participating in this group.

6. Overall, I feel satisfied with my experience in this group.**

*indicates items developed from the literature
**indicates item included from updated Hemmasi and Csanda survey

Perceptions of internal factors within the ConNEXUS group. Four constructs were examined to measure the respondents' perceptions of the CoP they participated in as a group in ConNEXUS. These constructs and their related items are shown in Table 3. *Member trust* was measured through five items adopted from the original Hemmasi and Csanda (2009) survey with the nomenclature adaptation for the term 'community' to 'group'. The *member connection* construct includes four items from the Hemmasi and Csanda (2009) survey with the aforementioned nomenclature adaptation. *Member commitment* was measured with five items from the original survey. One item from the original survey within the *member commitment* construct seeks to capture behavior related to active participation; however, the literature supports legitimate peripheral participation as a valid form of community

participation and learning (El-Hani & Greca, 2013; Gray, 2004; Lave & Wenger, 1991). To prevent peripheral participation (interpreted here as active monitoring but not active contribution to the group) from being negatively attributed to *member commitment*, one question capturing committed monitoring behavior is introduced to the respondent in addition to the one active participation item for a total of six items measuring this construct. *Leadership* was examined through seven items, four from the original survey with nomenclature adaptations and three developed from the literature. The three research-based items included in this construct were developed to incorporate concepts of mentoring and content knowledge as elements of leadership. Baker, Doyle and Yoon (2011) found that community members with high mentoring qualities were sought for advice more often than members with high content knowledge. The items included here based on this research seek to capture leadership qualities of members related to both perceived mentoring qualities and perceived high content knowledge and to capture group members' perceptions of members as leaders within the group.

Table 3

Constructs and Survey Items for Perceptions of ConNEXUS Group (CoP)

Construct (Variable)	Item
Member Trust	1. I trust most group members.
	2. I feel the other group members trust me.
	3. Based on my personal experiences, I believe others in my group communicate honestly with me.
	4. I feel comfortable sharing my opinions and ideas with group

members.

5. I feel comfortable sharing my frustrations and negative feelings with other group members.

Member Connection

1. I have new contacts as a result of this group.

2. I now feel more connected to people doing similar work across the country.

3. I feel that I have interests and goals that are similar to other members of my group.

4. I have positive feelings toward members of my group.

Member Commitment

1. I willingly devote time to the group even when it competes with my work.

2. I feel good about my level of involvement in the group.

3. I actively contribute to sharing knowledge in my group.

4. I regularly monitor group activity.*

5. I have participated less than I should have in my group.

6. I am willing to share ideas with the group even if I don't get the credit.

Leadership

1. In my group, there are member(s) who fulfill a leadership role in the group.*

2. The group leader(s) establish good relationships among the group members.

3. The group leader(s) understand the purpose of the group.

4. The group leader(s) encourage members to actively participate in the group.

5. The group leader(s) are good role models for collaboration and sharing.

6. The group leader(s) are experts in our group because of their knowledge and experience.*

7. The group leader(s) provide mentoring to members of the group.*

*indicates items developed from the literature

External factors of potential influence. Four constructs were identified as potential influences on the CoP experience of educators. These constructs were believed to exist to some degree in the lives of the educator-respondents and were seen as potential influences on their perceived experience in the CoP. Each of these constructs was derived from the literature and as such the items developed to capture data related to these constructs were validated through the pilot study. These constructs and their related items are shown in Table 4.

Professional isolation is a construct developed from the literature based on research studies identifying the isolation of educators and measured through ten items validated

through the pilot study. Isolation is a particularly challenging issue inherent in education as professionals are isolated by various causes. Geographic barriers of schools dispersed across physical distances and providing little opportunity for collegial networking and support is particularly challenging when school faculty numbers are small and a school is not part of a larger district. This challenge is particularly cogent to private, Christian schools that often tend toward a smaller number of faculty, not connected to other schools through districts, and are often geographically dispersed. It seems reasonable to expect this form of isolation to be influential on an educator's perception of the CoP experience (Gray, 2004). Isolation also occurs due to the limited time available to educators for discussion and connection with other educators during the work day (Darling-Hammond & Ball, 1997; Snow-Gerono, 2005). Interaction with other educators requires time – not only for discussion – but also for developing relationship and trust. Without this time for collaboration and engagement, educators can become more isolated and engaged in solitary efforts which can result in being closed to reflective practice (El-Hani & Greca, 2013). Due to the scheduling demands on educators, time is a significant barrier and contributes to professional isolation. This isolation is compounded when access to colleagues of varying levels of expertise is limited. Experienced educators with high levels of experience can feel further isolation when they do not have access to other educators with similar experience levels with whom to connect. Similarly, educators in specialized subjects and content areas can feel isolated when they are the only faculty member on staff in that subject area. Administrators may share these feelings of isolation when they are the only administrator in a school or one of few (Hartocollis, 2000; Snow-Gerono, 2005). Considering the impact of limited time, geography, and specialization and experience on

feelings of isolation, it is reasonable to suspect that this factor could influence the perceptions of experience for an educator engaged in a CoP.

Individual dispositions is a construct similarly developed from the literature and measured through ten items derived from the research and validated through the pilot study. This construct explores the potential influence on educators' CoP perceptions resulting from traits or attitudes evidenced in the individual that are particularly compelling in the literature as influential on the educators' professional learning. Several studies in the literature indicated that educators' professional learning is impacted by their own beliefs about their practice and self-worth, their ownership and assertiveness toward their professional growth, and their attitudes toward collaboration, professionalism, and support of peers professional growth (Glazer & Hannafin, 2006; Hodkinson & Hodkinson, 2003; Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009; Riel & Becker, 2000). Hodkinson and Hodkinson (2003) identified that much of educators' professional learning occurs outside of school on the educators' own time and through their own financial means. Thus, it is those educators who are self-initiated, willing to engage, and believe there is value to their efforts who are more likely to engage in professional learning. The role of self-efficacy in educator learning is identified as a contributing factor in professional learning as well as a factor in knowledge sharing within a community (Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009; Hsu, Ju, Yen, & Chang, 2007; Shulman & Shulman, 2004). These characteristics from the literature were captured through ten items addressing attitudes and behaviors related to self-efficacy, ownership and self-initiated professional learning, and professionalism. The individual dispositions in an

educator that compel them to engage in their own professional learning and development are likely also influential on their engagement with and perceptions of their CoP experience.

As a potentially influential factor, the construct of school culture was separated into two components based upon two actors engaged and influential within a particular school's culture – the administration (or supervisors) and faculty (or peers) (Gruenert & Whitaker, 2015). Separating these two forces within the culture of a school is an attempt to examine how each actor might individually impact the perceptions of the respondent. The literature cites the impact of educators' perceptions about the workplace as having a significant influence on their engagement and growth professionally (Admiraal, Lockhorst, & van der Pol, 2012; Glazer & Hannafin, 2006; Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009). Given the importance of these perceptions, examining the influence of two key actors within the workplace – administration and faculty - individually seems likely to provide more insight into their individual contributions.

School culture – faculty is a construct developed out of the literature and measured by nine items validated by the pilot study. These items examined the collaborative nature of the faculty based on findings in the literature that a collaborative working culture engaged in reflection and cooperation supports a more collaborative learning culture within a school able to engage in growth and reform (Blumenfeld, Fishman, Krajcik, Marx, & Soloway, 2000; Hodkinson & Hodkinson, 2003). Items here also examined the respondent's beliefs about workplace conditions with regard to collegial relationships and environment as these are shown to impact professional engagement and learning (Admiraal & Lockhorst, 2011; Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009). Additionally, items measured the

perceptions of faculty as professionals and their perceived attitudes toward professional growth as well as their support of colleagues' professional growth (Admiraal & Lockhorst, 2011; Glazer & Hannafin, 2006; Tschannen-Moran, 2009).   The impact of perceptions about the workplace, faculty and attitudes toward professional growth, collaboration, collegial support and professionalism are shown to have an influence on an individual within the school environment and this construct explored whether this influence also extended to the CoP experience.

School culture – administration was the second construct exploring the influence of school culture and was developed from the literature. Nine items, validated by the pilot study, measured the administrations' influence on school culture through policies related to professional growth and the values and beliefs about professional growth they hold as perceived by the respondent (Drago-Severson, 2012; Hodkinson & Hodkinson, 2003; Hoekstra, Korthagen, Brekelmans, Beijaard, & Imants, 2009). The administrations' climate shaping with regard to fostering collaboration and professional growth, positive working relationships with open communication between faculty and administration, and perpetuating a perception of professionalism among faculty through leadership were measured through additional items (Drago-Severson, 2012; Blumenfeld, Fishman, Krajcik, Marx, & Soloway, 2000; Tschannen-Moran, 2009). The potential influence of the administration on the respondent's CoP experience is suggested in the literature through research indicating that the climate of a school was influenced by the administration and this influence was seen extending into the online participation of the school's teachers (Vavasseur & MacGregor, 2008). This study further explored the potential influence of the administration on perceived CoP experience.

Table 4

Constructs and Survey Items for External Factors of Potential Influence

Construct (Variable)	Item
Professional Isolation	1. In my job, I work closely within a team of colleagues.*
	2. My colleagues and I work collaboratively together to fulfill our respective roles.*
	3. In my job, I have regular collaborative meetings with colleagues to discuss professional issues.*
	4. I have knowledgeable colleagues to whom I can go to for professional advice and help with work related issues.*
	5. In my school, I am the only professional in my specific role (grade level, subject area, administrative role, etc.)*
	6. I have personal relationships with other Christian educators outside of my school.*
	7. There are other Christian schools nearby which are similar to mine.*
	8. The area in which I work could be considered rural.*
	9. I feel that I am isolated from other Christian educators.*
	10. I wish that I could work more closely with other similar educators.*
Individual Dispositions	1. I actively seek out professional learning opportunities to help me grow. *

2. I have paid (or am willing to pay) to attend/receive professional development from my own personal finances.*

3. I depend solely on my employer to provide me with professional learning opportunities. *

4. I am a member of at least one professional organization associated with my field.*

5. I regularly read professional publications associated with my field (print or online).*

6. I follow professionals in my field through social media or blogs.*

7. I have earned a graduate degree or am currently enrolled in graduate study.*

8. I have at least one mentoring relationship with a colleague who helps me grow.*

9. When faced with a challenge, I feel confident that I will be able to rise to meet it.*

10. The work I do is more than just a job, I am a professional.*

School Culture – Administration	1. The administrator(s) in my school encourages our faculty to connect with other Christian educators through ConNEXUS.*
	2. The administrator(s) in my school uses ConNEXUS.*
	3. The administrator(s) in my school encourages our faculty to

work collaboratively with one another. *

4. The administration in my school values my professional growth.*

5. My school administration provides financial resources to support my professional growth.*

6. My school administration provides time-off and substitutes to fill my role when necessary in support of my professional growth.*

7. I have a good working relationship with my administrator(s).*

8. My school administrator(s) views our school faculty as professionals and treats us accordingly.*

9. My school administrator(s) actively engages in his/her own professional growth.*

School Culture – Faculty

1. The faculty in my school work collaboratively with one another.*

2. The faculty in my school actively engage in their own professional learning.*

3. In my school, the faculty are a team working together to achieve a common goal.*

4. In my school, the faculty have good working relationships with one another.*

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5. In my school, the faculty frequently reflect on and discuss their practice with one another.*

6. In my school, the faculty act as professionals.*

7. The working environment in my school makes it a great place to work.*

8. When we have in-school professional development the faculty are engaged and generally believe it is beneficial.*

9. The faculty in my school encourage one another to grow and improve professionally.*

indicates items developed from the literature

Pilot Study

Before the data collection instrument was deployed and the data collected, a pilot study was conducted to ensure that the instrument was clear and that the procedures laid out for the study were sound. The pilot study involved two assessments. First, a small group of educators were given the instrument to complete and asked to also assess the questions for clarity while responding. Following their completion of the instrument, the researcher discussed the instrument with the respondents to determine if the instructions and questions were clear and to ascertain whether any problems existed in understanding and providing the type of answer expected (Fowler, 2013). The second assessment provided an assessment of the study procedures and helped to determine potential response rates. In this assessment, a small, random sample from the population was invited to complete the survey. The results of this

initial study not only assisted in determining reliability but also provided information on possible response rates for estimating the sample size (Dillman, Smyth, & Christian, 2009).

Data Analysis

The data collected through the instrument was analyzed to explore the relationships between the dependent (criterion) variables and independent (predictor) variables in this study. This analysis extends understanding of how the independent variables of member trust, member commitment, *member connection*, leadership, professional isolation, individual dispositions, school culture - administration and school culture - faculty correlate to the dependent variables of *CoP experience*, *perceived job impact*, *perceived community effectiveness*, and *perceived community satisfaction* (see Figure 1). The data were subjected to an initial analysis using descriptive statistics to determine the means, standard deviations and ranges of the data (Creswell, 2003).

Following the descriptive analysis, the data was analyzed using Canonical Correlation Analysis. CCA examines relationships between two sets of variables and is useful for examining the strength and direction of these relationships but does not imply causality (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009). This analysis was performed using the Statistical Package for the Social Sciences for Windows (SPSS).

Assumptions

Canonical Correlation Analysis requires the assumptions of multivariate tests as well as multiple regressions because it is a multivariate form of multiple regression analysis (Abu-Bader, 2010). As such, CCA is subject to assumptions of *sample representativeness* in that predictions made of the population must be drawn from a sample which represents the

population. The data measured must be continuous data and drawn from a *sample size* sufficient for the population. In general, recommendations for sample size are based upon reliability coefficients and the number of independent variables in the study suggesting a minimum of 10-20 cases per variable with a reliability coefficient of .80 (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009).

CCA requires that the distribution of the predictor and criterion variates meet the assumption of *multivariate normality*. This assumption was tested by assessing the univariate normality of variables within these variates for measures of skewness and kurtosis through an examination of histograms and normal probability plots (Abu-Bader, 2010; Sherry & Henson, 2005). *Linearity* between the predictor and criterion variables was determined by examining the correlation coefficient between these variables and the scatterplots for all possible pairs of predictor and criterion variables and checking for outliers within the data set (Abu-Bader, 2010). *Homoscedasticity* assumes that for each predictor variable the criterion variables are normally distributed such that their variances are equal. This assumption was assessed by examining the scatterplots for all possible pairs of predictor and criterion variables. *Multicollinearity* indicates that correlation between pairs of predictor or criterion variables is too high, typically greater than .80. This was assessed by inspecting the correlation coefficients within each set of predictor and criterion variables. Issues with homoscedasticity or multicollinearity will result in less reliable results due to their confounding effects on the correlations between variables (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009).

Validity and Reliability

The analysis of a study's validity provides an indicator of how well the measurement procedures in the study analyzed what they intended to examine. This assessment further tells the researcher and reader how well the results of the study can be interpreted and applied. Content validity of the instrument employed in this study was assessed through a panel of experts - five educators familiar with the educational environment, had familiarity with ConNEXUS, and were familiar with research methods – examined the instrument questions (Salkind, 2004).

Construct validity is of critical importance to confirming a research study's applicability and interpretation. Research that does not establish construct validity is subject to criticism and limited in further application. Establishing construct validity requires the researcher to assess how well the measurement reflects the construct (Salkind, 2004). In this assessment, unidimensionality is key to establishing the measurement items' validity as it indicates that the empirical measurement items relate to the construct, and only that specific construct, which they are determined to measure (O'Leary-Kelly & Vokurka, 1998). Construct validity was examined in this study through Exploratory Factor Analysis. While the instrument in this study was built upon the instrument used by Hemmasi and Csanda (2009), significant modifications were made to the instrument to include the CoP experience variable, as well as the external factors of *individual disposition*, *professional isolation* and both variables related to school culture. These adaptations and modifications of the instrument necessitated analysis of the validity of the measurement. Exploratory Factor Analysis (EFA) is described as heuristic in

nature in that it allows the researcher to explore the variables without predefined assumptions or hypotheses (Williams, Brown, & Onsman, 2010).

Reliability refers to the stability of a measurement and how well it consistently produces similar results. Cronbach's alpha is a frequently used method of assessing reliability in part because it overcomes many of the challenges inherent in other methods of assessing reliability. The test-retest method of reliability assessment requires that two measures be taken at different points in time; this can be costly for a researcher in time and expense (O'Leary-Kelly & Vokurka, 1998). Hemmasi and Csanda (2009) assessed reliability of their original survey instrument through the Cronbach's alpha test and found strong inter-item consistency coefficients ranging between .72 - .91. The precedence set by this method of reliability analysis by Hemmasi and Csanda (2009) and other researchers (Bone, 2013) for similar instrumentation is strong and encouraged the use of this method here.

Summary

This chapter described the research design, research context, and data collection and analysis methods that used to conduct this study. This research employed a multivariate correlational design to explore the predictor and criterion variables. This design and the use of CCA as the method of analysis allowed the researcher to explore the set of predictor variables related to the use of CoPs for educators. Assumptions of CCA and issues of reliability and validity were also outlined. This research measured correlations between the predictor and criterion variables through a sample of educators engaged in multiple, different CoPs and included an examination of the influence of factors existing outside of the CoP on their

perceived experience. The instrument employed here captured demographic data and used

Likert-style items to measure these variables.

CHAPTER 4

RESULTS

Introduction

As research objectives, this study sought to explore three areas related to the community members' experience with the community of practice. First, it examined the extent to which members of the community experienced a community of practice as evidenced by their perceptions of characteristics of shared domain of interest, community, and shared practice within the community. Next, it explored the extent to which the internal characteristics of the community related to member perceptions of community effectiveness and satisfaction with their community experience. Finally, it also explored the extent to which external (to the community) factors in the lives of community members related to member perceptions of community effectiveness and satisfaction with the community experience. The research context was a network of individual Communities of Practice existing within a larger community, ConNEXUS. Assessment of the communities occurred through an online survey instrument implementing a 5-point, Likert-style scale. The results of this study are reported in this chapter.

