

INFORMAL LEARNING AND MOTIVATION IN A VIRTUAL
COMMUNITY OF PRACTICE: A STUDY OF EMAIL LIST
COMMUNICATIONS AMONG K-12 TECHNOLOGY COORDINATORS
IN THE STATE OF HAWAII

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For those that know me they know that I am the poster child for a lifelong learner. My mother and siblings constantly ask me when I am going to finish school. I feel as though I have been going to school for as long as I can recall. My family, including my husband Peter and my sons, Daniel and Dylan have all been party to my educational and academic endeavors and I truly appreciate all of the time they have given up for me to pursue my degrees. They have never wavered in their support for me and for that I am grateful.

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ABSTRACT

The purpose of this qualitative analysis was to examine how informal learning takes place in a virtual Community of Practice. The objective of this research was to analyze the components and characteristics associated with a group called the tech cadre who communicate via a listserv for the purpose of knowledge exchange. This study sought to identify the type of informal learning occurring through this computer mediation communication as well as the motivating factors that contribute to membership engagement. A grounded theory methodology was employed using a divergent method guided by Strauss and Corbin's (1999) grounded theory approach, which consisted of purposeful sampling. This qualitative analysis used the constant-comparative approach (Lincoln & Guba, 1985) for this study. This methodology approach was suitable given that the key purpose of this study was to help gain an understanding of a situation (Merriam, 2001) – informal learning that takes place among Hawaii K-12 public school technology coordinators engaging in knowledge sharing via a listserv, rather than to predict, prove or disprove underlying hypotheses.

Wenger's (1998) conceptual framework on communities of practice and Sobrero's (2008) framework on virtual communities of practice were used to guide this study.

Data was collected through an electronic survey emailed to all members of the listserv and findings were sent to some participants for the purpose of member checking. To ensure validity of the data inter-rater reliability was employed.

The findings revealed that this unique virtual community of practice is valued by its members and is an efficient and effective tool for acquiring knowledge, sharing knowledge and improving job performance. Motivational factors that contribute to membership engagement within this community were also identified with most members finding knowledge sharing and problem solving as primary motivators. Members also acknowledged that although listserv technology serves this community well there might be other more effective computer mediated communication tools worth exploring.

This study, as it relates to this unique virtual community of practice, may indeed have implications for other virtual communities of practice that engage in knowledge sharing through listserv technology.

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CHAPTER 1. INTRODUCTION

The 21st century is often characterized as the Knowledge Age, where new patterns of communicating and acquiring knowledge have been established. This 21st century postmodern era is also characterized as the information age or the digital age. What has become increasingly evident is that knowledge sharing is now engrained in culture. Given the pervasive nature of technology in daily lives and the increase in access to and use of personal mobile devices the opportunity exists for knowledge sharing or knowledge distribution to take place both formally and informally.

Knowledge Age knowledge is defined and valued not for what it *is*, but rather for what it can *do*. It is produced, not by individual experts, but by ‘collectivising intelligence’ that is, groups of people with complementary expertise who collaborate for specific purposes ("Shifting to 21st," n.d.). Raschke (2003) refers to this era as the age of distributed learning.

Online classes, blogs, wikis, discussion forums, social networking sites, and numerous other cloud-based communities provide the opportunity for individuals to produce and disseminate knowledge. These distributed learning environments where knowledge sharing takes place can serve as avenues where learning takes place as well. This type of learning can be categorized as either formal or informal.

Self-directed online inquiries or knowledge sharing interactions contribute to what many theorists refer to as informal learning, which is learning that takes place outside the boundaries of the classroom. When individuals share a common interest or practice it is not uncommon for those individuals to support each other through some sort of knowledge sharing community. These individuals may have, at one time, met around the water cooler or the break room or even after work at local establishments to discuss the issues that are most important to them in their work environments. Thornburg (2007) likens such encounters to “the watering hole” where members of a community gather to share information with each other. Modern information technologies have extended the boundaries of such communities enabling knowledge sharing to occur in online

environments, through electronic media or through virtual communities of practice. Thus, contemporary “watering hole” discussions might occur digitally among participants who have never actually physically met.

One of the useful and time-tested computer mediated communication technologies that has supported knowledge sharing is the listserv. A listserv is a tool that supports electronic discussions that usually focus on a topic that is of interest to members within a specific community. It typically serves a closed network community and provides a place for the exchanging of ideas and solving of problems thus allowing informal learning, which may or may not support ones workplace, to occur.

Listserv technology has, unlike some other technological innovations, withstood the test of time. It has changed relatively little and has maintained its usefulness and purpose as an effective mode of communication that supports the distribution of knowledge. A listserv provides the informal learning space for participants and/or members of the listserv community. Often the community is comprised of individuals who share a common practice. One of the mechanisms to support informal knowledge sharing is through Communities of Practice [CoP] (Hara & Hew, 2006). This closed network of individuals can choose their level of participation as they engage in the informal or self-directed learning process.

A study by Hara and Hew (2007) found that that conversation was identified as an important conduit for knowledge sharing among members in communities of practice and that such conversations came in the form of an open question or a request for help to the community via a listserv or online forum. In response, knowledge providers may either share their knowledge by describing a similar experience where a method was used to solve a problem, or, if unable to provide an appropriate solution, share knowledge indirectly by referring the individual to someone else who might know and be willing to help.

Membership in a community typically implies a minimum level of knowledge of that domain—a shared competence that distinguishes members from other people (Wenger, 1998). Such communities of practice can serve as a tremendous resource for individuals seeking knowledge from other practitioners. Through sharing knowledge with

one another, members explore the meaning of their practice, and develop a sense of professional identity (Gray, 2004).

Communities of Practice encourage collective learning, networking capabilities among its members, and a shared learning environment for those who desire to participate. This in turns allows the members to identify the best ideas and draw upon the strength of others (Allen, 2014).

The very nature of the communication medium also plays an important role in supporting and sustaining the online Community of Practice (Hara & Hew, 2006). The types of exchanges that take place within this community via the listserv play a significant role in the success or failure of that community. Online communities are strongest when grown by members into unique and supportive environments (Clark, 1998). There must be a perceived value to the community that keeps the members actively involved in using the listserv or the community will not thrive.

Given the long history that is associated with listserv technology and despite the fact that many innovative and accessible communication-sharing technologies are emerging, it is somewhat surprising to see this mode of knowledge sharing unchanged over time. Clearly, there is continued value to this communication tool as a support mechanism for knowledge exchange and informal learning within a virtual CoP.

Statement of the Problem

With nearly 300 public K-12 schools in the state of Hawaii and the geographical barriers that exist between the Hawaiian island chain significant, creating channels of communication that support common K-12 initiatives is beneficial. The 2010 National Educational Technology Plan presented a model of learning powered by technology, with goals and recommendations in five essential areas: learning, assessment, teaching, infrastructure, and productivity ("Transforming American Education," 2010). In the Hawaii Department of Education's 2011-2018 strategic plan (2012), Patricia Matayoshi, Superintendent of Education, discusses the evolution of technology and its impact on education. She states: "In the 21st century, the rate of change is driven by constantly evolving technology, the rapid creation and proliferation of information, new social and

environmental challenges, and a new knowledge-based economy” (p. 2). She also makes note of the importance to training and support for Hawaii’s teachers. “To successfully guide students toward their goals, educators and leaders in the Hawaii State Department of Education (DOE) need support, training, and new approaches to teaching” (p. 2).

Hawaii’s K-12 public school technology coordinators will play a pivotal role in supporting and facilitating many of the changes that will occur as education evolves to reflect the goals laid out in this updated strategic plan. Matayoshi states that, “we know that we must support teachers, leaders, and staff with the ‘adaptive leadership’ needed to work hand- in-hand with the community to build 21st century schools, classrooms, and learning opportunities” (2012, p.3). Much of this training and support referenced by Matayoshi will no doubt require the involvement of Hawaii’s public school technology coordinators.

The strategic plan noted above has also included a statement on the importance of and the value of learning communities. “We need to provide our teachers and school leaders with support and information—including professional development, mentorship, learning communities, and helpful real-time data—so they can excel in meeting the new demands of their professions” (p.5). Goal 2 in the Hawaii DOE strategic plan identifies a number of objectives related to staff success including objective 2B, which states that “training and professional development for all DOE employees supports student learning and school improvement” (p. 20).

Hawaii’s public school technology coordinators experience limited access to formal professional development learning opportunities due to the geographical barriers within the Hawaiian island chain. One channel of communication that has served as a support mechanism to this unique community of practice is the “Tech Cadre” listserv. This voluntary listserv was created for Hawaii’s technology coordinator community nearly two decades ago to informally support the exchange of knowledge among those with a common interest. It is an active community that thrives on knowledge sharing and has enabled many technology coordinators, new to the profession, to find solutions to technical problems. It is also recognized as a tool to share experiences and recommendations that are related to work place situations.