The Data Procedures section provides a description of the data, its distribution, and also details the preparation of collected data prior to analysis. The Statistical Assumptions for Canonical Correlation Analysis section explains the procedures for meeting the assumption requirements for the final analysis. Finally, the Data Analysis and Results section provides the final canonical correlation analysis and presents the results.

Data Procedures

Prior to data analysis, the data was examined for anomalies and then coded according to the data dictionary. No data was missing as all survey items were forced response. Each independent predictor or criterion item had a range of $1 - 5$. The possible range for each scale item was $742 - 3,710$, excluding demographic items.

Descriptive Analysis

Demographics. Demographic data showed that of the $10,212$ emails sent inviting participants to complete the survey, 742 respondents completed the survey for a completion rate of 7.3%. Of the 742 participants, 209 (28.2%) were male and 533 (71.8%) were female. The 28.2% of male participants represented 153 (20.6%) administrators, 53 (7.1%) teachers/faculty, and 3 (.4%) school staff. The 71.8% female participants represented 285 (38.4%) administrators, 224 (30.2%) teachers/faculty, and 24 (3.2%) school staff. Overall, the respondents included 438 (59%) administrators, 277 (37.3%) teachers/faculty, and 27 (3.6%) school staff. The ratio of gender reflected here differs from the U.S. Department of Education (2015) statistics for 2011-2012 citing 75% of private school teachers and 55% of private school administrators were female. Within this sample, 81% (224) of reporting teachers are female as are 65% (285) of reporting administrators.

The most frequently reported age range of participants was 50-59 with 258 (34.8%) reporting for this age bracket, followed by 40-49 with 210 (28.3%) respondents. Fewer respondents identified themselves within the 60-69 age bracket with 144 (19.4%). Responses in the 30-39 age range came in at 98 (13.2%) respondents and still fewer reported 21-29 at 17 (2.3%) respondents and finally 15 (2%) respondents identified in the 70-79 age range.

More than half of the participants had earned a graduate degree with 53% reporting an MA/MS and nearly half (45%) of those also reporting additional certifications. Respondents who had earned a BA/BS comprised 38% of the participants with an additional 9% reporting a terminal degree of which 74% of indicated an Ed.D. and 26% a Ph.D. Disaggregating the data for degrees earned by the roles participants' hold provides more insight into the distribution of degrees reported. The relatively high level of graduate degrees reported likely reflects the higher number of participants fulfilling an administrative role in the school (59%).

Examining participants' education level by role (see Table 5) reveals that 65% (284) of reporting administrators held a MA/MS degree, with 13% (57) holding an Ed.D. or Ph.D. and an additional 22% (97) with a BA/BS level degree. This data similarly reflects levels of education among this sample compared to national averages among private schools from the U.S. Department of Education report (2013) identifying 59.8% of principals with a master's degree, 31% with a bachelor's degree or less and 9.1% with a doctorate or first professional degree. Among teachers, 58% (162) of those reporting hold a bachelor's degree while 38% (104) and 4% (11) hold a masters or terminal degree, respectively. This data supports the U.S. Department of Education report (2015) of teacher statistics from 2011-2012 citing that 43% of private school teachers held a graduate or higher degree.

Table 5

Roles and Degrees Reported by Study Participants

ROLE	DEGREE	N	% of Total Sum	% of Total N
Administration	BA/BS	57	7.8%	7.7%
	BA/BS with add. certifications	40	6.2%	5.4%
	MA/MS	151	21.4%	20.4%
	MA/MS with add. certifications	133	18.6%	17.9%
	EdD	40	6.6%	5.4%
	PhD	17	2.8%	2.3%
	Total	438	63.5%	59.0%
Teacher/Faculty	BA/BS	78	9.1%	10.5%
	BA/BS with add. certifications	84	9.7%	11.3%
	MA/MS	57	6.9%	7.7%
	MA/MS with add. certifications	47	6.0%	6.3%
	EdD	10	1.3%	1.3%
	PhD	1	0.2%	0.1%
	Total	277	33.2%	37.3%
School Staff	BA/BS	14	1.8%	1.9%
	BA/BS with add. certifications	7	0.8%	0.9%
	MA/MS	6	0.7%	0.8%
	Total	27	3.3%	3.6%

ACSI estimates that approximately 4% of the ConNEXUS community members are

participating from outside of the U.S. This estimate is similar to the ratio of 6.7% of

respondents who identified they were participating in the community from outside the U.S.

While community members frequently participate in more than one group, respondents were

asked to select one group with which they identify with most strongly or participate in/monitor

most frequently. The groups identified by respondents are listed in Table 6. Upon identifying

the group they would consider for the basis of their survey responses, participants also

reported the length of time they had been participating in the identified group. More

participants (38.9%) reported participating for 1-2 years followed by 3-4 years of participation

for 29% of members. Reporting less than one year of participation (18.7%) was only slightly

higher than those 13.3% who reported more than 4 years of participation.

Table 6

Community Groups Identified by Study Participants for the Basis of Survey Responses

ConNEXUS Group Name	Frequency	Percent
Distinguished Christian High School Students	2	.3
Urban Schools	3	.4
SC School Heads	5	.7
Athletic Directors and Coaches	5	.7
4th Grade Teachers	6	.8
Advanced Placement (AP)	6	.8
Foreign Language Teachers	8	1.1
Curriculum Coordinators	8	1.1
Mathematics	8	1.1
ACSI Student Assessment Program	13	1.8
Special Needs	15	2.0
Librarians	15	2.0
Certification: EE-Grade 12	16	2.2
Guidance Counselors	17	2.3

International Student Programs	18	2.4
CA/HI Administrators	21	2.8
Classroom Technology	27	3.6
Biblical Worldview	27	3.6
Legal Legislative	29	3.9
Professional Development	37	5.0
Secondary Teachers	40	5.4
Elementary Teachers	59	8.0
Accreditation EE-12	59	8.0
Early Education	82	11.1
School Administrators	216	29.1
Total	742	100.0

Survey items. Given that the survey instrument required a response for each item, none of the survey items were missing a response. Each survey item received 742 responses. Responses for eight survey items – six assessing professional isolation, one assessing individual dispositions, and one assessing *member commitment* – were reverse coded. The range of scores for survey items was between 742 (1*742) at a minimum score and 3,710 (5*742) for a maximum score. The frequency responses for each predictor and criterion survey item are provided in Table 7.

Table 7

Frequency Responses for Predictor and Criterion Survey Items

Predictor Variable Items	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Professional Isolation PI1. In my job, I work closely with a team of colleagues. (reverse coded)	17	17	30	211	467

Predictor Variable Items	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Professional Isolation (cont'd)					
PI2. My colleagues and I work collaboratively to fulfill our respective roles. (reverse coded)	8	17	39	299	379
PI3. In my job, I have regular collaborative meetings with colleagues to discuss professional issues. (reverse coded)	11	40	47	292	352
PI4. I have knowledgeable colleagues to whom I can go to for professional advice and help with work related issues. (reverse coded)	8	23	35	324	352
PI5. In my school, I am the only professional in my specific role.	97	131	26	166	322
PI6. I have personal relationships with other Christian educators outside of my school. (reverse coded)	24	76	54	325	263
PI7. There are other Christian schools nearby which are similar to mine.	45	129	52	372	144
PI8. The area in which I work could be considered rural.	264	262	42	99	75
PI9. I feel that I am isolated from other Christian educators.	187	309	132	96	18
PI10. I wish that I could work more closely with other similar educators.	19	59	233	348	83
Individual Dispositions					
ID1. I actively seek out professional learning opportunities to help me grow.	3	18	63	380	278

ID2. I have paid (or am willing to pay) to attend/receive professional development from my own personal finances.	18	74	93	362	195
ID3. I depend solely on my employer to provide me with professional learning opportunities. (reverse coded)	172	355	111	83	21
ID4. I am a member of at least one professional organization associated with my field.	24	111	33	351	223
ID5. I regularly read professional publications associated with my field (print or online).	7	53	76	381	225
ID6. I follow professionals in my field through social media or blogs.	49	169	103	314	107
ID7. I have earned a graduate degree or am currently enrolled in graduate study.	77	147	11	120	387
ID8. I have at least one mentoring relationship with a colleague who helps me grow.	48	189	109	270	126
ID9. When faced with a challenge, I feel confident that I will be able to rise to meet it.	0	5	42	426	269
ID10. The work I do is more than just a job, I am a professional.	1	1	12	225	503
School Culture – Supervision *(Actual survey items worded appropriately based on respondent's role)*					
SCS1. My supervisor encourages our administration/faculty to connect with other Christian educators through ConNEXUS.	66	161	206	206	103
SCS2. My supervisor uses ConNEXUS.	71	123	229	198	121

SCS3. My supervisor encourages our school administration/faculty to work collaboratively with one another.	8	26	81	325	302
SCS4. My supervisor values my professional growth.	8	25	77	317	315
SCS5. My school provides financial resources to support my professional growth.	45	73	98	341	185
SCS6. My school provides time-off and substitutes to fill my role when necessary in support of my professional growth.	20	51	97	371	203
SCS7. I have a good working relationship with my supervisor.	4	8	58	277	395
SCS8. My supervisor views our school administration/faculty as professionals and treats us accordingly.	7	23	64	271	377
SCS9. My supervisor actively engages in his/her own professional growth.					
	10	46	139	292	255

School Culture – Peers
(Actual survey items worded appropriately based on respondent's role)

SCP1. The administration/faculty in my school work collaboratively with one another.	3	17	64	372	286
SCP2. The administration/faculty in my school actively engage in their own professional learning.	2	36	129	385	190
SCP3. In my school, the administration/faculty are a team working together to achieve a common goal.	2	27	68	346	299
SCP4. In my school, the	3	17	51	357	314

administration/faculty have good working relationships with one another.

SCP5. In my school, the administration/faculty frequently reflect on and discuss their practice with one another.	6	66	124	330	216
SCP6. In my school, the administration/faculty act as professionals.	3	7	47	346	339
SCP7. The working environment in my school makes it a great place to work.	4	15	72	291	360
SCP8. When we have in-school professional development the administration/faculty are engaged and generally believe it is beneficial.	8	42	90	347	255
SCP9. The administration in my school encourage one another to grow and improve professionally.	3	32	99	353	255
Trust					
T1. I trust most group members.	3	10	319	334	76
T2. I feel the other group members trust me.	1	6	437	251	47
T3. Based on my personal experiences, I believe others in my group communicate honestly with me.	1	5	316	359	61
T4. I feel comfortable sharing my opinions and ideas with group members.	8	46	287	348	53
T5. I feel comfortable sharing my frustrations and negative feelings with other group members.	25	132	364	191	30
Member Connection	32	146	301	229	34
MCON1. I have new contacts as a result of this group.					

MCON2. I now feel more connected to people doing similar work across the country.	23	96	286	297	40
MCON3. I feel that I have interests and goals that are similar to other members of my group.	7	22	260	408	45
MCON4. I have positive feelings toward members of my group.	5	13	291	381	52
Member Commitment MCOM1. I willingly devote time to the group even when it competes with my work.	95	259	270	104	14
MCOM2. I feel good about my level of involvement in the group.	30	154	316	226	16
MCOM3. I actively contribute to sharing knowledge in my group.	85	267	249	128	13
MCOM5. I regularly monitor group activity.	95	212	186	217	32
MCOM6. I have participated less than I should have in my group. (reverse coded)	15	55	242	340	90
MCOM7. I am willing to share ideas with the group even if I don't get the credit.	4	13	210	423	92
Group Leadership L1. In my group, there are member(s) who fulfill a leadership role in the group.	10	28	395	259	50
L2. The group leader(s) establish good relationships among the group members.	6	28	447	224	37
L3. The group leader(s) understand the purpose of the group.	4	10	399	281	48
L4. The group leader(s) encourage members to actively participate in the group.	9	39	462	198	34

L5. The group leader(s) are good role models for collaboration and sharing.	4	18	415	259	46
Group Leadership (cont'd)					
L6. The group leader(s) are experts in our group because of their knowledge and experience.	4	17	429	238	54
L7. The group leader(s) provide mentoring to members of the group.	8	49	489	167	29

Criterion Variable Items	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Experienced Community of Practice					
ECOP1. Our group is uniquely able to relate to one another because we have similar roles and/or interests.	12	15	227	394	94
ECOP2. People outside our group might struggle to follow our discussions or activities because they do not have the same experiences and knowledge as our group.	6	92	380	235	29
ECOP3. Members of our group share knowledge, best practices, and resources to help one another.	8	25	171	417	121
ECOP4. Members of our group share real-world challenges and successes.	6	28	188	394	126
ECOP5. There is a sense of goodwill between members in our group.	4	11	203	384	140
ECOP6. Members in our group have a range of knowledge and experience with our shared interest.	4	7	169	421	141
ECOP7. A sense of community exists between members in our group.	25	52	320	272	73

Job Impact

PJI1. This group has enabled me to get information and ideas that I would not have received otherwise.	20	66	202	370	84
PJI2. This group has positively impacted my ability to share and gain knowledge.	16	59	249	345	73
PJI3. I have adopted a best practice or new ways of doing things in my work that others shared within the group.	23	105	290	278	46
PJI4. I consider this group as valuable in improving my work.	33	78	277	295	59
PJI5. Being involved in this group has changed my work processes in a positive manner.	29	103	341	234	35
PJI6. I have become more innovative as a result of being involved in this group.	34	127	367	185	29
PJI7. As a result of being involved in this group, I feel I have support to help me deal with challenges in my work.	29	101	300	260	52
PJI8. I have felt encouraged in my work as a result of being involved in this group.	25	92	286	289	50
PJI9. I feel that I have more collegial support for my work as a result of being involved in this group.	29	109	316	250	38
PJI10. This group has positively impacted my professional growth as an educator.	25	86	298	288	45
PJI11. This group has encouraged me to reflect on my own practice.	22	79	209	375	57

Group Effectiveness

PGE1. I believe that this group has been effective in fulfilling its purpose.	23	61	248	347	63

104

Item					
PGE2. I am comfortable using the technology necessary to be a part of this group.	14	44	103	385	196
PGE3. I would consider starting a group around a different subject.	52	202	300	155	33
PGE4. I would recommend involvement in a group to others.	20	53	201	384	84
PGE5. This group is meeting my expectations.	24	68	291	309	50
PGE6. This group provides resources that were not previously available to me.	21	86	250	318	67
PGE7. This group has increased my ability to collaborate and share with like-minded professionals.	14	68	246	355	59

Group Satisfaction

Item					
PGS1. I enjoy being a member of this group.	18	37	298	329	60
PGS2. My experience in this group has been generally positive.	14	24	209	415	80
PGS3. I enjoy interacting with other members in the group.	12	28	370	280	52
PGS4. My involvement in this group is voluntary.	4	7	81	443	207
PGS5. I feel more satisfied with my work as a result of participating in this group.	23	90	409	193	27
PGS6. Overall, I feel satisfied with my experience in this group.	21	52	241	376	52

Based upon participant responses for each item comprising the variables, the responses indicating agreement with either a "Strongly Agree" or "Agree" response for predictor variables ranged from a low for *professional isolation* at 26.47% to a high for *school culture – peers* at 84.47%. Similarly, responses indicating agreement for criterion variables ranged from a low for *job impact* at 45.79% to a high for *CoP experience* at 62.40%.   While 62.40% of respondents identified their group experience as evidencing characteristics of a community of practice, the additional community of practice descriptive variables included from the Hemmasi and Csanda (2009) study reported a high response of "Neither Agree Nor Disagree." These variables ranged in agreement responses from a low of 29.99% for *member commitment* to a high of 50.07% for *member connection*. The neutral responses for these variables ranged from a low of 33.09% for *member commitment* to a high of 58.45% for *leadership*. Neutral responses for the criterion variables also reported higher ranges with a low of 31.56% for *group effectiveness* and a high of 38.41% for *job impact*. Neutral responses for the external variables were significantly less with a low of 8.80% for *individual disposition* and a high of 15.71% for *school culture – supervision*. The aggregated responses of each survey item for the predictor and criterion variables are presented as percentages in Table 8.

Table 8

Aggregated Item Responses for Predictor and Criterion Variables

Predictor Variable Items	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Professional Isolation	32.68%	31.55%	9.30%	16.90%	9.57%

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Individual Disposition	3.34%	11.46%	8.80%	42.91%	33.49%
School Culture - supervision	3.58%	8.03%	15.71%	38.90%	33.78%
School Culture - peers	0.51%	3.88%	11.14%	46.83%	37.65%
Member Trust	1.02%	5.36%	46.44%	39.97%	7.20%
Member Connection	2.26%	9.33%	38.34%	44.31%	5.76%
Member Commitment	8.96%	27.96%	33.09%	25.90%	4.09%
Leadership	0.87%	3.64%	58.45%	31.31%	5.74%

Criterion Variable Items	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
CoP Experience	1.25%	4.43%	31.92%	48.46%	13.94%
Job Impact	3.49%	12.31%	38.41%	38.83%	6.96%
Group Effectiveness	3.23%	11.21%	31.56%	43.38%	10.63%
Group Satisfaction	2.07%	5.35%	36.12%	45.73%	10.74%

Validity and Reliability

Construct validity of the survey instrument was assessed through factor analysis which also served to reduce and realign items against the constructs measured through the instrument. Statistical assumptions for a factor analysis were verified to ensure the applicability of factor analysis to the data. Many of the statistical assumptions for a factor analysis also apply to canonical correlation analysis. As such, preparing the data for the factor

analysis also assisted in assuring that the data would be appropriate for later analysis, although this was verified again prior to the final analysis.

Statistical Assumptions for Factor Analysis. When factor analysis is used simply to describe relationships between variables, assumptions of normality are relaxed. However, when factor analysis is used as a means of construct validity and factor isolation, normality is of greater concern (Tabachnick & Fidell, 2007). Because the survey instrument was forced response, no missing values were expected or found. A normal distribution was assessed through descriptive statistics and an examination of the skewness and kurtosis values (see Appendix A.1.) for each variable. Tabachnick and Fidell (2007, p.86) recommend "transformation of variables in all situations unless there is some reason not to." While ten variables indicated skewness values outside the normal 0 to 1 range, the decision to transform was complicated by the fact that because these variables would later become composite variables they would all need to be treated equally; thus, if one is transformed they must all be transformed (Mertler & Vannatta, 2005). Tabachnick and Fidell (2007) acknowledge that transformation can hinder interpretability and can complicate interpretability with data that will be grouped. Further, the transformation of the skewed variables similarly applied to those within a normal distribution is likely to skew those variables into a non-normal state. Based on this dilemma, the decision was made not to transform the data and to reassess normality once the data were grouped prior to CCA.