Hawaii’s K-12 public school technology coordinators utilize the tech cadre

(tcadre@k12.hi.us) listserv as a place for exchanging knowledge. The purpose of the Tech Cadre Listserv (TCL) is to provide a forum for discussion among the members of this community as well as other public school employees who share an interest in technology related issues. It serves, primarily, as a place for the sharing and exchanging of ideas most often related to technology-related problems that are encountered in their roles as technology coordinators.

Technology coordinators are continuously seeking knowledge sharing opportunities to keep up with rapid changes in the field. Most technology coordinators are responsible for managing entire networks, hundreds of computers and networked printers, interactive instructional technology tools, and a host of electronic mobile devices. They are also, to some degree, responsible for conducting professional development and technology training for faculty and staff, developing and implementing technology initiatives and keeping abreast of advances and/or changes in technology that impact their ability to be effective in their jobs. Recently, the Hawaii Department of Education completed a statewide initiative to bring wireless connectivity to all public K-12 schools. As a result of this upgrade technology coordinators have added to their workload the responsibility associated with wireless mobile device management.

The TCL is currently the only mechanism in place that has enabled professional exchanges and knowledge sharing to take place among Hawaii's technology coordinators. This mode of communication, which electronically connects this closed network of practitioners for the purpose of professional dialogue serves as a virtual CoP where informal learning opportunities exist. Having access to such a robust tool, in which to pursue informal learning and knowledge exchange can be of great value to members of any community. Further, participation in an online discussion outside of the traditional setting (such as a classroom) is conducive to informal learning.

Despite the noted support from the Superintendent acknowledging the importance of building 21st century schools, there remains no established job description for Hawaii's public school technology coordinators. Tasks assigned to technology coordinators are designated by individual school principals with guidance from complex area superintendents. The result of a lack of a job description is that technology coordinators within the state of Hawaii engage in tasks that vary from campus to campus. The reliance

on the tech cadre listserv is that much more important to its members as many principals and complex area superintendents are unaware of what the technology coordinator role entails.

Knowledge Sharing

Virtual CoP's can serve the needs of members by providing knowledge exchange opportunities, which can contribute to formal or informal learning. When knowledge is shared either through member contribution or acquisition it enables members to improve their skills and problem solving capabilities. Knowledge sharing and support can be reasons for participating in an online CoP. Some knowledge is not as easy to learn through a formal learning process, and this type of knowledge is often best shared through experiences and storytelling (Myers, 2103).

Informal Learning

Self-directed online inquiries or knowledge sharing interactions contribute to what many theorists refer to as informal learning, which is learning that takes place outside the boundaries of the classroom. Informal learning, although broad in its definition, is most simply understood as learning that is undertaken on the learner or learners' own terms without either prescribed curricular requirements or a designated instructor (Livingstone, 2001). It can also be referred to as self-regulated learning. Informal or self-regulated learning is often associated with a need to acquire knowledge that will support a personal or professional goal. Many workers new to a position may find that they require additional knowledge to be successful in their jobs. Seeking knowledge from peers or other practitioners in the same field would be considered to be a path to informal or self-regulated learning.

Formal Learning

Formal learning is associated with the traditional instructional practice where the learning environment is teacher-learner oriented. Formal learning is familiar to most individuals and is considered learning supported by an educational or training institution. It is structured and typically controlled by a teacher or a guide. It most often results in a

certificate or in the form of recognition of that training by receiving credit towards an elevated step in salary or by an earned degree.

Purpose

The purpose of this qualitative study was to examine how informal learning takes place in a virtual CoP. The objective of this research was to analyze the components associated with the tech cadre listserv as they relate to informal learning and identify the motivating factors that contribute to membership engagement. A qualitative analysis involving the constant-comparative approach (Lincoln & Guba, 1985) was adopted in this study. This approach was suitable given that the key purpose of this study was to help gain an understanding of a situation (Merriam, 2001) – informal learning that takes place among Hawaii K-12 public school technology coordinators engaging in knowledge sharing via a listserv, rather than to predict, prove or disprove underlying hypotheses.

Research Questions

In an attempt to respond to the two research questions qualitative data generated from an electronic survey distributed to the tech cadre listserv community were analyzed.

Q1: How does participation, via a listserv, in the virtual community of practice of Hawaii K12 public school technology coordinators contribute to informal learning within this community?

Q2: What are the motivating factors that draw K-12 technology coordinators in the state of Hawaii to participate in a virtual Community of Practice via a listserv?

Significance of the Study

Knowledge sharing interactions that contribute to informal learning have the potential to benefit individuals and the communities that they serve. Identifying the factors associated with motivation, levels of engagement and informal learning that take

place within a virtual CoP has the potential to contribute to general knowledge in this field.

Certain aspects of these findings may, in fact, be open to generalization or transferability when applied to other virtual communities of practice or even to other communities in general where virtual modes of communication provide the opportunity for informal learning to take place.

Conceptual Framework

Wenger's (1998) social theory of learning is an appropriate conceptual framework to use when engaging in qualitative research related to informal learning that takes place in a virtual community of practice (CoP). Wenger's (1998) original model, which characterized the essential elements associated with CoP's, has been broadened, in this study, to reflect virtual CoP's.

In an effort to contribute to Wenger's (1998) established conceptual framework Sobrero (2008) has developed a second set of components that augment the empirical signature of Wenger's essential traits. These components (as outlined in Chapter 2) were especially helpful to this study because they address levels of social engagement and informal learning that take place in a virtual community of practice. This is of significance because the research questions that were addressed in this qualitative study were directly associated with social engagement and informal learning.

Summary of Methodology

Zhang and Wildemuth (2006) define qualitative content analysis as a process designed to condense raw data into categories or themes based on valid inference and interpretation. They describe it as "mainly inductive, grounding the examination of topics and themes, as well as the inferences drawn from them, in the data" (p. 1). This process, which uses inductive reasoning, is key to Glaser's (1967) grounded theory approach. This is not at the exclusion however, of deductive reasoning which Strauss and

Corbin (1990) recognize as a subsequent part of their suggested coding process. Coding schemes can develop both inductively and deductively.

In this qualitative analysis data generated from surveys were analyzed to draw relationships, establish categories and identify themes that were present and using Wenger's CoP framework (1998) as a guide, and influenced by Sobrero's (2008) added components, a matrix of group characteristics was established.

Role of the Researcher

I am a Technology Coordinator in a Hawaii public high school and have been a participating member of the Tech Cadre listserv for nearly a decade. I am a licensed and tenured teacher in Computer Education at the Secondary level. I am also an Instructor in Computer Assisted Learning for adult students at a State of Hawaii school for adult learners and have expertise in Instructional Technology.

The participants within the tech cadre listserv consist of state employees who work in technology roles and voluntarily seek or share information through this medium.

Summary

Given the important role that technology coordinators play in our public schools and how their involvement is critical to meeting national technology standards for K-12 schools, it is important that we examine knowledge sharing technologies that support the informal learning process. It is also evident that technology coordinators often serve as change agents within their organizations and that these roles can require additional training needs that are broad in scope. The contributions that virtual communities of practice have on informal learning opportunities are worth consideration when examining how technology coordinators can share and acquire knowledge within the workplace.

The purpose of this research was not only to identify how participation in a virtual community of practice contributes to the informal learning process but also to identify what factors motivated members to engage in the knowledge sharing process.

It is hopeful that the findings of this qualitative analysis can contribute to the knowledge base associated with informal learning that takes place in virtual communities of practice. Additionally, taking into account the demands put on technology coordinators in public K-12 schools, the results of this study may help support opportunities for knowledge sharing among virtual communities of practice beyond the education community allowing broader and deeper experiences in professional practices.

CHAPTER 2. REVIEW OF LITERATURE

With the transition from the Industrial Age to what is now metaphorically labeled the “Knowledge Age,” significant increases have been observed in the speed at which knowledge is distributed. Improvements in information and communication technology (ICT) have enabled immediate access to information across the globe thus forcing organizations to consider how knowledge is managed. This relatively new field of knowledge management addresses the many aspects of how information created and shared can promote learning within an organization.

As we move from the Industrial Age into the Information Age, knowledge is becoming a key driver for the competitive success of firms and even nations (Martinez-Torres, 2006). Knowledge sharing, a vital part of the process, is at its highest and most effective level when the group or company is larger and has a high amount of diversity (Ruffus Doerr, 2010). When different participants bring to the learning context skills and knowledge that are of mutual benefit to each other, they are able to co-construct knowledge and meanings (Hung, Chee, Hedberg, & Seng, 2005). This form of knowledge sharing is an example of what transpires in this current period referred to as the Knowledge Age. The ability to share information that benefits individuals or groups who share a common concern is of great value. This collective knowledge sharing practice can be advantageous in the success of an institution or organization.

This literature review consists of an overview of relevant research associated with how knowledge is created and shared within an organization. In order to address the purpose of this study the following categories are discussed: the relevance of the CoP and its role in knowledge sharing, Social and Informal Learning that occurs within a CoP, and the role that Listserv technology plays in supporting knowledge sharing within a CoP.

Community of Practice

The building of a community is a process that can develop in numerous ways. We recognize that a community has traditionally referred to a neighborhood where individuals know each other and each other's families. They grow out of a common interest whereby members of the community live in close proximity and feel a sense of belonging due to regional and familial associations rather than common interest associations. Advances in technology however have led to a new understanding of community, one that removes the physical barriers of the traditional community to one that describes a networked community whose members are scattered across the globe. "It is a shift from being bound up in homogenous little boxes to surfing life through diffuse, variegated social networks" (Wellman, 2002, p. 1).

In more recent times, we see online communities developing at such a rapid pace and, with the help of social networking, transforming that traditional community from the physical to the virtual. Today's communities are virtual communities that may no longer be confined by a specific location like a neighborhood or building at a work site. "They are communities of shared interest rather than communities of shared kinship or locality" (Wellman, 2002, p. 4).

Twenty-first Century electronic communications have brought individuals together that otherwise would not have had the opportunity to do so due to the obvious restrictions of time and place. Such e-communications not only create new types of communities but they also serve as a mechanism to provide people a virtual place to express opinions, share knowledge, pose questions, and ultimately create opportunities to belong to a unique group or a unique community. Individuals that choose to become part of an online or virtual community have a shared purpose or common set of interests that draw them to a particular group or, in this case, a particular community. The common thread is typically a shared practice. When individuals with common interests join together in a virtual community to share and receive knowledge this is referred to as a community of practice (CoP). Stephanie Allen (2003) defines communities of practice as informal communities in which knowledge is generated and transferred among members who practice the same trade, or professional practice. Examples of communities of

practice include workers who share a common career path such as educators, medical professionals, or students participating in online courses. Other communities of practice develop among individuals who seek out others with common physical challenges such as those who suffer from disease or have emotional needs. Virtual communities of practice (VCoP) have grown and continue to grow at a rapid rate with more and more individuals participating in online discussions within VCoP's that span the globe. These communities offer answers to questions that in the past may have gone unanswered and allow like-minded individuals or those who share a common practice to connect and create a bond often without ever meeting each other.

Knowledge Management

Fenwick (2001) and Garrick (1998) believe that corporations, driven by the forces of economics and globalization, are struggling to capture the notions of collective knowledge, collaborative learning, and knowledge transfer (as cited in Conrad, 2008). Educational institutions, not unlike other organizations, are compelled to meet the demands of this era by engaging in their own knowledge management strategies. One concept that continues to be explored within both the business and education world is associated with the social phenomenon of communities of practice (CoPs). Communities of practice do, of course, exist beyond these sectors alone. They are prominent in government, associations, the social sector, international development, and in online communities (Seaman, 2010). What defines them however is the way in which knowledge is shared.

Wenger, McDermott and Snyder define CoPs as, "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" (2002, p.4). According to Wenger et al (2002), "a community of practice is a unique combination of three structural 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). Wenger et al. (2002) note that when these three elements function well together, they make a CoP an ideal "*knowledge structure* – a

social structure that can assume responsibility for developing and sharing knowledge” (p. 29). Wenger formally identified these essential elements of a CoP as joint enterprise, shared repertoire and mutual engagement (1998). In terms of community, these three dimensions provide the formation, the cohesion, and the goal of a community of practice (Seaman, 2010).

Nickols (2000) contends that, “learning communities and communities of practice play an interesting role in organizations . . . they are the bridging points between e-learning and knowledge management” (as cited in Conrad, 2008, p.15). The rise of a knowledge culture in recent years has contributed to a now commonplace and multidisciplinary understanding that learning is not bounded by walls, classrooms, or even the formalized structures of higher learning (Conrad, 2008). Modern information technologies have extended the boundaries of communities of practice enabling knowledge sharing to occur at any time and any place. “Virtual CoPs, through the provision of a number of a-synchronous and synchronous tools, enable the formation of community that is not physically constrained but exists within a common space of shared interest” (Brannigan, 2009, p. 4). It is precisely this broadened technology enhanced community that drives situated learning opportunities for those who wish to participate.

Social Learning Theory

Evans, Hodkinson, Rainbird and Unwin (2006) point out that recent thinking about workplace learning has been strongly influenced both by Lave and Wenger’s (1991) work on situated learning and by Wenger’s (1998) subsequent seminal work on communities of practice (Evans et al, as cited in Conrad, 2008). Situated Learning Theory posits that learning is unintentional and situated within authentic activity, context, and culture and that social interaction and collaboration are essential components of situated learning — learners become involved in a Community of Practice which embodies certain beliefs and behaviors to be acquired (Learning Theories Knowledgebase, 2011).

Educational institutions have traditionally supported learning as an individual process best encouraged by explicit teaching that is, on the whole, separated from the

social engagement that can exist outside that community. Those who argue for a more collaborative approach to learning, that supports social engagement such as Wenger's social theory of learning conceptual framework, have theoretically challenged this perspective. This framework underpins Lave and Wenger's (1991) notion of COP's as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Hodgkinson-Williams, Slay & Siebörger, 2008, p. 3). When this collaborative approach to learning takes place outside the traditional community it is often within a virtual environment.

Virtual collaboration is promoted as one of the ways that workplace leaders can leverage workplace knowledge into results, with claims that "the largest untapped resource in our organizations—the inherent or tacit knowledge of our knowledge workforce—is destined to become one of the most important competitive assets of the global marketplace" (Levy, 2006, para. 5).

Social learning theories incorporate notions of Communities of Practice: "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger & Snyder 2000, p. 139). What differentiate communities of practice from other communities are the informal and social dimensions associated with their existence.

Vygotsky's social development theory asserts that social interaction plays a fundamental role in the process of cognitive development (Learning Theories Knowledgebase, 2011). "Learning to navigate an online social networking site challenges the novice and creates a zone of proximal (ZPD) development" (Gunawardena, Hermans, Sanchez, Richmond, Bohley, & Tuttle, 2009, p. 11).

Virtual communities of practice can provide the social interaction among members who are seeking to engage in the learning process whether it is to share or garner knowledge. Social learning theories also play a role in understanding virtual communities of practice because they help us understand the dynamics associated with online social interaction and knowledge sharing practices within a community.

Bandura's (1977) social learning theory has had important implications in the field of education and is perhaps one of the most influential theories of learning and development. Although rooted in many of the basic concepts of traditional learning

theory, Bandura's theory added a social element, arguing that people can learn new information and behaviors by watching other people (Learning Theories Knowledgebase, 2011). Bandura's Social Learning Theory posits that people learn from one another, via observation, imitation, and modeling (Learning Theories Knowledgebase, 2011). This same theory applies when individuals learn from one another in a virtual environment or a virtual CoP. Often this type of self-directed learning is defined as informal. Intentional or tacit learning in which one engages either individually or collectively without direct reliance on a teacher or an externally organized curriculum can be termed self-directed or collective informal learning (Livingstone, 2001).

Formal and Informal Learning

To better understand the difference between informal learning and formal learning, Cross (2007) contrasts them in the following way (as cited in Berg & Chyong, 2008). Cross likens formal learning to riding a bus, as the route is preplanned and the same for everyone. Informal learning, then, is more like riding a bike in that the individual determines the route, pace, etc. Informal learning can take a reactive form, where the learning was unplanned but still recognized by the learner retrospectively. It can also be intentional and potentially somewhat structured (Simpson, 2006).

Situated learning theory proposed by Wenger and Lave (1991) has its own set of assumptions which associate individual learning with socialization, visualization, and imitation. Their thought was that learning could be attributed to the process associated with problem solving. Problem based learning occurs when people explore real life situations and find answers. The primary focus of this theory addresses learning through participation. From this theory emerges the concept of the community of practice. Furthering this theory is the idea that it is the active and ongoing participation in a community of practice that defines social learning.

A community of practice is not just a Web site, a database, or a collection of best practices. It is a group of people who interact, learn together, build relationships, and in the process develop a sense of belonging and mutual commitment. Having others who share your overall view of the domain and yet bring their individual perspectives on any

given problem creates a social learning system that goes beyond the sum of its parts (Wenger et al, 2002).

When researchers begin studying and analyzing communities the primary unit of analysis concerning communities of practice is the community itself. Wenger’s (1998) social theory of learning conceptual framework is an appropriate choice when engaging in qualitative research related to informal learning that takes place in a virtual CoP.

Wenger’s (1998) original model, which characterized the essential elements associated with CoP’s, has been broadened to reflect virtual CoP’s. The following Table identifies five constitutive dimensions associated with virtual communities of practice, specifically: mutual engagement, joint enterprise, shared repertoire, community, and learning or identity acquisition. These constructs are necessary, according to Wenger (1998), when evaluating a virtual community of practice and are illustrated in Table 1 along with the capabilities or indicators that are associated with each construct.

Table 1. Wenger Original Model

Constructs	Indicators
Mutual engagement	members' practice-related interactions to collaboratively solve problems, produce artifacts and discuss relevant issues.
Joint enterprise	domain of knowledge that brings the community together, gives it an identity and defines the key issues and problems that members need to address.
Shared repertoire	a set of communal resources that allow members to more effectively pursue their joint enterprise. These resources include tools, ways of doing things, stories, symbols and artifacts that the community has produced or adopted
Community	a stable group with strong personal interrelationships developed through sustained mutual engagement
Learning or identity acquisition	Wenger treats learning as equivalent to the acquisition of a new identity, because membership in a community of practice involves identifying with it, becoming an insider.