Linearity was assessed through residual plots for variables with specific attention to relationships between those variables in the normal range and those outside the normal range exhibiting higher levels of skew or kurtosis. The residual plots indicated linearity but also

confirmed the presence of outliers in the dataset. Univariate and multivariate outliers were addressed through evaluation of z-scores exceeding 3.29 and Mahalanobis distance at p<.001 (Mertler & Vannatta, 2005; Tabachnick & Fidell, 2007). Multivariate outliers were found in 101 cases. From an examination of these cases there was no clear pattern of why they might be outliers. Demographics of the outliers were examined as were the values themselves. After reviewing several sources the researcher determined that the removal of these outliers would not impact the generalizability to the population and no clear pattern of why they might be outliers was evident, thus the outliers were removed (Abu-Bader, 2010; Mertler & Vannatta, 2005; Tabachnick & Fidell, 2007). Removal of these outliers reduced the sample size to 641 observations. The few remaining univariate outliers were recoded to the minimum or maximum score, dependent upon whether they were an outlier on the minimum or maximum end of the z-score. Normality and linearity were once again examined and found to be improved upon following the removal of outliers (See Appendix A.2.).

The final statistical assumption of factor analysis is that of multicollinearity and singularity. The independent variables (predictors) and dependent variables (criterion) were assessed individually as IV and DV groupings. Multicollinearity and singularity were determined through an examination of the Pearson correlation coefficient. Multicollinearity was found at coefficient levels higher than .80 as recommended by Abu-Bader (2010). A second assessment of multicollinearity was conducted using the VIF and tolerance values where VIF values exceeding 10 and tolerance values less than .10 indicate multicollinearity (Abu-Bader, 2010). While all tolerance and VIF values did not exceed the limit values for multicollinearity, the correlation coefficients indicated collinearity exceeding .80 on several values. For these values,

the tolerance and VIF values approached the limit values but did not exceed them. From the independent variable group assessed, two variables were removed for high levels of collinearity from the Leadership variables. In the dependent variable group assessment, five variables were removed from the *perceived job impact* variables, two variables were removed from the *perceived group satisfaction* variables and one variable was removed from the *perceived group effectiveness* variables.

Factor Analysis. Using SPSS, a factor analysis was conducted providing the appropriate matrices, KMO, and Bartlett's values. Upon inspection of the correlation matrix, any variables with a correlation coefficient equal to or less than .300 were removed from the analysis. This assessment resulted in the removal of three items: two from the *professional isolation* variable and one from the *experienced CoP* variable. Linearity assessed using the Kaiser-Meyer-Olkin (KMO) measure at .950 — placing it at the highest level and indicating strong linear relationships overall. Individual KMO measures were all greater than .700 with two exceptions reporting a .635 and a .639. These values are acceptable given that they are greater than the .500 limit although on the lower end (Laerd Statistics, 2015). Despite this, most individual KMO measures in this analysis exceeded .800 and .900. These values are classified by Kaiser (1974) as 'middling' to 'meritorious'. Bartlett's Test of Sphericity reported statistically significant ($p < .0005$) indicating the appropriateness of factorization on the data (Laerd Statistics, 2015).

The first factor analysis conducted used a varimax rotation and revealed fifteen factors with eigenvalues greater than one and explaining 67.29% of the total variance. Visual inspection of the scree plot indicated retaining nine factors (Costello & Osborne, 2005). The interpretability criterion suggested 11 factors, but simple structure was difficult to establish.

Simple structure was achieved through an oblique rotation on a second factor analysis and suggested retaining 11 factors. Retaining 11 factors explained 67.29% of the total variance and was supported by visual inspection of the scree plot (Laerd Statistics, 2015; Yong & Pearce, 2013).

The 11 retained factors realigned survey items around the variables as seen in Table 9. Items measuring the criterion variables aligned around two variables: Enriched Knowledge and Skill and Perceived Group Knowledge. These variables were renamed to better address the underlying construct resulting from the new alignment. Many of the items measuring Perceived Job Impact, Perceived Group Effectiveness and Perceived Group Satisfaction constructs aligned together around this first factor. These items loaded on this factor with coefficients ranging from .438-.845. Similarly, the Experienced Community of Practice variable loaded with two of the original Experience CoP items as well as one from Perceived Group Satisfaction. Two additional items cross-loaded against others factors and were removed. These items loaded with a coefficient range of .492-.556 on this renamed factor, Experienced Community Value.

The original predictor variables also realigned with shifts in the variables. The two subsets of school culture which originally separated supervisors' and peers' impact on the school culture (with the supervisor role representing administration for teacher responses and Head of School or School Boards for administrator responses) loaded onto three factors. The first factor retained all of the original School Culture Peers variables comprising a Professional Culture of Growth -Peers with loadings from .583-.833. The School Culture Supervisor items loaded onto two separate factors, one for the Supervisor's Value of the Community with

loadings for three variables at .373-.945. The second new factor loaded with three variables addressing the Professional Culture of Growth – Supervisor with loadings of .419-.626.

Five of the original Leadership items loaded on a Leadership factor with coefficients ranging from .805-.879. Four of the original Individual Dispositions items loaded significantly on a retained Learning Disposition factor with loadings of .382-.697. Four of the original *professional isolation* items loaded together around a single factor renamed to better capture the underlying construct addressed by these items, *collaborative working relationships*, with loadings from .609-.901. Three additional *professional isolation* items loaded on a separate factor for *professional isolation* with a range of .401-.801. Trust loaded all of the original five items as well as one *member commitment* item ranging from .585-.738. Three *member commitment* variables loaded on a commitment factor with loadings from .439-.659. The retained variables and the items realigned to these retained variables may be seen in Table 9.

Inter-item Consistency. Reliability of the instrument was assessed by evaluating the internal consistency of each underlying construct, or scale, being measured through the survey instrument (Tavakol & Dennick, 2011). Cronbach's alpha indicated high levels of consistency for the scales as follows: *enriched knowledge and skill*, .967; *professional culture of growth –peers*, .922; *community leadership*, .912; *collaborative working relationships*, .855; *member trust*, .864; *professional culture of growth – supervisor* , .800; and *member commitment*, .762. The *learning disposition* scale reported an alpha level of .647. Investigation of sufficient values for alpha levels point to 'rules of thumb' suggesting that an alpha level between .600 and .700 is acceptable in some cases, however, others recommend an oft-cited convention of .700 as a minimum but recognize that there is dispute even around this standard (Cho & Kim, 2015;

Cortina, 1993; Gliem & Gliem, 2003; Lance, Butts, & Michels, 2006). Given the ambiguity in addressing issues of alpha levels below the conventional .700 value, this researcher determined to retain the scale but with caution given to the interpretation of its results.

Two additional reliability concerns arose in this analysis. The scale for *supervisor's value of the community* reported one item on this scale with a squared multiple correlation of .130, although the corrected item-total correlation was above the recommended .300 value at .349. Upon further inspection of this scale, this item did appear to be addressing a slightly different aspect of the construct. Despite the factor analysis loadings which aligned these items around this construct, some discrepancy seemed to exist. Where two of the items are investigating a supervisor's use and encouragement of supervisees' toward involvement in the community, the third item in question slanted more toward the supervisor's general professional growth involvement. The researcher's belief that that this item is divergent from the other items in this scale agrees with the low squared multiple correlation suggesting that these items do not measure the same latent construct and do not explain the variation in the other items (Laerd Statistics, 2015). Removing this item results in a two-item scale which is not ideal but seems preferable to the alternatives of retaining the item in question or discarding the construct altogether (Little, Lindenberger, & Nesselroade, 1999). Eisinga, Grotenhuis, and Pelzer (2013) recognize the necessity of this situation and recommend the Spearman-Brown reliability estimate for two-item scales. The revised two-item scale for the *supervisor's value of the community* construct, renamed to more accurately reflect the construct, indicates a Spearman-Brown reliability coefficient of .817.

The second reliability concern revealed through the analysis is with the *professional isolation* scale. This scale reported a Cronbach's alpha value of .574 and while the corrected item-total correlation coefficients were greater than the recommended 0.3, the squared multiple correlation coefficients for two of the three items were less than .200. Given the low alpha value and the concern for the fit of the items to the scale, this scale was removed from the study. The revised scale items following the reliability analysis are provided in Table 9. The research model was summarily revised based upon the reliability and validity analysis. The revised model for the study is provided in Figure 9.

Table 9

Retained Variables and Realigned Survey Items Following the Factor Analysis and Cronbach's Alpha

Variable	Survey Item Number and Question Text
Enriched Knowledge and Skill	PJI1. This group has enabled me to get information and ideas that I would not have received otherwise.
	PJI3. I have adopted a best practice or new ways of doing things in my work that others shared within the group.
	PJI4. I consider this group as valuable in improving my work.
	PJI6. I have become more innovative as a result of being involved in this group.
	PJI8. I have felt encouraged in my work as a result of being involved in this group.
	PJI11. This group has encouraged me to reflect on my own

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practice.

PGE1. I believe that this group has been effective in fulfilling its purpose.

PGE4. I would recommend involvement in a group to others.

PGE6. This group provides resources that were not previously available to me.

PGE7. This group has increased my ability to collaborate and share with like-minded professionals.

PGS3. I enjoy interacting with other members in the group.

PGS5. I feel more satisfied with my work as a result of participating in this group.

PGS6. Overall, I feel satisfied with my experience in this group.

ECOP1. Our group is uniquely able to relate to one another because we have similar roles and/or interests.

ECOP7. A sense of community exists between members in our group.

MCON2. I now feel more connected to people doing similar work across the country.

Experienced Community Value   PGS4. My involvement in this group is voluntary.

ECOP4. Members of our group share real-world challenges

and successes.

ECOP6. Members in our group have a range of knowledge and experience with our shared interest.

Professional Culture of Growth (Peers)	SCP1. The administration/faculty in my school work collaboratively with one another.
	SCP2. The administration/faculty in my school actively engage in their own professional learning.
	SCP3. In my school, the administration/faculty are a team working together to achieve a common goal.
	SCP4. In my school, the administration/faculty have good working relationships with one another.
	SCP5. In my school, the administration/faculty frequently reflect on and discuss their practice with one another.
	SCP6. In my school, the administration/faculty act as professionals.
	SCP7. The working environment in my school makes it a great place to work.
	SCP8. When we have in-school professional development the administration/faculty are engaged and generally believe it is beneficial.
	SCP9. The administration in my school encourages one

another to grow and improve professionally.

Professional Culture of Growth (Supervisor)	SCS3. My supervisor encourages our school administration to work collaboratively with one another.
	SCS7. I have a good working relationship with my supervisor.
	SCS8. My supervisor views our school administration as professionals and treats us accordingly.
Group Leadership	L1. In my group, there are member(s) who fulfill a leadership role in the group.
	L2. The group leader(s) establish good relationships among the group members.
	L4. The group leader(s) encourage members to actively participate in the group.
	L6. The group leader(s) are experts in our group because of their knowledge and experience.
	L7. The group leader(s) provide mentoring to members of the group.
Learning Disposition	ID1. I actively seek out professional learning opportunities to help me grow.

ID4. I am a member of at least one professional organization associated with my field.

ID5. I regularly read professional publications associated with my field (print or online).

ID6. I follow professionals in my field through social media or blogs.

Collaborative Working Relationships	PI1. In my job, I work closely with a team of colleagues.
	PI2. My colleagues and I work collaboratively to fulfill our respective roles.
	PI3. In my job, I have regular collaborative meetings with colleagues to discuss professional issues.
	PI4. I have knowledgeable colleagues to whom I can go to for professional advice and help with work related issues.
Member Trust	T1. I trust most group members.
	T2. I feel the other group members trust me.
	T3. Based on my personal experiences, I believe others in my group communicate honestly with me.
	T4. I feel comfortable sharing my opinions and ideas with group members.
	T5. I feel comfortable sharing my frustrations and negative

	feelings with other group members.
	MCOM7. I am willing to share ideas with the group even if I don't get the credit.
Supervisor's Value of the Community	SCS1. My supervisor encourages our administration/faculty to connect with other Christian educators through ConNEXUS.
	SCS2. My supervisor uses ConNEXUS.
Member Commitment	MCOM1. I willingly devote time to the group even when it competes with my work.
	MCOM2. I feel good about my level of involvement in the group.
	MCOM3. I actively contribute to sharing knowledge in my group.
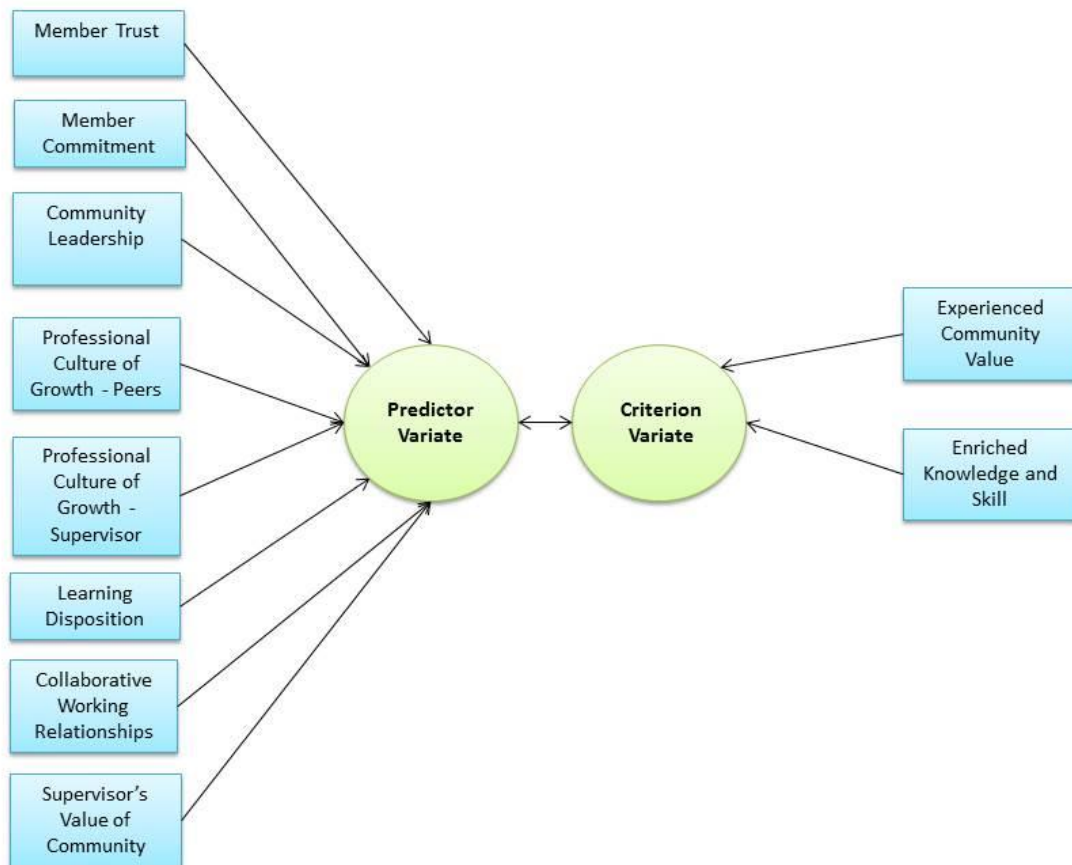
Figure 9. Revised research model with revisions made as a result of the validity and reliability analysis. The canonical correlation analysis for this study evaluates seven predictor variables and two criterion variables. Each set of variables is combined to develop a variate. These variates are then analyzed for correlation as representative of the variable sets from which they are derived.

Statistical Assumptions for Canonical Correlation Analysis

When used as a descriptive tool, canonical correlation analysis is not subject to normal distribution requirements in the data. However, when used as an inferential tool, the assumption of multivariate normality is required (Tabachnick & Fidell, 2007). This assumption is

challenging to assess on its own as tests of multivariate normality are not readily available, however, when the variables meet a univariate normal distribution, it may be assumed that multivariate normality is also met (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009; Tabachnick & Fidell, 2007).

Initial examination of normality was assessed for the raw data previously when preparing data for the factor analysis. However, before the canonical correlation analysis the raw data were transformed into indexes based upon the results of the factor analsyis and Cronbach's alpha analyses. Following the creation of these new composite variables, normality was once again assessed to ensure multivariate normality prior to the canonical correlation anaysis. This required an examination of normality, linearity, homoscedasticity, and multicollinearity (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009; Tabachnick & Fidell, 2007). The steps involved in assessing these assumptions and their results are provided here as measures of data preparation and assessment prior to the final canonical correlation analysis.

Data Transformation

Following the validity and reliability analysis, new indexes were created for each scale to reflect the results of these analyses through a new composite variable. The new composite variable was computed by summing the scale items as defined for each new scale under the new composite variable name. Once created, these variables were added to the SPSS file as new variables. Descriptive statistics and distributions were calculated for the new variables to ensure the appropriate calculation of the new values.

Normality

Canonical correlation (CCA) does not require that variables meet univariate normality. However, it does assume multivariate normality and this is more likely when the variables are normally distributed. In addition, the CCA is enhanced when the distribution is normal (Tabachnick & Fidell, 2007). Descriptive statistics were examined to assess univariate normality in the distribution of the ten factors.