[adapted from <http://informationr.net/ir/13-4/paper386.html>]

Seaman (2008) defines members of communities of practice as practitioners with a shared competence or practice: “A community of practice consists of members that share more than simply an interest; a community of practice shares expertise, competence, learning, activities, discussions, information, tools, stories, experiences, and a knowledge base” (Seaman, 2008, p. 270).

Wenger (1998) provides a framework from which researchers can derive some insight into what fosters informal learning and membership engagement within a selected community of practice. Studying the way learners share knowledge and practices can reveal a great deal about how informal learning takes place and what keeps members of a community engaged and motivated.

Wenger’s CoP Framework

When deciding on a research methodology and framework associated with a qualitative analysis on how informal learning takes place within a virtual community of practice and what contributing factors sustain that community, Wenger’s established framework was a suitable and perhaps appropriate place to begin. However, there are other constructs, in addition to Wenger’s, that needed to be considered when evaluating a framework for this study.

In an effort to contribute to Wenger’s (1998) established framework, Sobrero (2008) developed a set of components that augment the empirical signature of Wenger’s essential traits as applied to virtual communities of practice. The components identified in Table 2 are intended to deepen the meaning and further the original constructs outlined by Wenger but are crafted with specific attention to levels of social engagement and informal learning that take place in a virtual community of practice. This is of importance because the research questions being addressed in this qualitative study are directly associated with social engagement and informal learning in the virtual community of practice known as the TCL.

Table 2. Sobrero VCoP Components

Level of Social Engagement and Informal Learning in a Virtual Community of Practice	
Component	Virtual Community of Practice (VCoP)
Organizational Focus	Members select the topic themselves, create their own structure, and develop their own culture (Wenger & Snyder, 2000) May be related to an issue, discipline, problem, scientific/scholarly inquiry, and integration of knowledge
Membership & Purpose	Self-organized, self-managed social learning that crosses structures, cultures, organizations, time, and space to learn from each other, develop new knowledge, and continuously improve know-how (Lueg, 2000; Kimble et al., 2001)
Motivation	Learning and co-learning for the sake of sharing new knowledge, motivation to learn and share knowledge with others
Permanence	Permanence continues often as long as an issue requires learning and improvement (Wenger & Snyder, 2000)
Strength of Social Relationship	Co-learning passion, commitment, and identification with the group holds the group together (Wenger & Snyder, 2000)
Meeting Format	Online collaboration but not at the exclusion of face-to-face meetings
Trust	Level of trust is high, social relationships are established and sense of belonging as a valued member exists

[<http://www.joe.org/joe/2008june/a1.php>]

What is of interest in Sobrero’s framework model is the focus on the components that guide the research associated with virtual CoPs.

Leask and Younie (2001) describe virtual communities of practice as active learning environments in which learners participate in conversations and inquiry, via chat rooms, email lists and postings (as cited in Duncan-Howell, 2010). They also serve as a place where peers feel supported. The dynamic nature of online membership maintains

freshness and variety that traditional methods of learning may not be able to achieve (Duncan-Howell, 2010). Contact is maintained between members, often through listserv technology, allowing members the freedom to choose how, when and where they interact. There is no requirement for engagement thus this could lead to periods of inactivity yet still maintaining membership. That enough members exist within the virtual community to sustain activity (even when some members choose not to actively participate) is one of the positive characteristics of a virtual community of practice.

This study, which focused on virtual CoP's, was better served by blending the two conceptual frameworks developed by Wenger (1998) and Sobrero (2008). To begin, one needed to confirm the existence, within the selected community, of the established dimensions outlined in Wenger's original framework. Secondly, to contribute to an understanding of the factors that can sustain knowledge sharing among members of an online CoP, Sobrero's (2008) model served to deepen the research by probing further into participant behavior, community structure, traits that contribute to informal learning and identify levels of social engagement related to sustaining a VCoP. This helped to contribute to a greater understanding of the types of shared knowledge that characterized this specific online community of practice. Very few prior studies have addressed these pertinent factors that are attributed to sustaining long-term knowledge sharing within a virtual community of practice environment (Hara & Hew, 2007).

Listserv Technology

One of the most useful and time-tested computer mediated communication technologies that has supported knowledge sharing is the listserv. A listserv is a tool that supports electronic discussions that usually focus on a topic that is of interest to members within a specific community. It typically serves a closed network community and provides a place for the exchanging of ideas and solving of problems thus allowing informal learning, which may or may not support ones workplace, to occur.

Much like social networking sites, a listserv can provide the means to building a community of practice where members can engage in exchanges related to common interest. The listserv is not a new technology tool. "The listserv, bulletin board and chat

technology that supports many of today's online communities changed comparatively little during the last twenty years" (Preece & Maloney-Krichmar, 2003, p. 6). Its origin stems from what was essentially a manually managed list where individuals emailed a list manager and asked to be included in a mailing to all group members. In 1986 LISTSERV became an official commercial product that provided its users with an automated version mailing list tool (Grier & Campbell, 2000). A listserv is a database of email addresses that enables computer-mediated discussion among its members.

For an individual to join a listserv they must subscribe to a designated list. Once subscribed, the member will then receive email notifications of any and all postings to the listserv. Most listserv communities have established guidelines for use and require basic netiquette to maintain membership within the community. The listserv can be either public or private. In the case of a private or closed network listserv, the list's owner or sponsor can subscribe people, and discussions or postings are not available for other non-members to view. Some listserv functions may include a searchable database that enable members to access prior discussions while others function only as an e-mail list that enables communication among its subscribers.

A listserv provides the informal learning space for participants and/or members of the listserv community. Often the community is comprised of individuals who share a common practice. One of the mechanisms to support informal knowledge sharing is through communities of practice (Hara & Hew, 2007). This closed network of individuals can choose their level of participation as they engage in the informal or self-directed learning process.

In a study by Hara and Hew (2007) they found that conversation was identified as an important conduit for knowledge sharing among members in CoPs and that such conversations came in the form of an open question or a request for help to the community via a listserv or online forum. In response, a knowledge provider may either share his or her knowledge by describing a similar experience where a method was used to solve a problem, or, if unable to provide an appropriate solution, share knowledge indirectly by referring the individual to someone else who might know and be willing to help.

There are both push and pull technologies used for knowledge sharing. This type of exchange via listserv technology is referred to as push technology. A listserv, by nature, is an email list whereby all members are communicated with regardless of their interest in the topic. A group member pushes out information to the community. A forum or newsgroup, on the other hand, is an example of what is called pull technology where a user can log in to a community and seek out content or topics of interest as needed. Both pull and push technology contribute to knowledge sharing within communities of practice.

Membership in a community typically implies a minimum level of knowledge of that domain—a shared competence that distinguishes members from other people (Wenger, 1998). Such communities of practice can serve as a tremendous resource for individuals seeking knowledge from other practitioners. Through sharing knowledge with one another, members explore the meaning of their practice, and develop a sense of professional identity (Gray, 2004).

The very nature of the communication medium also plays an important role in supporting and sustaining the online community of practice (Hara & Hew, 2007). The types of exchanges that take place within this community via the listserv play a significant role in the success or failure of that community. Online communities are strongest when grown by members into unique and supportive environments (Clark, 1998). There must be value to the community that keeps the members actively involved in using the listserv or the community will not thrive.

The findings in one study conducted by Hara and Hew (2007) suggested that the online listserv environment, as a whole, functioned as an online community of practice, where online participation not only served as an avenue for knowledge sharing but also that participation helped to reinforce identity of the members practice itself.

“Listserv facilitates efficient information sharing, unobtrusive Q&A, and peripheral learning” (Blackmore, 2010 p. 111). Although scholars may not use discussion lists to engage in in-depth scholarly exchanges, they still use them heavily as sources of information and ways to communicate with others (Maron & Smith, 2009). While resources like this suggest that Web 2.0 technology will enable new forms of scholarly exchange and interaction in the future, there may still be a place for more traditional listservs and discussion forums for some time to come (Maron & Smith, 2009).

Motivation

In Hara and Hew's (2007) research article "*Empirical study of motivators and Barriers of Teacher Online Knowledge Sharing*" one of the goals in the study was to identify what factors contributed to or resulted in the sharing of knowledge between teachers through computer-mediated networks. More to the point, they examined a listserv that was used to support a group of literacy teachers.

What motivates a listserv member to be an active participant in a shared community of practice often depends on a number of factors related to that individual and the specific type of community to which they belong. In Hara and Hew's (2007) study on how a listserv supported a community of practice of literacy teachers, the results of this particular study found that there were several motives that determined participation and involvement. The motives identified were listed as being associated with ego, altruism, collectivism and principlism (2007). When members are interested in sharing their own knowledge for the benefit of themselves that would play into ones ego. If a member were truly committed to sharing information for the benefit of others then the motive to participate would fall into the altruism category. Collectivism refers to the collective or the group as a whole, which can benefit from the knowledge of all its members. In other words, one of the reasons people feel compelled to contribute to a community of practice via a listserv is because they identify themselves as part of the collective and are aware that what benefits one benefits all. The concept of principlism applies to a sense of moral obligation to the group. Often people feel that if others have helped them, it is their moral obligation to reciprocate (Hara & Hew, 2007).

In another study by Foss, Minbaeva, Pedersen and Reinholt (2009), the motivation to share knowledge was tied to job design and job characteristics. In other words the psychological implications to engage in knowledge sharing was directly related to their specific job design and therefore played a role in motivation to some degree. They also characterized motivation as falling into one of two categories: intrinsic and external (Foss, et al, 2009). "Intrinsic motivation to engage in knowledge sharing implies employees find the activity itself interesting, enjoying and stimulating" (Foss, et al., 2009,

p. 875). This type of motivation would be deemed positive and rewarding to an individual because there is the hope or expectation that engaging in this activity could benefit them in their job or simply contribute to personal growth. External motivation, on the other hand, is driven by external factors that would drive the interest to engage in knowledge sharing (Foss, et al., 2009). “External motivation means that an individual engages in an activity to attain a positive or to avoid a negative external outcome; thus, the reason underlying the behavior is not inherent in the behavior itself but rather is instrumental in obtaining separate outcomes” (Foss, et al., 2009, p. 874). External factors that motivate employees to engage in knowledge sharing might be a pay raise or a promotion or simply to maintain one’s job.

With respect to the technology coordinators, who are the participants in this qualitative research study, job design and job characteristics could play a significant part in motivation and engagement as each person serving in this role maintains different responsibilities assigned by their principals.

Summary

This chapter discussed the transition from the industrial age to the knowledge age and the role that knowledge distribution, through listserv technology, plays in how knowledge is distributed within an organization. It addressed the impact that virtual communities of practice can have on social learning, both formal and informal, and discussed the concepts associated with both Wenger’s and Sobrero’s frameworks related to a given community of practice. It also shared examples of current research that addresses the types of motivation associated with an individual’s desire to engage in knowledge sharing.

Given the relevance of the concepts of knowledge management, as it applies to organizations, and knowledge sharing within the workplace, this study provides answers to important questions related to why individuals in specific virtual communities of practice engage in knowledge sharing and what factors motivate them to participate in those communities.

The next chapter will describe the research methods including the methodology

used to address the two research questions in this qualitative study. It will also detail the chosen theory and conceptual framework as well as the role of the researcher, selected participants, and instrumentation used to collect data and finally, the data analysis approach that was used in this study. Limitations, reliability and validity of the study will also be addressed.

CHAPTER 3. METHODOLOGY

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 (Wenger et al., 2002). Once a community of practice is established, its value to its members will be dependent on a variety of factors. It must first be developed and have a legitimate purpose. Relationships and trust need to be nurtured so membership thrives and finally, sustained interactions must create a knowledge repository where members can find solutions to the problems to which they seek answers.

The individuals in this study, whose common interest is technology, may have, at one time, met around the office water cooler or the break room or even after work at local establishments to discuss the issues that are most important to them in their work environments. These casual meetings may still exist but today most of these exchanges are occurring in a virtual rather than physical space and in many cases, participants may not have met at all. The members of the virtual community of practice who participated in this qualitative study shed light on factors associated with motivation and engagement within this community.

This chapter will detail the need, significance and purpose of this qualitative study, the setting and participants involved, the role of the researcher as well as the selected data collection instruments and data analysis method that was used.

Research Design

To understand the internal dynamics of a virtual community of practice a qualitative study using a grounded theory methodology and involving constant comparative analysis was adopted to identify and categorize data collected from a survey and subsequent discussions. Purposeful sampling was employed to inform the research questions being investigated.

The Qualitative Paradigm

The purpose of this qualitative study was to examine how informal learning takes place in a specific virtual community of practice (VCoP). The objective of this research was to analyze the components associated with the Tech Cadre listserv as they relate to informal learning opportunities and identify the motivating factors that contributed to membership engagement.

Research Questions

The research questions that were addressed in this qualitative study were:

Q1. How does participation, via a listserv, in the virtual community of practice of Hawaii K-12 public school technology coordinators contribute to informal learning within this community?

Q2: What are the motivating factors that draw K-12 technology coordinators in the state of Hawaii to participate in a virtual Community of Practice via a listserv?

Grounded Theory

Grounded theory, as a system for analyzing and interpreting research, rose out of a co-created approach to research analysis and theory development in the 1967 publication by Barney Glaser and Anselm Strauss titled *The Discovery of Grounded Theory*. Grounded theory is a methodology that seeks to construct theory about issues of importance in peoples' lives (Glaser, 1978; Glaser & Strauss, 1967; Strauss & Corbin, 1998). Morse (2001) sees this approach to constructing theory as a process of data collection that is often described as inductive in nature (as cited in Mills, Bonner & Francis, 2006). The researcher analyzes data by constant comparison, initially of data with data, progressing to comparisons between their interpretations translated into codes and categories and more data. This constant comparison of analysis to the field grounds the researcher's final theorizing in the participants' experiences. (Mills et al, 2006).

The grounded theory method of qualitative research developed by Glaser and Strauss (1967) is, as noted above, mostly inductive, which means the researcher does not begin with a hypothesis about the phenomenon to be studied but instead remains open to

whatever theory emerges from the data (Licquirish & Seibold, 2011). This approach was selected because the purpose of this study was to help gain an understanding of a very specific situation rather than prove an underlying hypothesis.

The process of building grounded theory consists of several phases including identifying the research problem and determining the research questions. The next phase is the data collection followed by the data coding and analysis, which ultimately leads to the emerging of theory (Bitsch, 2005).

There are a variety of ways to conduct research using the Grounded Theory Method including the traditional Glaser and Strauss (1967) approach, the Strauss and Corbin (1990) approach which has been characterized (by Glaser) as very prescriptive and there is also Charmaz's (2000) constructivist grounded theory approach which some believe allows room for the researcher to direct their research in a way that is more suitable or appropriate for the research environment.

Determining which variant of grounded theory to use in qualitative research is complex. Glaser (1998) suggests that researchers should stop talking about grounded theory and get on with doing it (as cited in Heath & Cowley, 2004). Bulmer (1979) notes that Glaser and Strauss' (1967) traditional grounded theory approach views induction as the key process, with the researcher moving from the data to empirical generalization and on to theory (as cited in Heath & Cowley, 2004). Others suggest that the novice researcher should set aside their 'doing it right' anxiety, and adhere to the principle of constant comparison, theoretical sampling and emergence and discover which approach helps them best to achieve the balance between interpretation and data that produces a grounded theory (Heath & Cowley, 2004).

It seems appropriate for all grounded theory research to at least begin with Glaser and Strauss's (1967) original approach, which sets out to deliver a systematic means of generating theory from rigorous data collection and analysis (Hunter, Murphy, Grealish, Casey & Keady, 2011). Determining whether to continue with this traditional approach or embrace Strauss and Corbin's (1990) variant may involve the consideration of which approach provides more structure and guidance. As a novice researcher, guidance and structure are essential and Strauss and Corbin (1990) provide considerable direction regarding data collection and analysis.

In deciding which grounded theory approach to use for a study it is equally helpful to look at what is being studied. The purpose of this qualitative study was to examine how informal learning takes place in a virtual community of practice and what factors contribute to the levels of participant engagement within this community. Being that the objective of this research was to analyze certain components associated with practitioners in the field of educational technology who utilize a dedicated listserv as a knowledge sharing tool, the variant selected should fit with this objective. Looking at the research questions in this study reveals that there are already three easily identifiable concepts with which to develop categories from: participation, informal learning and motivating factors. Although there is no proposed hypotheses that warrants a prediction or is being proved or disproved, there are concepts that will lead the study.

*Q1. How does **participation**, via a listserv, in the virtual community of practice of Hawaii K12 public school technology coordinators contribute to **informal learning** within this community?*

*Q2: What are the **motivating factors** that draw K-12 technology coordinators in the state of Hawaii to participate in a virtual Community of Practice via a listserv?*

A grounded theory approach, developed by Glaser and Strauss (1967), which employs the constant comparative method and theoretical sampling, constitute the core of this qualitative analysis however, sensing a need or desire for additional guidance and structure throughout the data collection and analysis process the divergent grounded theory model proposed by Strauss and Corbin (1990) seemed to be a better choice for this research. This somewhat more structured approach to grounded theory was better suited to this study because of the considerable direction given regarding data collection and data analysis.

Another consideration when deciding which of the two grounded theory approaches to use had to do with the inductive versus deductive argument. In the original development of grounded theory by Glaser and Strauss (1967) Bulmer (1979) views induction as the key process, with the researcher moving from the data to empirical generalization and on to theory (as cited in Heath & Cowley, 2004). Strauss and Corbin

(1994) claim that in the original development of grounded theory inductive aspects were overlaid (as cited in Heath & Cowley, 2004). Strauss and Corbin (1990) acknowledge the place of personal experience, professional background and perceived need along with the literature in shaping the area of study, in contrast to the completely open approach put forward by Glaser (1978) [Hunter et al, 2011, p. 9].