Table 10

Descriptive and Distribution Statistics for Ten Composite Variables

N=641	*Min*	*Max*	*Mean*	*SD*	*Skew*	*SE*	*Kurt*	*SE*
EnrichedKnow_Skill	17.00	80.00	55.63	10.46	-.570	.097	1.12	.193
ProfCulture_Peers	18.00	45.00	37.78	5.34	-.672	.097	.379	.193
Learn_Disp	6.00	20.00	15.45	2.68	-.486	.097	.077	.193
Memb_Commit	3.00	15.00	8.44	2.20	.241	.097	.074	.193
Coll_Work_Relation	4.00	16.00	6.44	2.55	1.25	.097	1.667	.193
Comm_Leadership	10.00	25.00	16.81	2.71	.716	.097	.530	.193
Sup_Value_Community	2.00	10.00	6.45	2.11	-.148	.097	-.547	.193
Memb_Trust	11.00	30.00	21.22	3.13	.421	.097	.228	.193
EComm_Value	6.00	15.00	11.88	1.69	-.117	.097	-.083	.193
ProfCulture_Superv	6.00	15.00	12.99	1.92	-.920	.097	.475	.193

Note. N = population sample; Min = minimum; Max = maximum; SD = standard deviation; SE = standard error; Skew = skewness statistic; Kurt = kurtosis statistic

Descriptive statistics for the ten composite variables are shown in Table 10. Examination of the skewness and kurtosis coefficients for these variables indicated that the distribution of these variables was non-normal. With the exception of the Experienced Community Value and Supervisor's Value of the Community variables, the eight remaining variables indicated non-

normality with skew or kurtosis coefficients outside of the -1.96 to +1.96 range. Fisher's

measures of skewness and kurtosis indicate that when a skewness or kurtosis coefficient are

divided by their respective standard error statistic, the value must be within the -1.96 to +1.96

range to be considered normal (Abu-Bader, 2010). Inspection of the histogram and Normal

Probability Q-Q plots (see Appendix A.3.-A.19.) confirmed Fisher's measure for each of the

variables indicating they were not normally distributed.

The eight non-normal variables were transformed in an attempt to bring them into a

more normal distribution. Transformation attempts on Enriched Knowledge and Skill to

overcome a negative skew did not result in an improved distribution. A reflected log10,

reflected square root, and reflected inverse were all attempted and either increased the skew

or had little effect. Thus, this variable was not successfully transformed, while the Fisher

measure indicates a significant skew other references to ranges of skew employ a more liberal

range of coefficients between 0 and 1. By these less stringent standards, the variable may be

considered closer to a normal range (Mertler & Vannatta, 2005). The remaining variables were

improved through the transformations employed as seen in Table 11. Post-transformation

descriptive statistics, Q-Q Plots, and histograms confirmed an improvement in normality.

Univariate normality was thus assumed for all ten variables.

Table 11

Transformations Employed on Variables with Non-Normal Distribution

Variable	Transformation	SPSS Code for Transformation
ProfCulture_Superv	Reflected LOG10	COMPUTE T_ProfCultureSup_ref_lg10=LG10 (16 - ProfCulture_Superv).

		EXECUTE.
Memb_Trust	Square Root	COMPUTE memb_trust_Tsqrt=SQRT(Memb_Trust). EXECUTE.
Comm_Leadership	LOG10	COMPUTE Comm_Lead_T_LG10=LG10(Comm_Leadership). EXECUTE.
Coll_Work_Relation	Inverse	COMPUTE Coll_Work_Rel_Tinverse=1/Coll_Work_Relation. EXECUTE.
Memb_Commit	Square Root	COMPUTE memb_Commit_Tsqrt=SQRT(Memb_Commit). EXECUTE.
Learn_Disp	Reflected Square Root	COMPUTE T_LearnDisp_ref_sqrt=SQRT (21 - Learn_Disp). EXECUTE.
ProfCulture_Peers	Reflected Square	COMPUTE T_ProfCultPeers_ref_sqrt=SQRT (46 -

Root   ProfCulture_Peers).

EXECUTE.

Linearity and Homoscedasticity

A second precursor to assuming multivariate normality is establishing linearity (linear

relationships) and homoscedasticity between the pairs of dependent and independent

variables. Two methods were used to assess linearity and homoscedasticity–visual inspection

of bivariate scatterplots and residual plots– as recommended by Mertler and Vannatta (2005).

Overall, the bivariate scatterplots between the predictor and criterion variables indicated

various degrees of linearity and homoscedasticity. Supervisor's Value of the Community and

Collaborative Working Relationships tended toward heteroscedasticity in more of its

relationships with other variables in general. Residual plots generally tended toward linearity

between variables as well. Both methods of evaluation similarly confirmed that the assumption

of linearity and homoscedasticity was met.

Multicollinearity

Multicollinearity was assessed through an examination of Pearson correlation

coefficients. This assessment was confirmed through an evaluation of the tolerance and

variable inflation factors (VIF) obtained through a regression analysis. Correlation coefficients

greater than .800 indicate multicollinearity (Abu-Bader, 2010; Tabachnick & Fidell, 2007). The

correlation coefficients for the predictor and criterion variables in this analysis ranged from a

low of 0.051 to a high of 0.703 confirming the absence of multicollinearity. This assessment was

confirmed through a regression analysis of each of the criterion variables against the predictor

variables to generate the VIF and tolerance statistics. Interpretation of these values asserts tolerance values less than .100 and VIF values greater than 10 as indicators of multicollinearity (Abu-Bader, 2010; Tabachnick & Fidell, 2007). For the criterion and predictor regression analysis between Enriched Knowledge and Skill and all predictor variables, the tolerance values all exceeded .100 ranging from .441-.900 and the VIF values were all below 10 with ranges from 1.11 – 2.27. The regression analysis between Experienced Community Value and the predictor variables produced similar results with tolerance values exceeding .100 and ranging from .445-.907; VIF values were below 10 with a range from 1.10-2.25. These evaluations indicate that multicollinearity was not present within this variable set.

Each analysis testing the assumptions of canonical correlation analysis were successfully conducted. The results of assessments of normality, linearity, homoscedasticity, and multicollinearity all produced reasonable ranges to confirm the assumption was met and multivariate normality was assumed based on these results. With the assumptions met, the data was considered appropriate for canonical correlation analysis.

Data Analysis and Results

Employing canonical correlation analysis provided a means to explore if and how the variables in the predictor and criterion sets were related and to assess the strength and direction of the relationships. The predictor variables represented a set of internal characteristics of the community and external characteristics from the members' daily work lives (Member Trust, Member Commitment, Community Leadership, Professional Culture of Growth – Peers, Professional Culture of Growth – Supervisor, Learning Disposition,

Collaborative Working Relationships, and Supervisor's Value of the Community). The criterion

variables (Experienced Community Value and Enriched Knowledge and Skill) represented the

members' perceptions of their experience within a community of practice. Examining

correlations between these two factors through canonical correlation analysis allowed the

researcher to conduct one analysis that would explore all of the potential relationships

between these variables.

Evaluation of the Full Canonical Model

Analysis began with an evaluation of the full canonical model to determine whether

anything of statistical significance existed. Sherry and Henson (2005) caution researchers

engaged in general linear model (GLM) analyses to approach their work from a framework that

first seeks to determine if the analysis yielded anything of significance. They caution

researchers in this area not to delve into interpreting individual variable results without first

assessing if the analysis produced a significant model (Sherry & Henson, 2005). With this

recommendation in mind, the researcher approached interpretation of the analysis first to

determine if the analysis yielded anything of significance; did the analysis produce correlations

that were statistically significant and valuable to interpret? With confirmation of this, the

researcher then engaged in interpreting the results at a deeper level to determine what the

significant effect was and where the observed correlations were found.

Test statistics addressing the full model "evaluate the shared variance between the

predictor and criterion variables across all of the canonical functions" (Sherry & Henson, 2005,

p.42). Analysis of this model produced two canonical functions. The number of possible

canonical functions is limited by the total number of variables in the smaller of the two

(predictor and criterion) sets (Abu-Bader, 2010). With only two variables in the criterion set analyzed in this study, there were only two canonical functions possible in the results. SPSS analysis calculates four methods for establishing statistical significance for the full model as seen in Table 12. Of the four methods provided, Wilks' lambda (λ) is the most commonly used method and the one that was used to establish statistical significance for this model (Abu-Bader, 2010; Sherry & Henson, 2005).

Table 12

Four Methods of Evaluating Full Model Statistical Significance Calculated by SPSS

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.73.63	48.82797	16.00	1264.00	.000
Hotellings	1.94337	76.52036	16.00	1260.00	.000
Wilks	.31345	62.00774	16.00	1262.00	.000
Roys	.64371				

In this analysis, the full model was statistically significant with a Wilks' lambda λ = .313, $F (16, 1262) = 62.01$, $p < 0.001$. By nature, Wilks λ values are more of an inverse-effect measurement in that they report the amount of variance that is not shared between the functions. In other words, this value indicates the amount of variance not explained by the full model (Nimon, Henson, & Gates, 2010; Sherry & Henson, 2005). Because of this, the overall

effect of the variance can be found by taking $1 - \lambda = R_c^2$, thus, $1 - .313 = .687$. This value (R_c2) is interpreted in the same way as the multiple R^2 in regression as it describes the "proportion of variance shared between the variable sets across all functions" (Sherry & Henson, 2005, p.42). Therefore, the Wilks' lambda and R_c^2 confirm a statistically significant full model explaining 68.7% of the shared variance between the variable sets.

After confirming that the full model was significant, each canonical function was evaluated individually. In CCA, the first function is created to maximize the correlation between the two synthetic variates – one variate for the predictor variables and one variate for the criterion variables (refer to Figure 9) – to explain as much of the observed variance between the variable sets as possible. The second and subsequent canonical functions are then created to explain as much of the remaining observed variance, that which is leftover (or not explained) after the first canonical function (Sherry & Henson, 2005). Because the second canonical function is explaining the observed variance that is leftover, or not explained by the first function, the two functions are uncorrelated (orthogonal) to one another.

Table 13

Eigenvalues and Canonical Correlations for Both Canonical Functions

Function	Eigenvalue	Canonical Correlation	Squared Correlation
1	1.80668	.80231	.64371
2	.13670	.34678	.12026

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The two functions produced in the analysis explained 64.4% and 12% of the variance respectively. The canonical correlation and squared correlation for each function are provided in Table 13 where the squared correlation represents the amount of variance explained by each function. Remember that the full model explained 68.7% of the observed variance between the predictor and criterion variable sets. Of this variance, Function 1 explained 64.4% of the total variance observed in the model and Function 2 explained 12% of the variance remaining. Added together these variances appear to explain more variance at 76.4% than the full model explains at 68.7%. This seeming discrepancy is due to the uncorrelated nature of the two functions (Nimon, Henson, & Gates, 2010).

As orthogonal functions, Function 1 explains as much of the total observed variance in the model as possible at 64.4%. The canonical correlation coefficient for Function 1 (R_c = .802 as seen in Table 13) indicates that the correlation between the predictor variate and criterion variate in this function are strongly, positively correlated. The variance remaining, that which is not accounted for by Function 1, is then leftover to be explained as optimally by Function 2 as possible, in this case at 12%. While this is a relatively low portion of the variance explained by Function 2, the canonical correlation coefficient for Function 2 indicates that the predictor and criterion variates in this function are moderately, positively correlated (Laerd Statistics, 2015; Sherry & Henson, 2005).

Nimon and Reio (2011) identify a canonical correlation at R_c< .300 as a limit for interpreting the results of a function. Function 2 exceeded this value at R_c = .347. The dimension reduction analysis further examined the significance of the functions independently and calculated a Wilks' λ and significance value for Function 2. The effect of the variance

accounted for by Function 2 was statistically significant with a Wilks' lambda λ = .88, F (7, 632) = 62.01, p < 0.001. Table 14 provides these values found through the dimension reduction analysis. The reader may recognize that the Wilks' lambda for Function 1 is a familiar number discussed earlier in reference to the significance of the full model, remember that this is because Function 1 attempted to account for the full model's observed variance.

Given that both Function 1 and 2 were individually statistically significant (p<.001) and accounted for compelling portions of the variance with moderate (Function 2) to strong (Function 1) positive correlations between their respective predictor and criterion variates, both functions are candidates for further analysis. However, the proportion of variance explained by Function 2 at 12% is low. When one considers that this 12% is not a 12% portion of the entire variance, but rather that portion of the 68.7% of total variance described by the model that is leftover after Function 1 accounts for 64.4% of it; in light of this the 12% is a less significant explanation of the variance. Based upon this assessment and precedent for interpreting canonical functions with low proportions, despite its statistical significance and positive correlation, it does not explain a sufficient portion of the total explained variance to warrant continued analysis. Thus, Function 2 was removed from further analysis and only the results of Function 1 are interpreted in this study (Abu-Bader, 2010; Bone, 2013; Hair, Black, Babin, & Anderson, 2009; Sherry & Henson, 2005).

Table 14

Statistical Significance Tests for Each Individual Function – Dimension Reduction Analysis

Functions	Wilks λ	Approx. F	Hypoth. DF	Error DF	Sig. of F
Function 1	.31345	62.00774	16.00	1262.00	.000

Function 2	.87974	12.34164	7.00	632.00	.000

Evaluation of the Canonical Function

Having established that a statistically significant effect was observed in the full canonical model, the evaluation moved toward examining from where the effect originated. This involved examining the relationships of the individual variables with their canonical variates through their canonical weights, structured coefficients, squared structure coefficients, cross loadings and squared cross loadings. Each of these statistics describes the relationships between the variable and their canonical variate from a slightly different perspective and is useful in describing the relationships.

Canonical weights (called beta weights in regression analysis) describe the "relative contribution of one predictor to the criterion given the contribution of other predictors" (the predictor's contribution to its own variable set's variate) and are advantageous for interpretation because they account for changes in the variable sets (Sherry & Henson, 2005, p.43). Structure coefficients (or correlations) are more often examined in multivariate analyses and describe the "simple linear correlation between an original variable in the dependent or independent set and the set's canonical variate" (Hair, Black, Babin, & Anderson, 2009, p.23). The squared structure coefficient indicates the proportion of shared variance between the variable and its own set's variate (Sherry & Henson, 2005). While the structure coefficient describes how a variable contributes to it's own variate, the cross-loadings describe how the variable correlates to the opposite set's variate. Thus, the cross-loadings "provide a more direct

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measure of the dependent-independent variable relationships by eliminating an intermediate step [the variable's own variate]" (Hair, Black, Babin, & Anderson, 2009, p.24). The squared cross-loadings describe the proportion of variance in a variable that is explained by the opposite set's variate (Hair, Black, Babin, & Anderson, 2009).

There seems to be some divergence among researchers as to which of these statistics should be used as the primary statistic for interpretation of the variable-variate relationship. Hair et al. (2009) state that three primary methods for interpretation exist in the literature. Each of these methods are defined by the statistic that is identified for interpretation: the weights, the correlations (structured coefficients), or the cross-loadings. These interpretation methods and variations of the methods are evident in the literature (Abu-Bader, 2010; Hair, Black, Babin, & Anderson, 2009; Nimon & Reio, Jr., 2011; Sherry & Henson, 2005; Tabachnick & Fidell, 2007).

A common standard for interpretation is the use of canonical weights and structure coefficients when interpreting canonical functions. Structure coefficients are valuable when multicollinearity exists between variables and contribute to the understanding provided by the canonical weights (Nimon & Reio, Jr., 2011; Sherry & Henson, 2005). Given that variables in canonical correlations are often grouped in variable sets because of their logical relationship to one another, using structure coefficients in interpretation is helpful to overcoming the frequent presence of multicollinearity (Sherry & Henson, 2005). Other researchers, however, point to the variability that can exist in structure coefficients across samples and caution their use because of this instability (Hair, Black, Babin, & Anderson, 2009). In light of these concerns, canonical cross-loadings are recommended as a preferred method for interpretation due to their stability,

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when loadings are not available, structure coefficients are recommended as a secondary

method of interpretation (Hair, Black, Babin, & Anderson, 2009). For this study, the researcher

interpreted the results by first examining the cross-loadings and then looked to the structure

coefficients and weights for confirmation of the effect.

Table 15

Variable Weights, Structure Coefficients, and Cross-Loadings for Function 1

Variable		Canonical Weight	Structured Coefficient (Correlation)	Squared Structure Coefficient (Correlation)	Cross Loadings	Squared Cross Loadings
Predictor Variables						
Professional Culture - Peers		-.061	-.294	.086	-.236	.056
Learning Dispositions		-.015	-.239	.057	-.192	.037
Member Commitment		.208	.665	.442	.533	.284
Collaborative Work Rel.		.053	.202	.041	.162	.026
Community Leadership		.339	.788	.621	.633	.401

Supervisor's Value of Community		.140	.374	.140	.300	.09
Member Trust		.576	.900	.810	.722	.521
Professional Culture – Supervisor		.060	-.159	.025	.127	.016
R_c^2				.644		
Criterion Variables						
Enriched Knowledge & Skill		.870	.992	.984	.796	.634
Experienced Community Value		.176	.776	.602	.622	.387

Note. Loadings and correlation coefficients are interpreted as correlated at |.30| and above R_c^2 = squared canonical correlation for Function 1

Criterion Variable Effects. Statistics for Function 1 of the canonical analysis are shown in Table 15 providing the canonical weights, structure coefficients, squared structure coefficients, cross-loadings and squared cross-loadings for each variable. The criterion variables' cross-loadings showed a moderate to high, positive correlation between Enriched Knowledge and Skill (.796) and the Experienced Community Value (.622) variables and the predictor variate. The squared cross-loadings for each of these variables indicated that 63.4% of the variance in Enriched

Knowledge & Skill and 38.7% of the variance in Experienced Community Value are explained by the predictor variate.

The predictor variables seemed to explain the variance shared by the criterion variables well. This was evidenced by the structure coefficients and squared structure coefficients for Enriched Knowledge and Skill and Experienced Community Value. Enriched Knowledge and Skill and Experienced Community Value both exhibited strong, positive correlations to their variate with structure coefficients of .992 and .776 respectively. The squared structure coefficient revealed that these variables contributed 98% and 60% of the shared variance between each of these respective variables and the criterion variate. In general, the weight and structure coefficients agreed with the cross-loadings statistics supporting a moderate to high, positive correlation between the criterion variables and their own variate and strong, positive correlation between the variance of these variables and the predictor variate.

Predictor Variable Effects. Referring again to Table 15, cross-loadings statistics showed that *member trust*, *community leadership*, and *member commitment* had the highest correlation with the criterion variate with values of .722, .633, and .533 respectively. The *supervisor's value of the community* showed a cross-loading coefficient of .300 which is at the recommended minimum limit for correlation (Abu-Bader, 2010; Tabachnick & Fidell, 2007). With such a low correlation, the correlation is reported here as valid for interpretation but with caution as discussed further in the next chapter. The four remaining variables did not reveal cross-loadings higher than .300 and thus did not contribute substantially to the model as an explanation of variance. The squared cross-loadings for each of these variables indicated that 52.1% of the variance in *member trust*, 40.1% of the variance in *community leadership*, 28.4% of the variance

in *member commitment*, and 9% of the variance in *supervisor's value of the community* were explained by the criterion variate.

The criterion variables seemed to explain the variance shared by the predictor variables well. This was evidenced by the structure coefficients and squared structure coefficients. *Member trust* exhibited the strongest, positive correlation to the predictor set variate with a coefficient of .900. *Community leadership* and *member commitment* similarly reported moderate to strong, positive correlation with .788 and .665 respectively. Again, *supervisor's value of the community* revealed a coefficient above the .300 limit with a coefficient of .374. The squared structure coefficient revealed that these variables contributed substantially toward the shared variance between each of the respective variables and the predictor variate with proportions as follows: *member trust*, 81%; *community leadership*, 62.1%; *member commitment*, 44.2%; and *supervisor's value of the community*, 14%. In general, the results of the canonical weights, structure coefficients, and cross-loadings all agreed and arrived at complementary interpretations.

In summary, the canonical correlation analysis derived a single function that revealed the relationships between characteristics of a community as well as factors existing in member's lives outside the community (predictor variables) and member's perceptions of their experience in the community of practice (criterion variables). The model demonstrated that three of the predictor variables were substantially, positively correlated to the criterion variables with one additional predictor exhibiting a less substantial but still positive correlation. This reveals that as positive changes occur in the predictor characteristics, positive changes may be expected as a result in the criterion variables.

CHAPTER 5

DISCUSSION

Introduction

The focus of this research was to explore the impact of a number of factors on the perceptions of members participating in Communities of Practice. In particular, this research sought to reveal the extent to which the members' perceptions of the community - specifically their perceptions of the community's effectiveness and their satisfaction with their experience as members – were impacted by characteristics within the community and factors existing in the professional lives of the members outside the community. Three research questions framed this study and defined it objectively. This research sought to: 1) examine the extent to which members of the community experienced a community of practice as evidenced by their perceptions of characteristics of shared domain of interest, community, and shared practice within the community; 2) explore the extent to which the internal characteristics of the community related to member perceptions of community effectiveness and satisfaction with their community experience; 3) explore the extent to which external (to the community) factors in the lives of community members related to member perceptions of community effectiveness and satisfaction with the community experience.

A canonical correlation analysis (CCA) provided a means to examine two sets of variables in a single analysis to explore the relationships between the variables and determine how the variables related to one another in strength and direction. The predictor variables comprised the characteristics of the community that were believed, based upon prior empirical research (Hemmasi & Csanda, 2009), to have an effect on members' perceptions of community

effectiveness and satisfaction with their community experience. These variables, Member

Trust, Member Commitment, and Community Leadership represented these internal

characteristics within the predictor variable set. The other variables in this set, Professional

Culture of Growth - Peers, Professional Culture of Growth – Supervisor, Learning Disposition,

Collaborative Working Relationships, and Supervisor's Value of the Community completed the

predictor variable set. These five variables represented additional factors believed to

potentially have an external effect on members' perceptions of the community experience and

were derived from an examination of the literature (see Chapter 2). The criterion set of

variables represented the members' experience within their community group and sought to

assess their experience through items related to the defining characteristics of a community of

practice (shared domain of interest, community, and shared practice) as well as their

perceptions of effectiveness and satisfaction. Following realignment of items in the factor

analysis, these elements were represented by the Experienced Community Value and Enriched

Knowledge and Skills variables.

Overall, the model derived through the CCA provided a logical explanation of where and

how relationships existed between these variables. As a multivariate analysis of correlation, it is

important that the reader remember that the results of the analysis do not imply causality;

rather the results indicate relationship between the variables and description of its strength

and direction. Based upon this understanding of correlation among variables, this chapter will

provide the results of the analysis followed by a concluding discussion of the results. Finally,

recommendations are suggested for further research on Communities of Practice in online

environments.

Summary of Results

Of the 742 individuals who completed the online survey, 533 (71.8%) were female and 209 (28.2%) were male. Respondents identified their age bracket from 21-29 to 70-79 with the most frequently reported age bracket (at 34.8%) being 50-59. Individuals holding a BA/BA degree accounted for 280 respondents, those with MA/MS degrees accounted for 394 respondents, and those reporting an Ed.D. or Ph.D. totaled 50 and 18 respectively. Respondents also identified their role within their school, 438 (59%) indicated they were administrators and 304 (41%) identified as school faculty/staff. The majority of respondents indicated that they were responding from within the United States at 692 (93.3%) and 50 (6.7%) were outside of the United States. It is important to note that this designation does not define nationality of the respondents. While the respondents outside of the United States may be of foreign nationality, it is also possible that they are U.S. citizens serving in international or national schools abroad as ACSI membership comprises both of these types of schools. Finally, respondents identified the length of time they had been participating in their community group. Respondents identifying participation under a year comprised 139 (18.7%) of responses, 1-2 years was identified 289 times (38.9%), 3-4 years was identified 215 times (29%), and more than 4 years was indicated 99 times or 13.3%.

The degree to which members perceived the structural components of a community of practice - the shared domain of interest, shared practice, and sense of community - were evaluated by three questions embedded within the survey instrument. Of these responses, 72.5% indicated agreement that shared practice existed within their community (4.5% disagreed, 23% neutral). A shared domain of interest was positively confirmed by 75.7% of

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respondents (1.4% disagreed, 22.8% neutral). Finally, evidence of community as assessed by feelings of goodwill among community group members was positively acknowledged by 70.7% of respondents (2% disagreed, 27.4% neutral).

The full model resulting from the CCA was statistically significant with a Wilks' lambda λ = .313, $F (16, 1262)$ = 62.01, $p < 0.001$ and R_c^2 = .687. The model comprised a predictor variable set that included eight variables: Member Trust, Member Commitment, Community Leadership, Professional Culture of Growth - Peers, Professional Culture of Growth – Supervisor, Learning Disposition, Collaborative Working Relationships, and Supervisor's Value of the Community. The criterion variable set included two variables: Enriched Knowledge and Skill and Experienced Community Value. While the CCA produced two statistically significant models, only the first model explained a sufficient proportion of the variance to be considered for interpretation. Function 1 accounted for 64.4% of the total observed variance in the model and produced a strong, positive correlation between the predictor and criterion variate (R_c = .802).

Four predictor variables made the largest contributions to the predictor variate: Member Trust, 81%; Community Leadership, 62.1%; Member Commitment, 44.2%; and Supervisor's Value of the Community, 14%. In addition, the criterion variate played a significant role in explaining the variance found in these four predictor variables. The criterion variate explained 52.1% of the variance in Member Trust, 40.1% of the variance in Community Leadership, 28.4% of the variance in Member Commitment, and 9% of the variance in Supervisor's Value of the Community.

The criterion variables contributed to the criterion variate at 98% for Enriched

Knowledge and Skill and 60% for Experienced Community Value. Again, the opposite variate, in

this case the predictor variate, significantly explained the variance found in both of the criterion

variables. The predictor variate explained 63.4% of the variance in Enriched Knowledge & Skill

and 38.7% of the variance in Experienced Community Value.

Ultimately, Member Trust, Community Leadership, and Member Commitment exhibited

the strongest, positive correlations to the criterion variate with correlations of .722, .633, and

.533. A secondary effect surfaced with a less substantial but still positive correlation in

Supervisor's Value of the Community with a correlation of .300. This reveals that as positive

changes occur in these predictor characteristics, positive changes may be expected in the

criterion variables as well. The four remaining predictor variables revealed insubstantial effects

on the criterion variate that did not meet the .300 limit for identifying correlation: Professional

Culture of Growth – Peers (-.236), Professional Culture of Growth – Supervisor (.127), Learning

Disposition (-.192), and Collaborative Working Relationships (.162). These results are further

discussed in the next section.

Concluding Discussion of the Results

The following discussion addresses the outcome of the study with regard to each

research question.

Research Question 1: to what extent are members experiencing a community of practice as
evidenced through their identification of CoP characteristics related to the shared domain of
interest, community, and shared practice within the community?

Results from this study reveal that more than 70% of the responding community members identified the defining structural components of a community of practice: shared domain of interest, shared practice, and community. These results suggest that more than 2/3 of the members were experiencing a community of practice within their identified community groups. With respect to the communities identified by respondents (see Table 6), it appears that the shared domain identified by respondents often relates to the common roles shared by members in their respective schools (school administrators, curriculum coordinators, foreign language teachers) or shared interests related to performing their roles (advanced placement, mathematics, classroom technology).

Respondents indicated that shared practice existed within their communities in the form of shared knowledge, best practices, and resources with 538 respondents positively confirming this exchange within their community. In addition, 520 respondents confirmed that community members shared real-world challenges and successes with one another. The third structural component, community, was assessed through feelings of goodwill among members. A question initially was included in the survey that asked specifically if "a sense of community" existed between members of the group; however, a definition of "sense of community" was not provided for the respondents. Responses to this question indicated 345 respondents agreeing and 320 neither agreeing nor disagreeing, with only 77 respondents indicating disagreement. The high number of neutral responses creates difficulty in definitively interpreting the responses to this question. Thus, the researcher determined to assess the existence of community by also considering the related question assessing feelings of goodwill among members. Feelings of goodwill existed among members in the community with 524

respondents confirming this feeling. These responses suggest the presence of community, the third defining structural component of a CoP. Based upon these results, the researcher believes that most (more than 70%) of respondents experienced a CoP within their respective communities and as such, the remaining two research questions building upon the CoP experiences of members are valid.

Research Question 2: to what extent do community characteristics related to the member's sense of trust, community leadership, connections with community members, sense of member commitment to the community, and perceived impact on the member's job relate to member perceptions of community effectiveness and satisfaction with the community experience?

The second research objective sought to determine the relationship between internal characteristics of the community and member perceptions of community effectiveness and satisfaction with their community experience. The CCA analysis indicated that a correlation between *member trust*, *community leadership*, and *member commitment* existed. As such, when these characteristics are increased or improved within the community, the positive perceptions of community members will also improve or increase. In essence, when an online community exhibits trust between members, strong leadership, and members committed to the community, the community members will perceive an increase in the level of knowledge and skill gained as a result of their community experience and perceive higher value in the experience. For communities such as these, created for the purpose of professional learning and connection for educators, an increase in knowledge and skill and perceived value from the community experience indicates communities that are effective and likely satisfying to members. Thus, in these communities, perceptions of effectiveness and satisfaction are intricately linked to increases in members' professional knowledge and skill and the value ascribed to the community experience by its members.

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In the literature, trust is a critical component to effectiveness in CoPs. Trust is not only necessary as a foundation for knowledge sharing, but they are also mutually reinforcing such that when knowledge sharing occurs, trust builds (Booth, 2012). With 73% of respondents reporting knowledge sharing activities within the community, one can infer that trust is also being established within these communities. Trust is also necessary for maintaining a membership that is integrated and cohesive within the community (Hoy & Tschannen-Moran, 1999). It is connected to the development of leadership within the community and the leaderships' ability to perpetuate a knowledge sharing environment (Booth, 2012). The connections in the literature between trust and traits of participants' commitment, knowledge sharing, and leadership support the results of the CCA. The CCA results identified the relationship between trust, member commitment, and leadership in the predictor variate as influential on the members' perceptions of their community experience. It is important to remember that this does not imply causality, rather a linear relationship which indicates that when these characteristics within a CoP increase, so too do member value perceptions of community effectiveness and satisfaction.

While the literature supports the CCA results with regard to *member trust*, *member commitment*, and *community leadership*, it is interesting to note how these results compare to the results found in the previous study conducted by Hemmasi and Csanda (2009). In their study, Hemmasi and Csanda (2009) found that member commitment and trust in other community members seemed unrelated to perceptions of overall community effectiveness. Instead, impact on members' jobs, feelings of connectedness with other members, and the strength of community leadership were significant to overall perceptions of effectiveness.

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However, when considering members' perceptions related to the impact of their job participation, *community leadership* and *member commitment* were significantly, positively related (Hemmasi & Csanda, 2009). In this study, members' perceptions of job impact and community effectiveness were aligned into a single construct (*enriched knowledge and skill*) following the factor analysis. Because of this, it is more challenging to make direct comparisons with Hemmasi and Csanda's original study however, it is evident that community leadership and *member commitment* are significant contributors in both studies to members' perceptions of the community experience.

Within the criterion variate, the squared structure coefficients for *enriched knowledge and skill* and *experienced community value* revealed that these criterion variables contributed 98% and 60% of the shared variance with the criterion variate. The squared cross-loadings for each of these variables indicated that 63.4% of the variance in *enriched knowledge and skill* and 38.7% of the variance in *experienced community value* are explained by the predictor variate. As a construct, the *enriched knowledge and skill* variable was comprised most significantly of items assessing *perceived job impact*, then *perceived community effectiveness*, and *perceived satisfaction*. The *enriched knowledge and skill* variable also contributed a higher percentage of the shared variance with the criterion variate. These results indicate that when the characteristics of trust, member commitment, and community leadership increase in a community purposed to provide professional learning and connection for educators, the educators' will also perceive an increase in their knowledge and skills related to their job. Simultaneously, member perceptions related to the effectiveness of the community and their satisfaction with the community experience will also increase.

Survey respondents identified the length of time they had been participating in their respective communities with 42.3% indicating they had been participating for 3 or more years and 81.2% indicated they had been participating for a year or more. At the time of this study, the community had only been operating for 4.5 years. While the longevity of participation evidenced in the member responses does not directly confirm an increase in knowledge and skill as a result of participation or equate with perceptions of community value, it might seem to indicate a certain level of satisfaction with their experience in the community. If participants in the community were not deriving a benefit from their participation (such as increased knowledge and skills and professional support through connection with other educators), it would seem likely that they would cease to participate in the CoP, however, close to half (42.3%) of the participants have continued as members for three or more years.

Based upon these results, the researcher believes that as *member trust, member commitment*, and *community leadership* increase within a CoP for educator professional learning and connection, the members will also perceive an increase in their professional knowledge and skill and perceive greater value in their community experience. The longevity of members' participation in the communities studied here suggests that there are members experiencing these benefits of participation.

Research Question 3: to what extent do external factors in the professional lives of members, namely the member's sense of professional isolation, their personal disposition toward learning, and the awareness of their school cultures' valuation of professional growth as perceived in peers and administration, relate to member perceptions of community effectiveness and satisfaction with the community experience?

The third research objective, also addressed by the results of the CCA, explored external (to the community) factors in the lives of community members believed related to member

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perceptions of community effectiveness and satisfaction with the community experience. Four variables were originally derived from the literature but realigned to five constructs as a result of the factor analysis. Of these five variables, only one variable evidenced a sufficient correlation and cross-loading with the criterion variate in the results. *supervisor's value of the community* met the limit value for cross-loading at .300 and had a low correlation at .374. While this does not indicate a strong relationship between community effectiveness and satisfaction, it does evidence a positive relationship. This variable was comprised of items that assessed the degree to which a supervisor modeled community participation through their own participation and the degree to which they encouraged those they supervise to participate in the community themselves. Despite the lack of strength in this relationship, it does evidence support that the actions of a supervisor, whether a school administrator (for faculty) or head of school or school board (for administrators), through their modeled use and encouragement of community participation clearly have an effect on their subordinates. This result coheres in the literature through the positive influence made by principals who model learning in their leadership (Drago-Severson, 2012) and who encourage teachers to engage in their own learning (Granger, Morbey, Lotherington, Owston, & Wideman, 2002).

The remaining four predictor variables comprised of external characteristics did not evidence sufficient correlation to identify them as variables correlating with effect in the model. Two predictors, however, *professional culture of growth – peers* and *learning dispositions* both evidenced structure coefficients just below the .300 limit for correlation with -.294 for the first and -.239 for the second variable and cross-loadings of -.236 and -.192 respectively. While not sufficiently correlated with coefficients less than .300, the direction of the relationship is of

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interest. Both variables indicated an inverse or negative relationship such that when the

professional culture of growth among peers decreased or was low in a school setting, the

perceptions of *enriched knowledge and skill* and *community value* (the criterion variate)

increased. This inverse effect also exists in the relationship with learning dispositions such that

when an individual's disposition toward learning – their self-efficacy in developing their own

methods and engaging in their own means of professional learning – decrease or are low, the

perceptions of the criterion variate again, increase. These relationships, while inconclusive

here, are worthy of further consideration.

 Collaborative working relationships evidenced a positive directionality but did not

produce scores sufficient for further consideration with a structure coefficient below the .300

limit for correlation and a cross-loading of .162. The researcher was surprised by the direction

of this relationship, as an inverse relationship seemed more theoretically likely. This variable

assessed the degree of collaboration and strong working relationships existing within the

members' school. Theoretically, one might assume that where these relationships existed the

value and impact of the community experience would decrease. Further investigation into the

impact of this variable is necessary before inference on this construct's effect on a CoP can be

made. Similarly, the variable *professional culture of growth - supervisor* produced a positive,

albeit minimal, effect on the criterion variate with a cross-loading of .127 however, the

direction of correlation with the predictor variate was negative (and again small at -.159). The

minimal effect between this variable and the predictor and criterion variates suggests that

further research is necessary before any inference may be asserted on this construct.