Glaser identified something called theoretical sensitivity as a key concept to the grounded theory approach, which recommends thinking about the data in theoretical terms (Bitsch, 2005). Strauss and Corbin (as cited in Bitsch, 2005) define theoretical sensitivity as “the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn’t” (1990, p. 42).

Role of the Researcher

The participants within the tech cadre listserv consist of state employees who work in technology related roles and voluntarily seek or share information through this medium. This research stemmed from my own curiosity and interest in discovering more about the nature of virtual communities of practice and the characteristics associated with this particular listserv community as they relate to informal learning as well as levels of participant engagement and motivation. As a member of the TCL there may be assumptions made on my part that could contribute to bias within this study. In an attempt to provide a balanced analysis within this study I engaged in both member checking and inter-reliability. I also had no contact with the participants but rather collected survey responses, which were anonymously submitted.

Conceptual Framework

Wenger’s (1998) social theory of learning conceptual framework is appropriate to use when engaging in qualitative research related to informal learning that takes place in a virtual CoP. Wenger’s (1998) original model, which characterized the essential elements associated with CoPs, has been broadened to reflect virtual CoPs. Wenger’s constructs are listed in Figure 1.

In an effort to contribute to Wenger’s (1998) established conceptual framework Sobrero (2008) developed a second set of components that augment the empirical signature of Wenger’s essential traits. These components (as outlined in Chapter 2) are especially helpful to this study because they address levels of social engagement and informal learning that take place in a virtual community of practice. This is of significance because the research questions being addressed in this qualitative study are directly associated with social engagement and informal learning. Both Wenger’s constructs and Sobrero’s components are noted in Figure 1. A blending of these two established conceptual frameworks served to guide this research.

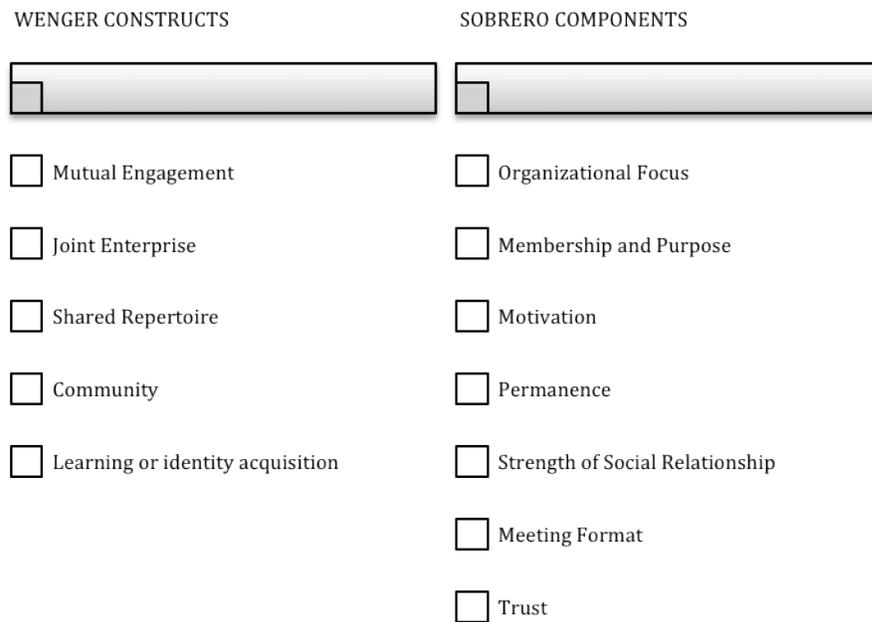


Figure 1. Blended constructs and components

Participants and Context

Participants

Participants were voluntary and were members and/or contributors of a public listserv community called the Tech Cadre, which is dedicated to the support of Technology Coordinators within the Hawaii Department of Education K-12 community.

The TCL is designed to be a resource for knowledge exchange for those members who choose to participate within this virtual community of practice. At the time of this study there were 287 public schools in Hawaii and a total population of 334 (N) members were confirmed as being subscribed to the tech cadre listserv (based on information provided by the listserv administrator). It should also be noted that not all schools employ a technology coordinator. Members of the listserv do not necessarily need to be technology coordinators however most who utilize the listserv do identify themselves as providers of technical support to their schools.

Since the participants are members of the State of Hawaii Department of Education I was required to submit an application to the Institutional Research Branch (IRB) of the Hawaii Department of Education for approval of this research. The application was submitted online in early March 2013. Although the IRB application to perform research was granted (see Appendix D), the review and approval process took approximately nine months, which was much longer than anticipated. This type of delay in a research study can prove detrimental to those researchers who are working on an established timeline to complete their research. The State of Hawaii DOE data governance office that reviews all research applications was extremely slow to review the application and during the course of the nine-month waiting period, implemented a new online application process. The original application submitted had to be re-entered into the newly revised online application thus furthering the delay in its processing and ultimate approval.

The IRB application required a copy of the informed consent form (see Appendix A) as well as the list of questions that were to be asked in the electronic survey (see Appendix B). I also was required to apply for IRB approval from the University of Hawaii Human Studies Program. That approval process was much more simplified and was completed within a two-week period (See Appendix C).

Instrumentation

Using the web-based [SurveyMonkey](#) survey tool, an electronic survey was emailed to the tech cadre listserv. Each member of the listserv community who received the

email was provided with a link to an electronic survey and given a two-week timeframe for completion. To encourage participation, a link to a second survey was sent to tech cadre listserv members offering a gift card for participating. The gift card required a response, which included the name of the participant and a physical address where their gift card should be sent. Those who elected to receive a gift card were contacted again and asked if they would be interested in commenting on the survey results. The purpose of this follow up with selected participants was for member checking. Bitsch (2005) acknowledges the value of member checks, which address research participants' input and interpretations of the data.

Data Collection

SurveyMonkey software was used to build, distribute, collect and analyze data. The SurveyMonkey survey website offers a free version of their software however, this version is relatively limited in terms of data analysis. The next level, which is fee-based is considered the Basic level which does include a variety of analysis tools. Using this Basic level enabled this researcher to create charts from data, create and export reports of analyzed data and filter and cross-tabulate responses for customizing criteria.

The data collection period began in November 2013. The timeframe for survey participants to complete the survey was approximately two weeks.

Data Analysis

While this is primarily a qualitative study, some of the questions related to demographics were quantitatively analyzed which provided the necessary context for the grounded theory analysis.

The constant comparative method which refers to the process of identifying the similarities and differences in the data, allowing coding, category development and concept development (Hunter et al, 2011) was the primary strategy used in this theorizing method. This approach was suitable given that the key purpose of this study was to help

gain an understanding of a situation (Merriam, 2001) – informal learning that takes place among Hawaii K12 public school technology coordinators engaging in knowledge sharing via a listserv, rather than to predict, prove or disprove underlying hypotheses.

The constant comparative method is an analysis process during which the researcher constantly compares incident with incident and then incident with concept (Taber, 2011). Constant comparison is a way of maintaining a connection between categories (codes) and data. When a new passage appears related to an existing coded incident, it is compared and then either confirmed to be coded the same or provided with a new coding.

The next step was to find the categories or properties of categories to which the incident belongs. In the generation of categories, the grounded theory (GT) analyst looks for patterns and for a conceptual name that is given to a pattern of many similar incidents. The incidents compared can be used as indicators of the same concept. Categories are generated from similar occurrences of a pattern and not from isolated single occurrences that cannot be generalized (Taber, 2011). When there is no more to add because many interchangeable incidents have been found and coded, the researcher has reached the saturation point.

Validity

Determining the validity or soundness of qualitative research involves establishing credibility of the results. It also questions the transferability or generalization of the findings. Unlike most qualitative methodology, the grounded theory approach, which was used in this study, claims to produce testable outcomes: grounded theory is intended to lead to predictions which may be subject to traditional experimental and statistical testing (Taber, 2011). In other words the outcomes may be generalizable.

In qualitative research, the researcher often brings a unique perspective to the study. Qualitative research is usually carried out from a relativist perspective, which acknowledges the existence of multiple views of equal validity. Therefore, it does not readily lend itself to the production or observance of such a hierarchy of evidence (Barbour, 2001).

Since this was a qualitative study, which addressed factors associated with informal learning and motivation associated with a virtual community of practice, the most obvious potential threat to validity of the study was whether members of the tech cadre listserv constitute a virtual community of practice. The validity of this study will be strengthened if it can be shown that members of the tech cadre do constitute a VCoP. Based on the constructs and components outlined in the selected framework for this qualitative study, it was determined that the members of this listserv community do, in fact, constitute a VCoP.

Reliability

Reliability and validity are ways of demonstrating and communicating the rigour of research processes and the trustworthiness of research findings (Roberts, et al, 2006).

In this study inter-rater reliability was used to validate the coded data. By using inter-rater reliability as a solidification tool, the inter-raters become true validators of the findings of the qualitative study, thereby elevating the level of believability and generalizability of the outcomes of this type of study (Margues & McCall, 2005).