In summary, this research yielded several noteworthy results with implications beyond this study. Online community organizers, developers, or leaders might consider the impact of member trust, member commitment, and community leadership on the perceptions and experiences of their members. For those engaged in developing successful communities, the import of these characteristics within the community should be considered.

Administrators and Heads of School might consider the impact of their modeling behaviors and encouragement given to their subordinates (faculty/staff and administrators) to participate in professional learning communities and online activity. This research revealed that a positive relationship exists between these behaviors on the part of school leaders and school personnel perceiving increases in their perceived knowledge and skill and value in the community. Whether the effect of these increased perceptions is due to an increase in attribution of value to the community solely based on a supervisor's encouraging behaviors, or based on school personnel engaging more readily with the community because of the supervisor's encouragement and thus perceiving increases in knowledge, skill, and community value because of their experience is unclear. Additional investigation through research specifically to define the impact of the supervisor's effect is recommended.

Finally, inverse relationships were found between an individual's learning dispositions and the culture of growth among peers within a school to the criterion variables indicating increases in knowledge and skill and value in the community experience. This suggests that online communities for professional learning are considered more valuable when an individual's learning disposition is low – characterized by an individual not engaged in professional learning through their own reading or association with other professionals and

professional learning activities in the field. Similarly, the online community for professional learning would be considered more valuable if an educator was working in a school culture with peers not particularly supportive of professional growth and learning. When these constructs are limited in an educator's life and work experience, the results of this study suggest that they find an increase in the value and benefit of an online professional learning community. More research is needed to further explore these implications; however, these results provide insight for online community leaders and school leaders as they relate to CoPs.

Recommendations for Further Research

The results of this study must be considered cautiously when generalizing the results to another population. This study explored online communities of practice providing professional learning and connection to Christian school educators participating in 25 communities within a larger network of communities. This research suggests that members of these communities were experiencing a community of practice as evidenced by their identification of a shared domain of interest, community, and shared practice within their online communities and this validated these online communities as CoPs. Further, this research suggests that community characteristics within the community are significant contributors to members' perceptions about the community and their experience within it. In addition, there is some support for considering factors existing outside the community, in the daily lives of members, as also impacting members' perceptions of the community and their experience. In this study, those external factors were specific elements of educators' experiences within a school as a school faculty member or administrator and largely related to professional growth attitudes and

opportunities within the school setting. Further research is required to examine how external factors may impact perceptions of the community experience across different populations and among communities existing with different purposes.

With regard to the criterion variables, further research is needed to better understand the role of job impact and effectiveness and satisfaction. Within this study, the job impact construct (assumed through the factor analysis into the *enriched knowledge and skill* variable) was combined with the effectiveness and satisfaction measures. Additional research identifying the relationship between effectiveness and satisfaction apart from job impact would be informative, especially as it incorporated dimensions of emotional connection within the community. Research conducted on CoPs in educator professional learning identify emotional sharing and support as important aspects of the community and intricately related to knowledge sharing and trust (El-Hani & Greca, 2013; Hur & Brush, 2009; Routman, 2002). Further research exploring the role of emotional sharing, apart from skill and knowledge activities, and how role impacts value perceptions could be helpful to community moderators and leaders; in addition, it may provide further insight into the role of emotional sharing and support in educators' professional growth.

The predictor variables leave significant room for exploration of how professional culture within a school impacts the online professional learning and community experience would benefit online communities and also those engaged in professional development for educators. Increased understanding of the role that collaborative faculty relationships and individual learning dispositions play on educators' participation in online learning communities will provide researchers with a better understanding of characteristics of CoP participation. The

reader is reminded that the inter-item consistency analysis resulted in a low alpha value for the

learning dispositions scale at .647 and the scale was retained with caution for interpretation.

This indicated a potential issue with the scale employed to assess the *learning dispositions*

construct and as such, warrants further investigation into this construct and its potential impact

on members' participation and value perceptions. With the identification of a positive

relationship between supervisors' modeling and encouragement of staff participation in the

community, further investigation of this construct is also recommended.

Exploration of the *member connection* construct is also encouraged. Hemmasi and

Csanda (2009) linked *member connection* to *perceived job impact*, *perceptions of effectiveness*,

and satisfaction. However, the *member connection* items in this study cross-loaded in the factor

analysis and with one exception were removed from the analysis. Further exploration of this

construct would lend validation to the Hemmasi and Csanda (2009) study.

Summary

This research resulted in the identification of relationships between internal

characteristics of an online CoP and external factors in the lives of community members,

specifically the lives of educators engaged in professional learning within the community, on

the members' perception of the community. The canonical correlation analysis derived a single

function which best modeled the relationships between the variables. This function (Function 1)

explained 64.4% of the total observed variance between the predictor and criterion variable

sets. A second canonical function was initially derived and considered statistically significant,

however, its explanation of the shared variance was insubstantial and did not warrant

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interpretation. The most significant relationships - which were strongly, positively correlated - existed between *member trust, member commitment*, and *community leadership* (in the predictor variate) and *enriched knowledge and skill* and *experienced community value* (in the criterion variate). *Member trust* and *enriched knowledge and skill* were the strongest variables within the function.

The results of this study indicate that the canonical model provides a good explanation of the relationships within an online CoP for educators engaged in professional learning and community. Caution must be taken when attempting to generalize the results of this study beyond this population, however, the model may be useful to community developers or leaders engaged in creating or managing online communities for educator professional learning. It may also be useful to school leaders seeking to provide professional growth and support for their school personnel. Researchers may find this study rife with additional questions and directions for further research.

This research evidenced internal CoP characteristics and external factors to the online CoP environment that indicated significant, positive relationships as predictors to the criterion perceptions of value held by community members. With regard to their experience in the CoP, participants identified their online communities as CoPs through recognition of the shared domain, shared practice, and community elements. As a result of participation, members perceived an increase in their professional knowledge and skill and found value in their experiences within the CoP. Members also experienced online relationships with other educators that developed elements of trust and commitment. This correlational study provided empirical research into the implementation of online CoPs in professional learning for

educators. The results of this study suggest that online CoPs may be effective in providing professional learning opportunities for educators and warrants further investigation in implementing online CoPs for professional learning.

APPENDIX A

DESCRIPTIVE STATISTICS

A.1. Descriptive Statistics for All Variables

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PI1 - RC	742	1	4	1.50	.779	1.710	.090	2.593	.179
PI2 - RC	742	1	4	1.61	.739	1.270	.090	1.650	.179
PI3 - RC	742	1	4	1.73	.860	1.209	.090	.941	.179
PI4 - RC	742	1	4	1.66	.756	1.246	.090	1.652	.179
PI5	742	1	5	3.65	1.495	-.656	.090	-1.145	.179
PI6 - RC	742	1	5	2.02	1.063	1.124	.090	.610	.179
PI7 - RC	742	1	5	2.41	1.159	.778	.090	-.408	.179
PI8	742	1	5	2.27	1.336	.854	.090	-.558	.179
PI9	742	1	5	2.26	1.049	.652	.090	-.304	.179
PI10	742	1	5	3.56	.885	-.604	.090	.446	.179
ID1	742	2	5	4.23	.720	-.837	.090	.851	.179
ID2	742	1	5	3.87	.994	-.933	.090	.447	.179
ID3 - RC	742	1	5	3.77	1.017	-.825	.090	.163	.179
ID4	742	1	5	3.86	1.103	-.973	.090	.048	.179
ID5	742	2	5	4.04	.854	-.858	.090	.365	.179
ID6	742	1	5	3.35	1.170	-.417	.090	-.903	.179
ID7	742	1	5	3.80	1.492	-.766	.090	-1.068	.179
ID8	742	1	5	3.32	1.207	-.272	.090	-1.072	.179
ID9	742	3	5	4.30	.580	-.152	.090	-.587	.179
ID10	742	3	5	4.66	.513	-1.089	.090	.047	.179
SCS-TF1	742	1	5	3.16	1.176	-.129	.090	-.866	.179
SCS-TF2	742	1	5	3.24	1.189	-.222	.090	-.765	.179
SCS-TF3	742	2	5	4.21	.811	-.911	.090	.438	.179
SCS-TF4	742	2	5	4.23	.808	-.953	.090	.515	.179
SCS-TF5	742	1	5	3.74	1.120	-.934	.090	.186	.179
SCS-	742	1	5	3.92	.958	-1.059	.090	1.038	.179

TF6									
SCS-TF7	742	2	5	4.42	.706	-1.085	.090	.844	.179
SCS-TF8	742	2	5	4.34	.800	-1.166	.090	.908	.179
SCS-TF9	742	1	5	3.99	.949	-.800	.090	.208	.179
SCP-TF1	742	2	5	4.25	.721	-.839	.090	.793	.179
SCP-TF2	742	2	5	3.98	.797	-.573	.090	.051	.179
SCP-TF3	742	2	5	4.23	.773	-.938	.090	.735	.179
SCP-TF4	742	2	5	4.30	.714	-.958	.090	1.088	.179
SCP-TF5	742	1	5	3.92	.939	-.726	.090	-.005	.179
SCP-TF6	742	3	5	4.38	.624	-.490	.090	-.648	.179
SCP-TF7	742	2	5	4.34	.756	-1.003	.090	.607	.179
SCP-TF8	742	2	5	4.09	.853	-.822	.090	.204	.179
SCP-TF9	742	2	5	4.12	.808	-.752	.090	.211	.179
PJI1	742	1	5	3.58	.900	-.704	.090	.461	.179
PJI2	742	1	5	3.54	.857	-.547	.090	.429	.179
PJI3	742	1	5	3.30	.896	-.355	.090	-.066	.179
PJI4	742	1	5	3.36	.932	-.519	.090	.189	.179
PJI5	742	1	5	3.19	.874	-.311	.090	.147	.179
PJI6	742	1	5	3.06	.870	-.187	.090	.145	.179
PJI7	742	1	5	3.28	.921	-.335	.090	-.025	.179
PJI8	742	1	5	3.33	.899	-.425	.090	.067	.179
PJI9	742	1	5	3.21	.895	-.332	.090	-.002	.179
PJI10	742	1	5	3.33	.881	-.448	.090	.182	.179
PJI11	742	1	5	3.49	.892	-.735	.090	.371	.179
PGE1	742	1	5	3.49	.878	-.657	.090	.543	.179
PGE2	742	1	5	3.95	.899	-1.019	.090	1.189	.179
PGE3	742	1	5	2.89	.963	.058	.090	-.355	.179
PGE4	742	1	5	3.62	.876	-.782	.090	.789	.179
PGE5	742	1	5	3.39	.867	-.533	.090	.421	.179
PGE6	742	1	5	3.44	.911	-.478	.090	.050	.179
PGE7	742	1	5	3.51	.840	-.566	.090	.355	.179
PGS1	742	1	5	3.51	.811	-.532	.090	.883	.179
PGS2	742	2	5	3.72	.720	-.358	.090	.060	.179

PGS3	742	1	5	3.45	.749	-.168	.090	.868	.179
PGS4	742	2	5	4.14	.655	-.471	.090	.554	.179
PGS5	742	1	5	3.15	.793	-.208	.090	.649	.179
PGS6	742	1	5	3.52	.837	-.791	.090	.900	.179
T1	742	2	5	3.64	.687	.286	.090	-.481	.179
T2	742	2	5	3.46	.628	.825	.090	-.036	.179
T3	742	2	5	3.64	.641	.311	.090	-.513	.179
T4	742	2	5	3.54	.733	-.146	.090	-.261	.179
T5	742	1	5	3.09	.851	-.113	.090	.086	.179
MCO N1	742	1	5	3.12	.921	-.214	.090	-.297	.179
MCO N2	742	1	5	3.32	.877	-.458	.090	.062	.179
MCO N3	742	2	5	3.63	.658	-.267	.090	-.015	.179
MCO N4	742	2	5	3.63	.650	.014	.090	-.244	.179
MCO M1	742	1	5	2.57	.946	.168	.090	-.407	.179
MCO M2	742	1	5	3.06	.870	-.287	.090	-.316	.179
MCO M3	742	1	5	2.62	.957	.159	.090	-.563	.179
MCO M5	742	1	5	2.84	1.113	-.046	.090	-.985	.179
MCO M6 - RC	742	1	5	2.41	.869	.514	.090	.364	.179
MCO M7	742	2	5	3.80	.676	-.172	.090	-.051	.179
LEAD 1	742	2	5	3.43	.695	.387	.090	-.085	.179
LEAD 2	742	2	5	3.36	.649	.592	.090	.294	.179
LEAD 3	742	2	5	3.49	.646	.552	.090	-.196	.179
LEAD 4	742	2	5	3.29	.655	.592	.090	.500	.179
LEAD 5	742	2	5	3.44	.656	.555	.090	-.031	.179
LEAD 6	742	2	5	3.44	.670	.673	.090	.031	.179
LEAD 7	742	2	5	3.23	.638	.667	.090	.896	.179
ECOP 1	742	1	5	3.77	.706	-.383	.097	.943	.193

ECOP 2	742	1	5	3.23	.721	.022	.097	.147	.193
ECOP 3	742	1	5	3.86	.703	-.507	.097	.963	.193
ECOP 4	742	1	5	3.84	.716	-.375	.097	.441	.193
ECOP 5	742	1	5	3.87	.712	-.190	.097	.086	.193
ECOP 6	742	1	5	3.93	.673	-.317	.097	.609	.193
ECOP 7	742	1	5	3.49	.803	-.203	.097	.526	.193

A.2. Descriptives for Variables Following Recoding/Removal of Univariate and Multivariate

Outliers

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PI1 - RC	641	1	4	1.49	.763	1.720	.097	2.729	.193
PI2 - RC	641	1	4	1.59	.715	1.274	.097	1.830	.193
PI3 - RC	641	1	4	1.71	.835	1.220	.097	1.089	.193
PI4 - RC	641	1	4	1.64	.740	1.233	.097	1.695	.193
PI5	641	1	5	3.63	1.492	-.627	.097	-1.174	.193
PI6 - RC	641	1	5	1.98	1.017	1.173	.097	.897	.193
PI7 - RC	641	1	5	2.37	1.129	.842	.097	-.235	.193
PI8	641	1	5	2.27	1.332	.876	.097	-.501	.193
PI9	641	1	5	2.24	1.017	.611	.097	-.333	.193
PI10	641	1	5	3.54	.864	-.608	.097	.471	.193
ID1	641	2	5	4.22	.713	-.824	.097	.916	.193
ID2	641	1	5	3.89	.938	-.906	.097	.543	.193
ID3 - RC	641	1	5	3.75	.993	-.806	.097	.180	.193
ID4	641	1	5	3.85	1.064	-.955	.097	.087	.193
ID5	641	2	5	4.02	.852	-.820	.097	.295	.193
ID6	641	1	5	3.35	1.152	-.421	.097	-.875	.193
ID7	641	1	5	3.77	1.476	-.726	.097	-1.109	.193
ID8	641	1	5	3.34	1.157	-.248	.097	-1.040	.193
ID9	641	3	5	4.29	.570	-.091	.097	-.553	.193
ID10	641	3	5	4.65	.515	-1.033	.097	-.089	.193
SCS-TF1	641	1	5	3.20	1.137	-.154	.097	-.778	.193
SCS-TF2	641	1	5	3.26	1.153	-.195	.097	-.695	.193
SCS-TF3	641	2	5	4.23	.781	-.886	.097	.475	.193
SCS-TF4	641	2	5	4.26	.760	-.865	.097	.425	.193
SCS-	641	1	5	3.76	1.076	-.959	.097	.398	.193

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
TF5									
SCS-TF6	641	1	5	3.94	.906	-1.007	.097	1.098	.193
SCS-TF7	641	2	5	4.42	.694	-1.001	.097	.595	.193
SCS-TF8	641	2	5	4.34	.795	-1.162	.097	.920	.193
SCS-TF9	641	1	5	4.01	.924	-.747	.097	.098	.193
SCP-TF1	641	2	5	4.27	.682	-.722	.097	.633	.193
SCP-TF2	641	2	5	4.00	.763	-.547	.097	.162	.193
SCP-TF3	641	2	5	4.26	.732	-.901	.097	.867	.193
SCP-TF4	641	2	5	4.32	.695	-.946	.097	1.155	.193
SCP-TF5	641	1	5	3.96	.911	-.748	.097	.111	.193
SCP-TF6	641	3	5	4.39	.621	-.506	.097	-.636	.193
SCP-TF7	641	2	5	4.36	.741	-1.005	.097	.621	.193
SCP-TF8	641	2	5	4.09	.840	-.810	.097	.239	.193
SCP-TF9	641	2	5	4.14	.768	-.693	.097	.254	.193
ECOP1	641	2	5	3.77	.687	-.102	.097	-.190	.193
ECOP2	641	1	5	3.23	.723	.036	.097	.153	.193
ECOP3	641	2	5	3.86	.688	-.329	.097	.197	.193
ECOP4	641	2	5	3.84	.704	-.254	.097	-.022	.193
ECOP5	641	2	5	3.86	.702	-.050	.097	-.452	.193
ECOP6	641	2	5	3.93	.662	-.147	.097	-.132	.193
ECOP7	641	1	5	3.48	.814	-.256	.097	.596	.193
PJI1	641	1	5	3.62	.830	-.599	.097	.394	.193
PJI2	641	1	5	3.57	.803	-.473	.097	.413	.193
PJI3	641	1	5	3.36	.830	-.321	.097	.033	.193
PJI4	641	1	5	3.42	.870	-.543	.097	.496	.193
PJI5	641	1	5	3.26	.814	-.287	.097	.342	.193
PJI6	641	1	5	3.15	.817	-.187	.097	.395	.193
PJI7	641	1	5	3.36	.850	-.308	.097	.188	.193
PJI8	641	1	5	3.41	.835	-.414	.097	.306	.193
PJI9	641	1	5	3.30	.822	-.337	.097	.248	.193
PJI10	641	1	5	3.38	.834	-.413	.097	.251	.193
PJI11	641	1	5	3.54	.823	-.683	.097	.416	.193

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PGE1	641	1	5	3.54	.828	-.606	.097	.626	.193
PGE2	641	1	5	3.97	.822	-.865	.097	1.014	.193
PGE3	641	1	5	2.91	.903	.068	.097	-.260	.193
PGE4	641	1	5	3.65	.814	-.700	.097	.795	.193
PGE5	641	1	5	3.45	.799	-.456	.097	.536	.193
PGE6	641	1	5	3.49	.829	-.370	.097	.069	.193
PGE7	641	1	5	3.55	.779	-.517	.097	.446	.193
PGS1	641	1	5	3.55	.761	-.471	.097	.895	.193
PGS2	641	2	5	3.75	.682	-.290	.097	.108	.193
PGS3	641	1	5	3.48	.712	-.093	.097	.775	.193
PGS4	641	2	5	4.11	.639	-.350	.097	.383	.193
PGS5	641	1	5	3.23	.725	-.052	.097	.687	.193
PGS6	641	1	5	3.58	.764	-.688	.097	1.025	.193
T1	641	2	5	3.64	.657	.277	.097	-.465	.193
T2	641	2	5	3.47	.614	.797	.097	-.143	.193
T3	641	2	5	3.64	.629	.257	.097	-.492	.193
T4	641	2	5	3.56	.709	-.129	.097	-.209	.193
T5	641	1	5	3.14	.802	-.062	.097	.145	.193
MCON1	641	1	5	3.18	.850	-.137	.097	-.260	.193
MCON2	641	1	5	3.37	.821	-.406	.097	.079	.193
MCON3	641	2	5	3.64	.644	-.238	.097	-.026	.193
MCON4	641	2	5	3.64	.623	.017	.097	-.283	.193
MCOM1	641	1	5	2.66	.907	.101	.097	-.332	.193
MCOM2	641	1	5	3.09	.839	-.283	.097	-.253	.193
MCOM3	641	1	5	2.70	.922	.111	.097	-.490	.193
MCOM5	641	1	5	2.87	1.075	-.063	.097	-.928	.193
MCOM6 - RC	641	1	5	2.42	.831	.511	.097	.496	.193
MCOM7	641	2	5	3.77	.630	-.195	.097	.097	.193
LEAD1	641	2	5	3.44	.659	.503	.097	-.022	.193
LEAD2	641	2	5	3.39	.607	.699	.097	.205	.193
LEAD3	641	2	5	3.49	.628	.545	.097	-.226	.193
LEAD4	641	2	5	3.32	.626	.635	.097	.491	.193
LEAD5	641	2	5	3.46	.624	.576	.097	-.117	.193
LEAD6	641	2	5	3.43	.642	.694	.097	.050	.193
LEAD7	641	2	5	3.24	.612	.631	.097	.833	.193

A.3-A.17. Histogram and Normal Probability Q-Q Plots for Variables

A.3. Histogram and Normal Probability Q-Q Plot: Supervisor's Value of the Community (Normal Distribution)
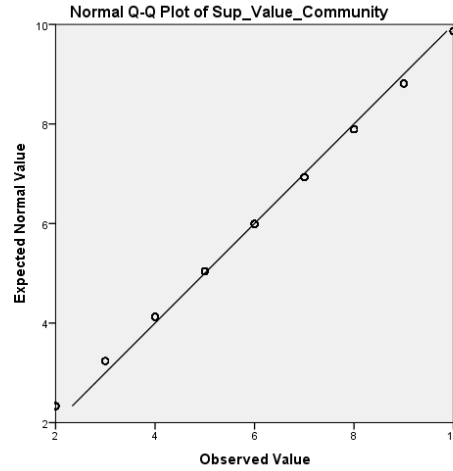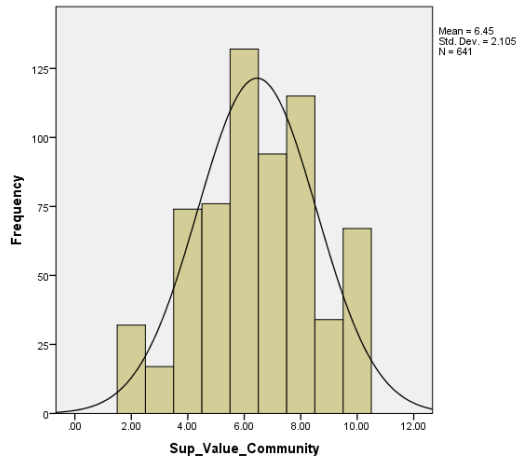
A.4. Histogram and Normal Probability Q-Q Plot: Experienced Community Value (Normal Distribution)
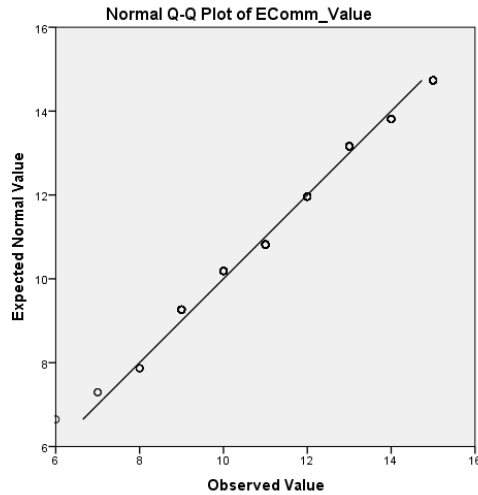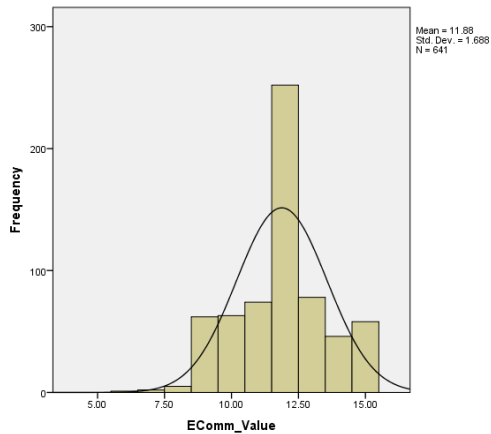
A.5. Before Transformation Histogram and Normal Probability Q-Q Plot: Enriched Knowledge
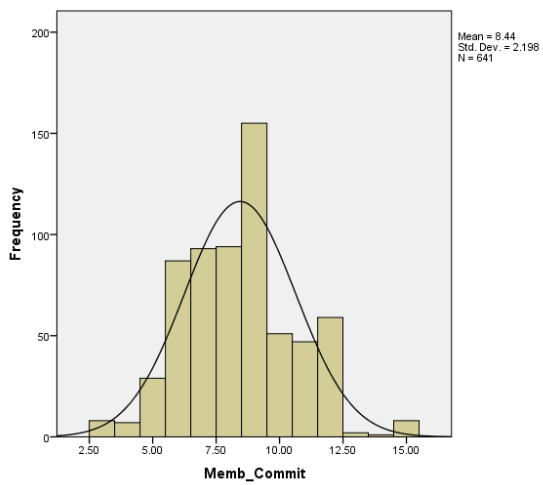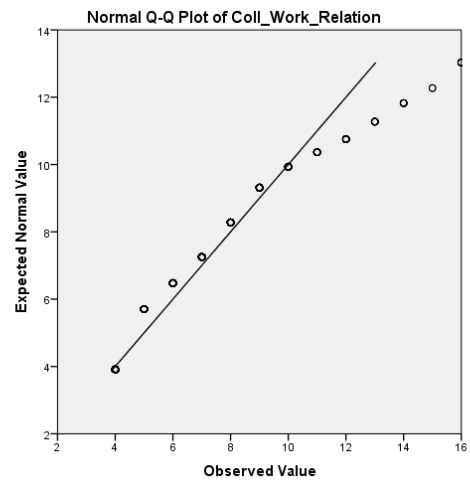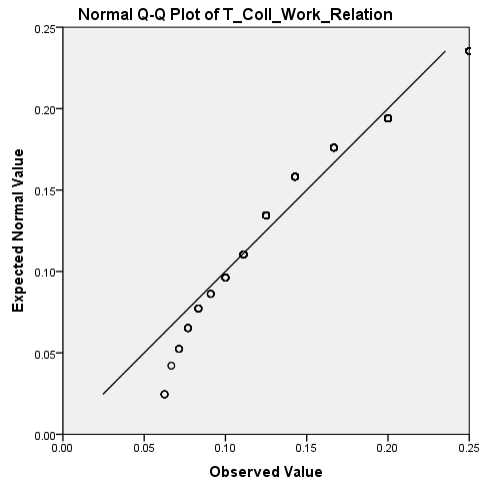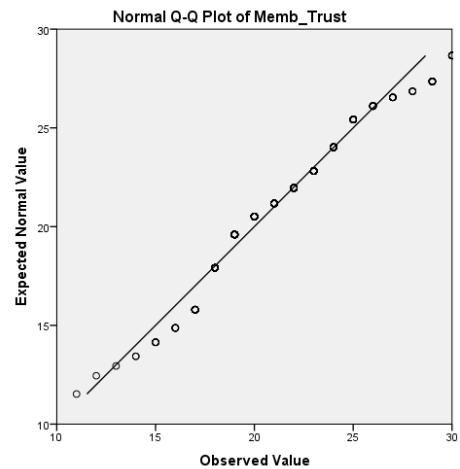
and Skill (Transformation attempted but not successful)
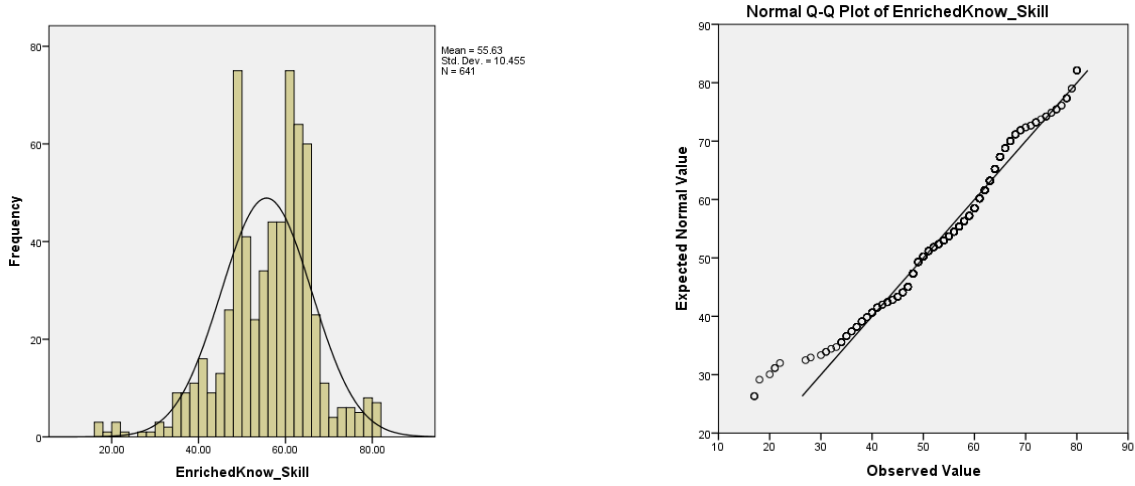
A.6. Before Transformation Histogram and Normal Probability Q-Q Plot: Professional Culture of
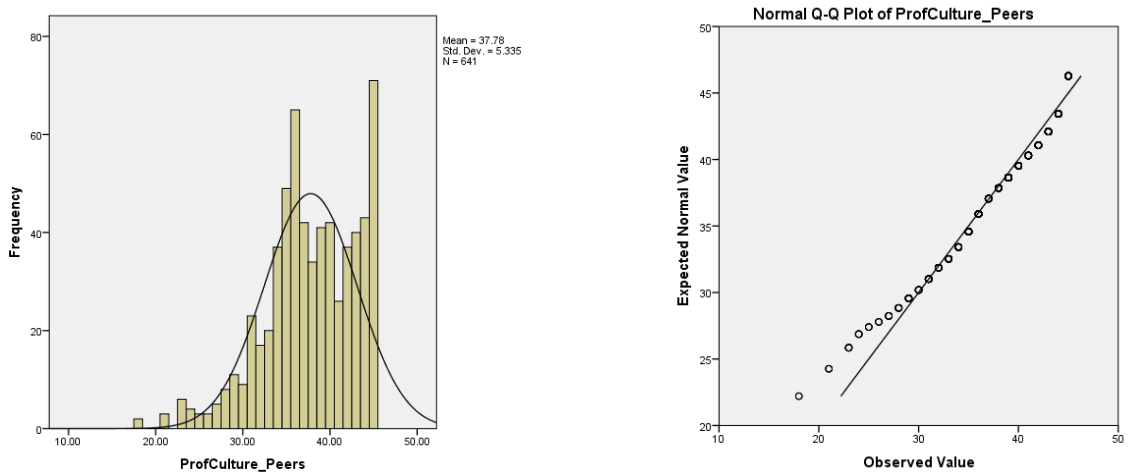
Growth - Peers