Verification

Strauss and Corbin describe grounded theory as being inductively derived from the study of the phenomenon it represents. It is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon (1990). The process of collecting data, analyzing it and allowing a theory to emerge is what differentiates grounded theory research from experimental research, which attempts to prove or verify a hypothesis through testing.

That is not to say that verification is not an issue in grounded theory research, it is simply that there is not a hypothesis to prove. There must still be evidence that supports the existence of the categories, which emerge from the data.

CHAPTER 4. FINDINGS

Overview

Chapter 4 contains the results of this study. The results of this qualitative study were obtained from an electronic survey sent to all technology coordinators in the Hawaii K12 public school system that are members of a tech cadre listserv. The survey results include detailed demographic information on participants and responses to questions related to informal learning, knowledge sharing and motivation levels associated with using the tech cadre listserv in their role within the Hawaii Department of Education. Some participants, who had previously provided contact information, were selected to receive the results of the survey and asked to comment on those results. The purpose of following up with some listserv members was to share data results for general feedback for validity and member checking purposes.

The survey that was sent to the participants consisted of 25 questions. The survey tool that was used to deliver the survey was SurveyMonkey. In November 2013 the survey was sent to all members of the tech cadre listserv (tcadre@lyris.k12.hi.us). Members were given a two-week window to complete the survey. It is unknown how many of the 334 members were still active members of the listserv or were technology coordinators.

Demographics

Participant Profiles

A total of 45 (n) tech cadre listserv members or 13.5% of the 334 (N) subscribed members responded to the survey. The survey was intended to solicit responses from technology coordinators however there were some participants who responded to the open-ended choice, which provided the option to identify a job title not listed. Those who chose the open ended option identified themselves in a role(s) other than (or in addition to) technology coordinator including curriculum coordinator, resource teacher, computer

teacher, student services coordinator, data processing user support tech and information specialist. Seventeen of the 45 respondents included a role other than technology coordinator however, the majority of the respondents (89%) listed technology coordinator as their job title. Figure 2 shows the detailed results of the roles of those participants who have responded to this survey.

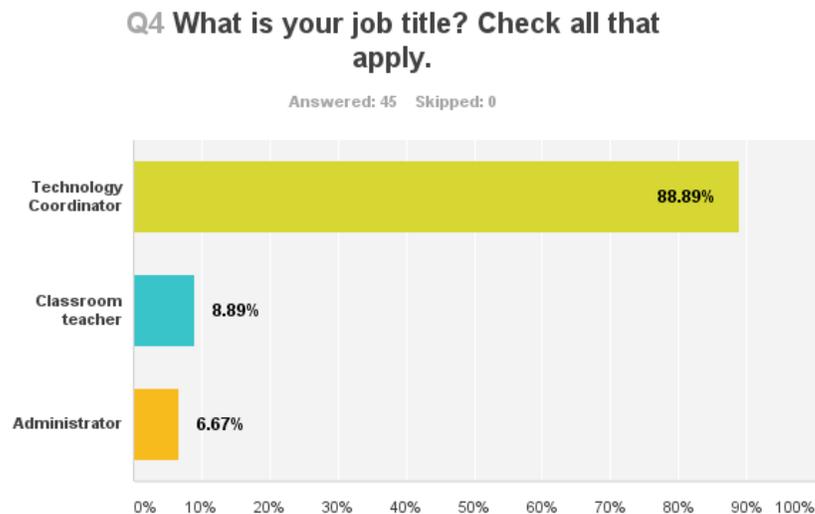


Figure 2. Job title

Job Title

The majority of the respondents to this survey are technology coordinators (89%) and although 9% stated that they were classroom teachers they may still be performing the duties of the technology coordinator. Some smaller schools within the DOE do not have the funding available to support a technology coordinator so they assign that duty to a classroom teacher. There were nearly 7% who indicated that they were administrators. Again in some of the smaller schools without technology coordinators the responsibility to support technology falls upon administrators or classroom teachers.

One of the questions in the survey was to identify the Hawaiian island that the member was from. The relevance of this question was to identify how many members exist on each of the different islands. Having that knowledge provided more insight into the number of people that actually belonged to the listserv and also could help reveal how many may not be aware of this resource. Figure 3 shows the demographics related to location of members who participated in this survey.

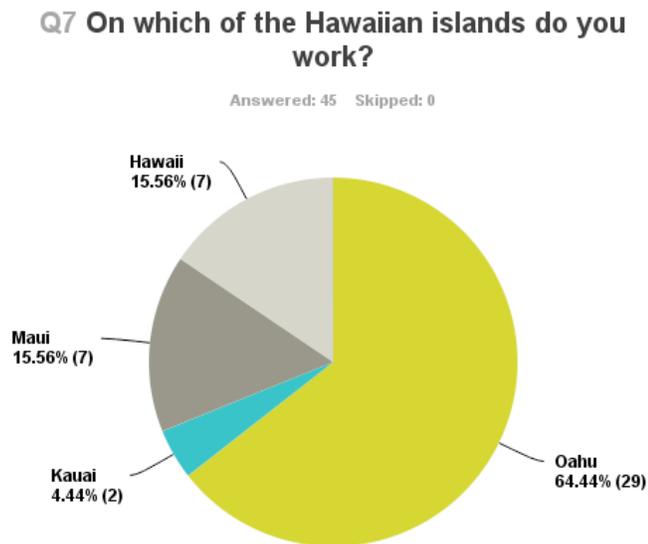


Figure 3. Participant location

Content Area

Not all technology coordinators are certified teachers however most technology coordinator positions do require certification. There are some Hawaii DOE schools that hire non-certified individuals to serve in the position of technology coordinator but based on results from question #8, most of those serving in this role are certified in a content area or grade level. Question #8 of the survey asked respondents to identify which content area they were certificated in, if they were certificated at all. There were 38 respondents who answered this question.

The relevance of asking this question in the survey was to identify the field of study that participants come from which may or may not contribute to their level of engagement and use of the listserv. There can be no assumption that technology coordinators who are selected to fill this role would have experience or expertise in the field.

Responses to question #8 indicated that the content areas of teachers who serve in technology roles were quite broad and diverse. When evaluating the content areas associated with members of the tech cadre listserv, those who reported identified at least 12 different content areas. Nineteen of the 38 respondents noted elementary education as their content area: 1 reported social studies, 1 library studies, 1 computer science, 3 science, 2 special education, 1 counseling, 2 math, 1 philosophy, 1 music, 1 history and foreign language, 1 Hawaiian immersion and 3 indicated NA or not certified.

In reviewing the findings related to member's content area, the data revealed that there is not a common set of skills that are brought to the role of technology coordinator and that very few technology coordinators have a distinct credential or academic certification in a technology related field. Only one survey respondent actually identified a background related to technology (computer science). The most common content area listed was a general certification in elementary education, which implies that many who responded to the survey and use the listserv come from the elementary school level. What the responses to this question also revealed was that the role of technology coordinator is one that is not clearly defined nor is there a certification associated with it thus, individuals from a variety of content areas end up filling this position.

The need for opportunities to engage in informal learning would thus prove helpful to anyone filling this critical school role. Seeking the knowledge to successfully perform ones job would be a motivating factor attributed to this position as well. That being said not all technology coordinators use the TCL and this study did not reveal how many of these TC's are aware of the TCL or how many simply choose not to subscribe to it.

Gender and Age

The demographics of this population indicated that there were nearly an equal amount of men and women serving in this role and that the age range of the tech cadre member's was quite broad from the mid 20's to upward of 60 years old. The majority of the participants fell into the 30 – 60 year old category.

Question #5 asked the participant to identify the age group to which they belonged. The median age of the participants was 40-50 years old. However, ages of participants ranged from within the 20's to over 60 years old. The detailed results are noted in Figure 4.

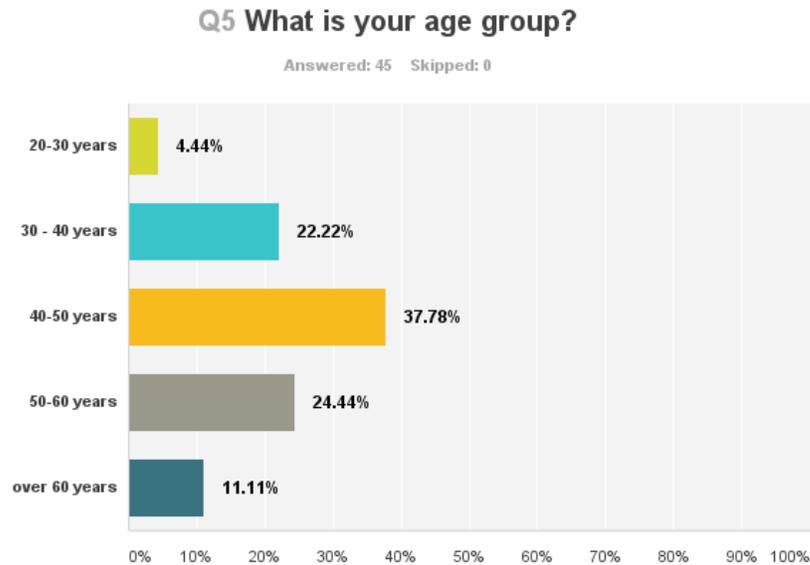


Figure 4. Participant age group

Years with DOE and years as Tech Cadre member

To better understand the audience, respondents indicated the length of time they had been working for Hawaii DOE. Just over 50% (23) had worked for more than 15 years, 25% (11) 10-15 years, 13% (6) 6-10 years, and 11% (5) 1-5 years

In addition to years of service, the study asked participants if they could recall how many years they had been members of the TCL. The results revealed that 35% of members had been subscribed for 0-5 years, 40% had been subscribed for 5-10 years and 20% for 10 years or more. Two respondents were unsure so their responses were not noted. This question helped gain an understanding of the timeline associated with members' involvement with the listserv.