A.7. After Transformation Histogram and Normal Probability Q-Q Plot: Professional Culture of
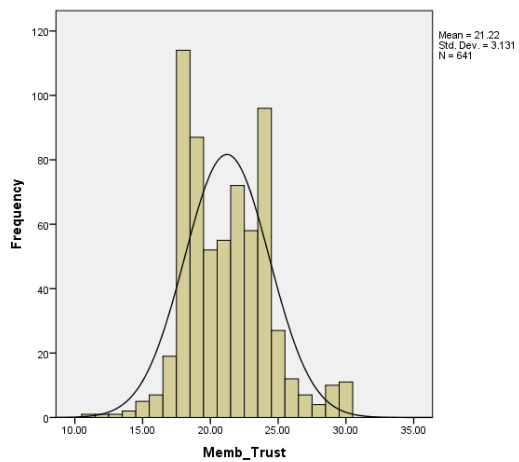
Growth - Peers
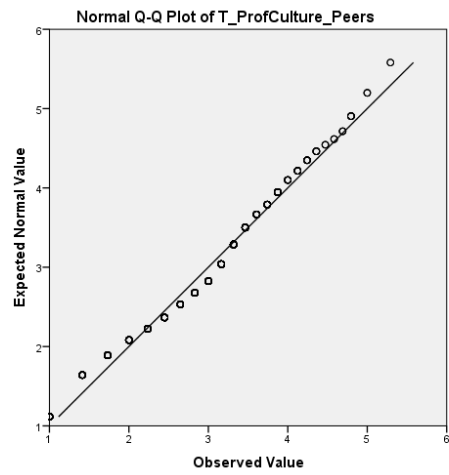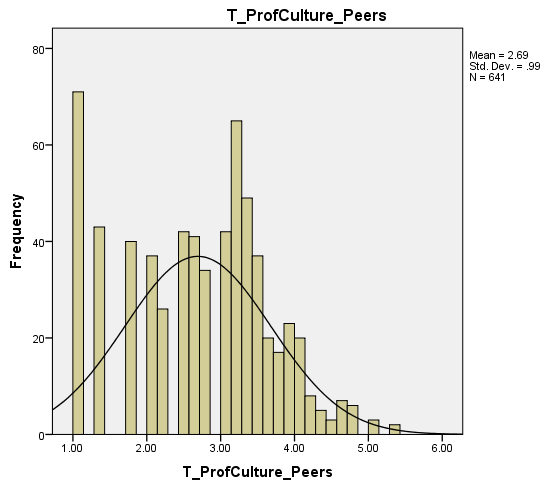
A.8. Before Transformation Histogram and Normal Probability Q-Q Plot: Member Commitment
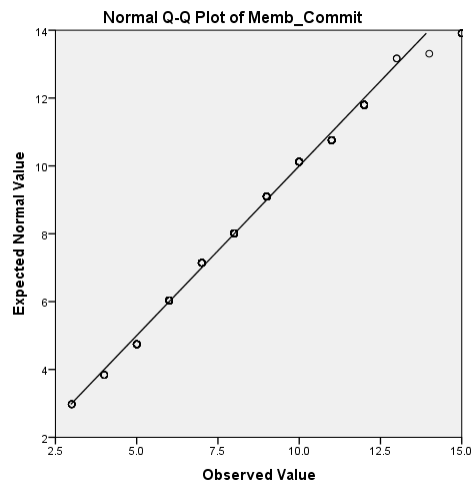
A.9. After Transformation Histogram and Normal Probability Q-Q Plot: Member Commitment
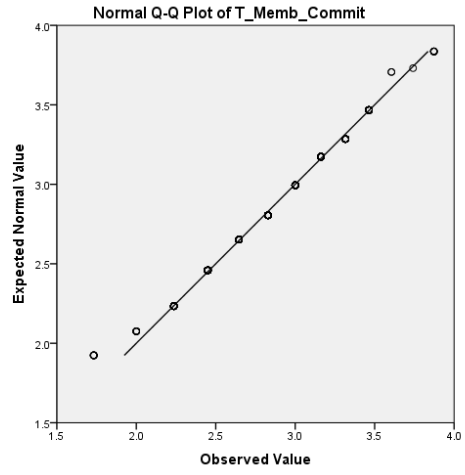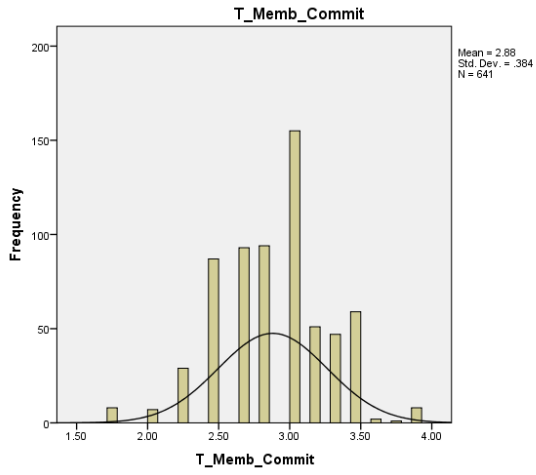
A.10. Before Transformation Histogram and Normal Probability Q-Q Plot: Collaborative Working Relationships
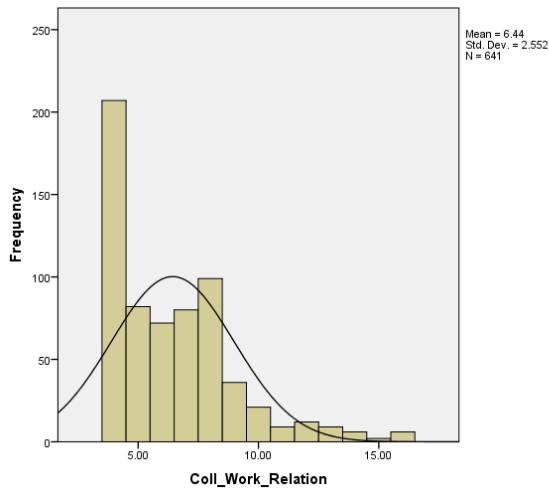
A.11. After Transformation Histogram and Normal Probability Q-Q Plot: Collaborative Working Relationships
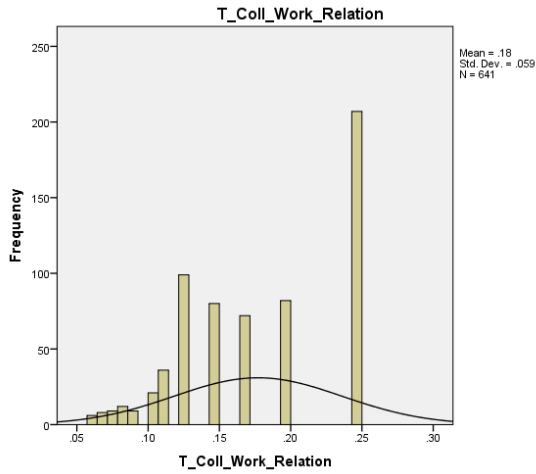
A.12. Before Transformation Histogram and Normal Probability Q-Q Plot: Community Leadership
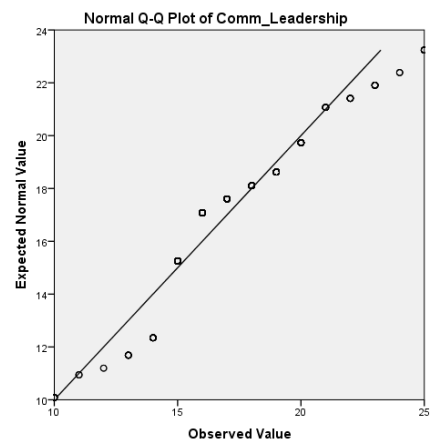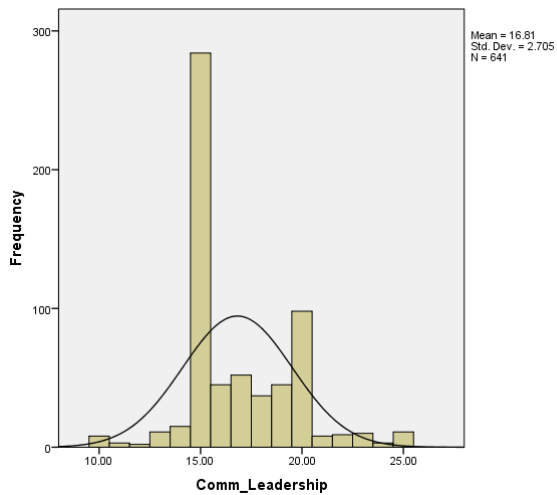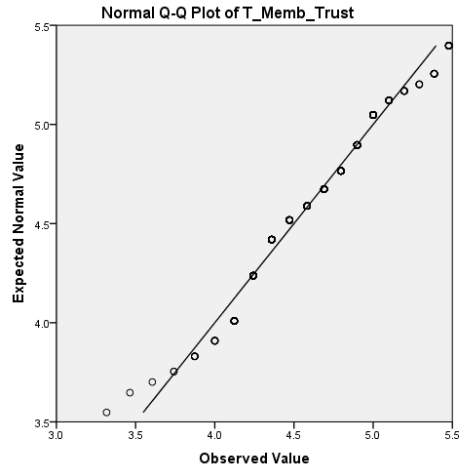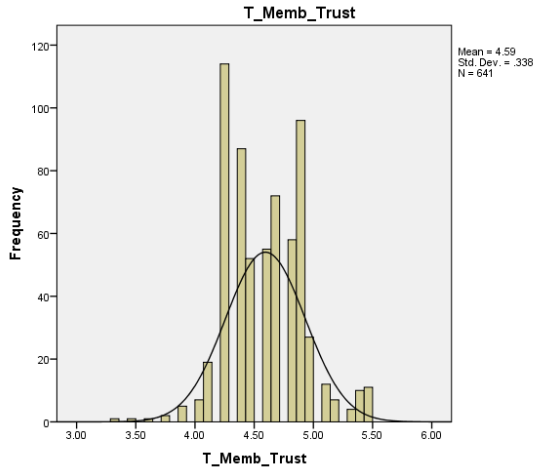
A.13. After Transformation Histogram and Normal Probability Q-Q Plot: Community Leadership
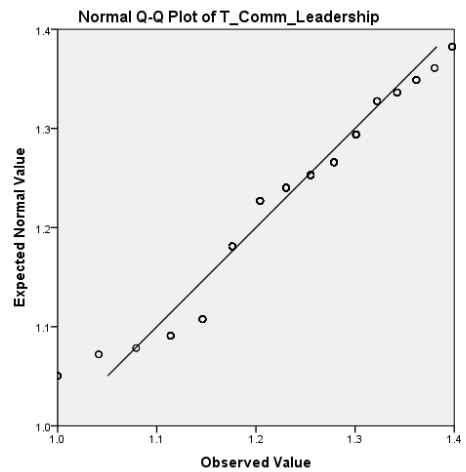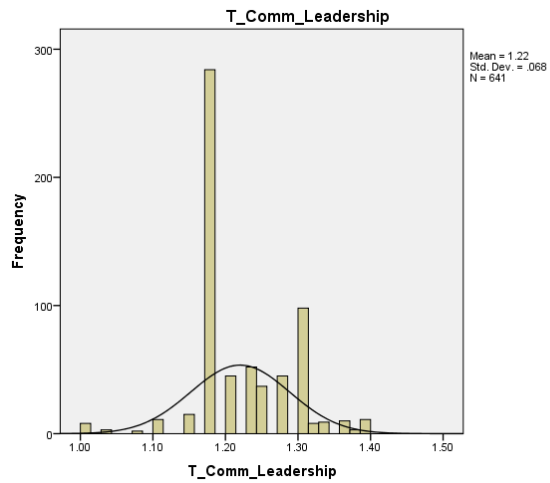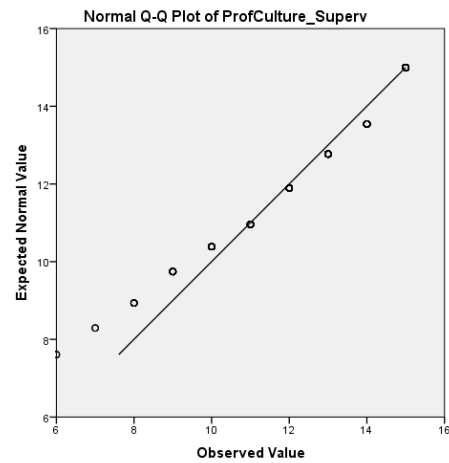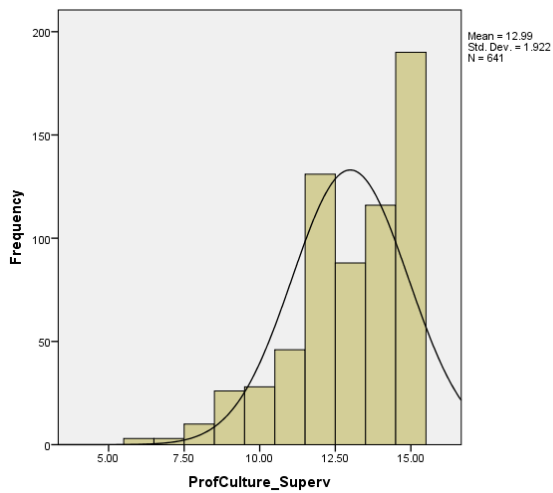

A.14. Before Transformation Histogram and Normal Probability Q-Q Plot: Member Trust
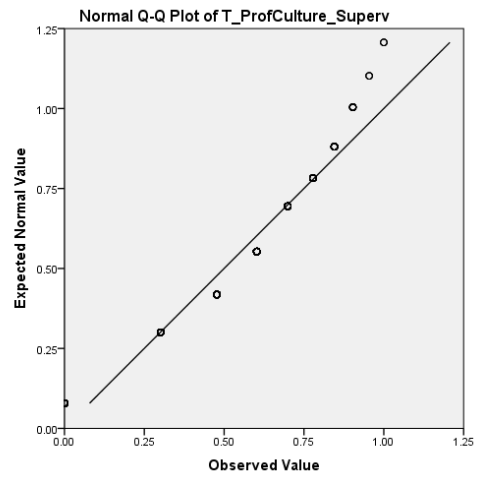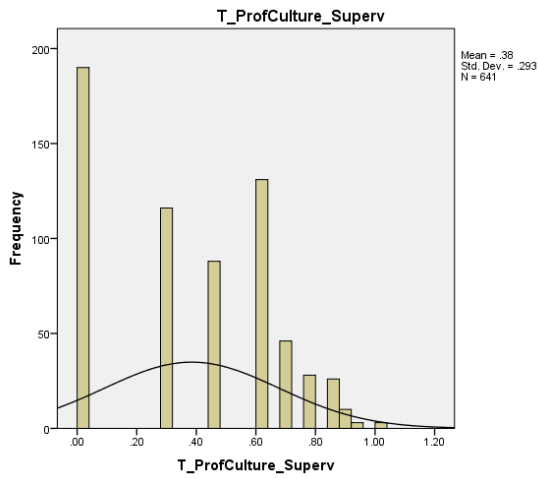
A.15. After Transformation Histogram and Normal Probability Q-Q Plot: Member Trust

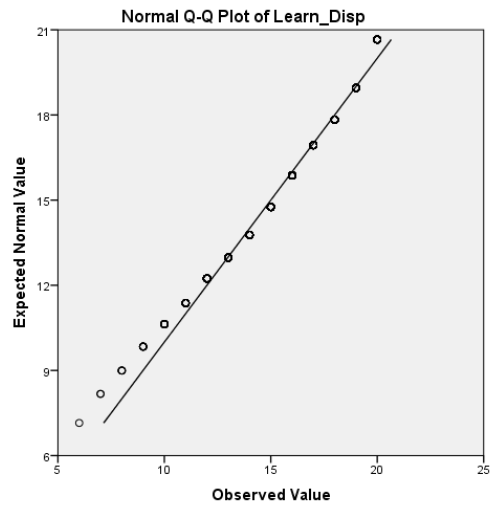## A.16. Before Transformation Histogram and Normal Probability Q-Q Plot: Professional Culture Supervisor
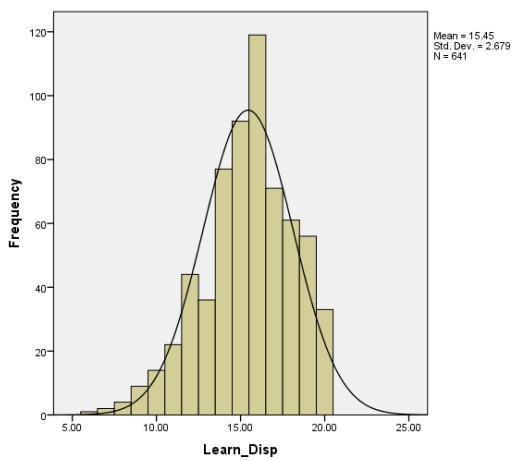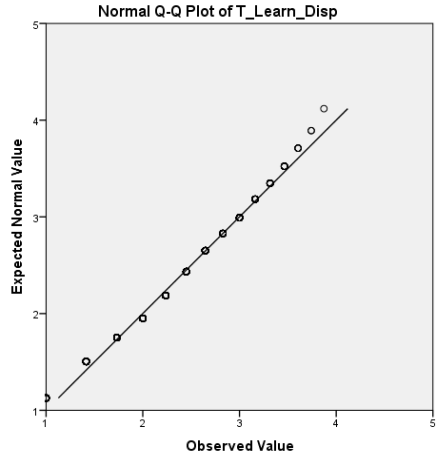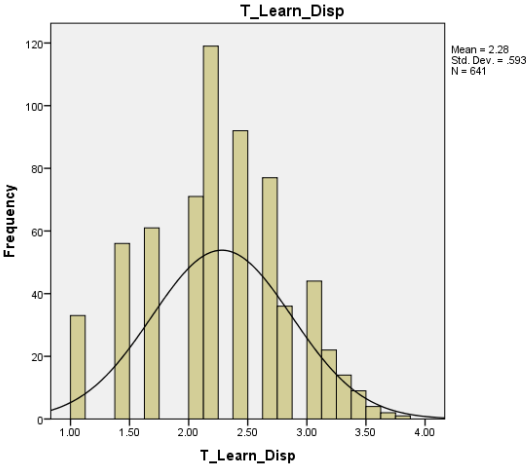
A.17. After Transformation Histogram and Normal Probability Q-Q Plot: Professional Culture Supervisor

A.18. Before Transformation Histogram and Normal Probability Q-Q Plot: Learning Disposition

A.19. After Transformation Histogram and Normal Probability Q-Q Plot: Learning Disposition

APPENDIX B

INVITATION TO PARTICIPATE EMAIL

Greetings,

I am conducting a survey for my doctoral dissertation to examine how members perceive their experience in online communities like ConNEXUS. The goal of this research is to examine how the online community 1) provides a space for members to support and connect with one another around areas of interest, 2) is perceived through member experience, and 3) is perceived through the influence of members' professional experiences outside the community.

This study has been approved by the University of North Texas Institutional Review Board as meeting their standards for such research. The survey is anonymous and will not collect or retain personally identifiable information. Users can expect to complete the survey in 30 minutes or less, and you are free to exit the survey at any time.

While there are no known direct risks or benefits to you for completing the survey, sharing your experience may help ACSI and other community organizers improve the experiences and benefits of online communities for members like you.

I would sincerely appreciate your participation in this study.

Thank you for your consideration!

[survey link inserted here]

Shannon Bomar

Doctoral Candidate, University of North Texas – Information Science

APPENDIX C

UNIVERSITY OF NORTH TEXAS INSTITUTIONAL REIVEW BOARD INFORMED CONSENT NOTICE

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits, and risks of the study and how it will be conducted.

Title of Study: From the Outside In: A study of effectiveness in Communities of Practice

Student Investigator: Shannon Bomar, University of North Texas (UNT) Department of Information Science. Supervising Investigator: Dr. Brian O'Connor.

Purpose of the Study: You are being asked to participate in a research study which examines your experiences in the online community, ConNEXUS. The goal is to identify what makes the online community experience most effective and beneficial to its members.

Study Procedures: You will be asked to complete a survey consisting of agreement-type questions (i.e., 1= strongly disagree and 5= strongly agree). Completing the survey will take less than 30 minutes of your time.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: This study is not expected to be of direct benefit to you, but by sharing your experience you may help ACSI and other community organizers improve the experiences and benefits of online communities for members like you.

Compensation for Participants: None

Procedures for Maintaining Confidentiality of Research Records: The confidentiality of your individual information will be maintained in any publications or presentations regarding this study. No identifying data is captured in this survey.
Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet.

Questions about the Study: If you have any questions about the study, you may contact Shannon Bomar at 719-867-0153.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-4643 with any questions regarding the rights of research subjects.

Research Participants' Rights: Clicking "next" below and completing the survey indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Shannon Bomar has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

APPENDIX D

PERMISSION CORRESPONDENCE WITH DR. HEMMASI

Request for permission to conduct research regarding Communities of Practice

---

Shannon <Shannon>   Fri, Jul 17, 2015 at 12:13 PM
To: <Dr. Hemmasi>

Hello Dr. Hemmasi,

My name is Shannon Bomar and I am a doctoral student in the College of Information at the University of North Texas. I am currently working on my dissertation research and while conducting my literature review I was greatly informed and appreciated reading your article, "The Effectiveness of Communities of Practice: An Empirical Study" on the research you conducted with Carol Csanda.

In your article, you state that "replicating the study using a more heterogeneous sample" would be desirable. In my research, I am examining an online network of communities of practice comprised of K-12 teachers and administrators representing more than 3000 schools. While this population does not provide cross-industry diversity as you recommended, I believe that given the large network and number of schools represented it will provide a strong population from which to sample and a strong element of diversity across educational entities. In my research, I would like to replicate your study as well as introduce 4 external (to the CoP) factors as identified in the literature that I believe will also have an effect on community members' perceptions of effectiveness and satisfaction. I am interested in confirming your results and then examining the effect of the external factors.

I am writing to ask if you would be willing to provide me with the research instrument(s) you used to conduct your study so that I may conduct my research and build upon the foundation you have established?

If you are willing to provide the instrument, will you also grant me permission to modify the instrument as appropriate for this audience and to incorporate my additional factors to be measured?

Please be aware that UNT places electronic versions of dissertations freely available online and as such, the modified instrument will be reproduced in the appendix of my dissertation and accessible online through the UNT Dissertation electronic platform.

Thank you Dr. Hemmasi for your research and for considering my request. If you have any questions or would prefer to discuss this by phone, please do not hesitate to contact me at this email address or by phone at xxx-xxx-xxxx.

Sincerely,

Shannon Bomar

Survey Instrument

Hemmasi, Masoud <Dr. Hemmasi>   Thu, Aug 20, 2015 at 1:58 PM
To: <Shannon>

Shannon,

Sorry for the delay in responding to your email. I was out of the country for much of the past serval months. I am sending you the original questionnaire that we used and also a second (improved version) version. The one that has a v2 extension in the name is the improved one. Feel free to use either one. Good luck with your study.

Masoud Hemmasi, Ph.D.
Professor Emeritus,
Department of Management & Quantitative Methods
Illinois State University

Phone: xxx-xxx-xxxx

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