Over 50% of the respondents to this survey have been employed with the Hawaii DOE for 15 years or more. The data also revealed that the tech cadre listserv has been utilized for knowledge sharing for more than 15 years and perhaps as long as 20 years (indicated by some members). What may be relevant to the success of this VCoP is the continuity of its membership and the value that this TCL offers to its members. Without such a tool this community has no other means of sharing information or problem solving. As revealed in the responses to question #2 of the survey at least 40% of the respondents have been members of the listserv for 5-10 years. Twenty percent of the respondents identified their membership as having been 10 years or more. There are also the newcomers to the community that have identified their membership to be between 0 – 5 years. This newcomer category represents 35% of respondents. . From just the survey responses of these 45 participants we can estimate that there is, at the very least, a total of approximately 400 years of combined experience within the organization. The implication of such experience deems this listserv as a vast resource of knowledge that has great value to its members.

One of the factors that is identified in both Wenger's (1998) and Sobrero's (2007) frameworks for a successful CoP or VCoP is the cultivation of the community and the continuity of its membership. Providing a productive social relationship between long-term members and newcomers to the group builds a sense of community where the transfer of knowledge can take place. Sobrero (2007) associates this concept with her frameworks component entitled *Membership & Purpose*. Wenger (1998) builds this concept into his *Community* construct. Peer to peer collaboration, in an effort to share knowledge or problem solve among a community where there are both experts as well as novices, would accurately place this group within Vygotsky's (1978) Zone of Proximal Development.

Another factor that was examined was determining if a member’s listserv use and posting behavior was associated with the age group and number of years he/she had been subscribed to the listserv. Table 3 details the results of the data categories that were revealed in the survey results.

Table 3. Listserv Use and Posting Behavior

<u>Age</u>	<u>Average #years as TCL member</u>	<u>Average posting</u>	<u>Use</u>
Over 60 (6)	11	once monthly	read regularly
50-60 (11)	7	once monthly	read and post
40-50 (16)	6	1-2 monthly	read and post
30-40 (10)	6	once monthly	read and post
20-30 (2)	2	once a week	read and post

Island

There are approximately 288 public schools in the state of Hawaii. Some schools that are included in this list may have closed or may not have opened as of yet. That is why it is an approximate number. The majority of the schools are on the island of Oahu (180) while Hawaii Island has 55 public schools. Maui, Molokai and Lanai all combined have 33 and Kauai has 20 public schools. Table 8 shows an almost direct relationship between surveys received and schools represented.

Table 4. Percent of Schools and Surveys Received Per Island

<u>Island</u>	<u>% of schools</u>	<u>% surveys received</u>
<i>Oahu</i>	<i>63</i>	<i>64</i>
<i>Maui</i>	<i>11</i>	<i>16</i>
<i>Hawaii</i>	<i>19</i>	<i>16</i>
<i>Kauai</i>	<i>7</i>	<i>4</i>

What is significant about these findings is that they quite accurately represent the demographics of the public schools in the Hawaii system except, of course, for Lanai and Molokai. The lack of responses received from members from Lanai or Molokai is also significant given that these two islands are the most remote and least populated islands with perhaps the biggest need for external support. Further evaluation would be needed to identify the reason behind the lack of response.

Revisiting the Purpose

Very little is known about the factors that foster people's voluntary willingness to share knowledge and interact with strangers in a virtual community (Chen, Chang, & Liu, 2012). As stated in Chapters 1 and 3, the objective of this research was to analyze the survey results and identify constructs and components associated with the tech cadre listserv as they relate to informal learning and identify the motivating factors that contribute to membership engagement. The constant comparative method which refers to the process of identifying the similarities and differences in the data, allowing coding, category development and concept development (Hunter et al, 2011) was the primary strategy used in this theorizing method.

The survey questions that were emailed to the tech cadre members solicited two specific categories of information: demographic and experiential. The demographic data provided this researcher with detailed and specific information about the participants, illustrated above. The experiential data or qualitative data were analyzed using the constant comparative method to inductively develop a theory or theories.

To further clarify, the research questions were intended to identify the characteristics of the listserv user and also examine and explore the experiences members had using the listserv as a tool for exchanging knowledge.

A Place for Informal Learning

Four of the survey questions were open-ended which provided the data for the qualitative analysis. These questions addressed the topic of informal learning as related to the virtual community of practice of tech cadre members. Question #18 asked the

participant to provide an example of something that was learned as a member of the tech cadre listserv. Thirty-nine individuals provided a response to this question. Using the grounded theory methodology, which incorporates the constant comparative method survey results were analyzed, (see Appendix E) and identified as falling into one of two categories: 1) resources and 2) troubleshooting/problem solving. Each item noted in Table 4 identifies how many respondents referenced that category item (see parenthesis). Some respondents listed more than one category item.

Table 5. Informal Learning Reported

Resources	Troubleshooting/Problem Solving
Equipment vendors (3)	Electronic student information system (eSIS) (8)
Technology resources (9)	Hawaii State Assessment (HSA) (8)
Event announcements (2)	Wireless network related issues (6)
Product recalls (1)	Google Apps for Education (2)
Research studies (1)	Java related issues (3)
Software (2)	Proxies (3)
Hawaii DOE announcements (3)	Lotus Notes (2)

Question #19 defines informal learning as learning that takes place outside of a structured classroom and that it is often self-directed and unintentional. The participant was then asked if they feel that listserv technology can contribute to informal learning and if so, to provide examples of informal learning that took place as a result of using the tech cadre listserv. Of the 45 respondents 41 answered yes to the first part of the question while 4 answered no.

Of those who responded yes to question #19 open-ended responses were given reflecting upon their use of the tech cadre lists. Their responses provided individual perspectives on their learning experiences. Those responses were analyzed and categorized and coded (see Appendix E) into the following themes: learning, sharing and expertise as identified in Figure 5.

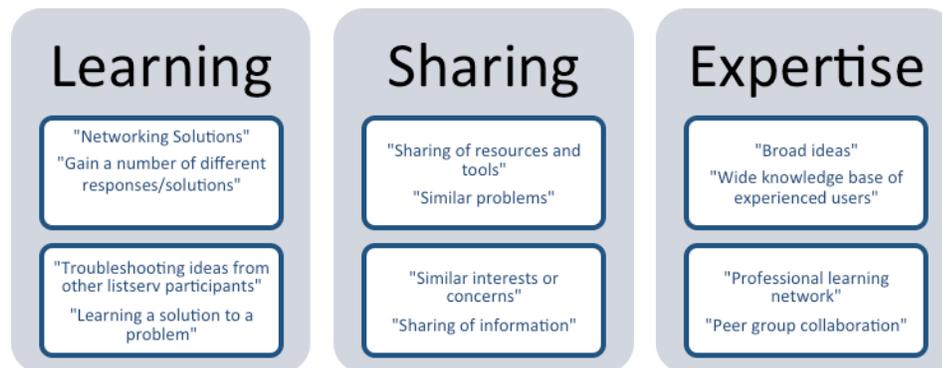


Figure 5. Themes revealed

Membership, Usefulness and Purpose

Question #21 of the survey addressed the perception of usefulness that the tech cadre serves to the members of this VCoP. As demonstrated in Table 5 the majority of respondents rated the tech cadre listserv as very useful or useful as a knowledge sharing/exchange tool (93%), for distributing information (86%), and as a resource for informal learning (87%).

Table 6. Participant Perception of Usefulness

	very useful	useful	somewhat useful	somewhat useless	useless	very useless	Total
as a knowledge sharing/exchange tool	73.33% 33	20.00% 9	2.22% 1	2.22% 1	0.00% 0	2.22% 1	45
for distributing information	66.67% 30	20.00% 9	11.11% 5	2.22% 1	0.00% 0	0.00% 0	45
as a resource for informal learning	56.82% 25	29.55% 13	9.09% 4	4.55% 2	0.00% 0	0.00% 0	44

Question #23 of the survey provided respondents an opportunity to share their recommendations, if they had any, of other resources that might prove more effective or

as effective as the tech cadre listserv as an informal learning knowledge sharing tool that the Hawaii department of education might support. The results from question #23 were compared, analyzed, coded and categorized as either no recommendation or listed as other resources. Of the 44 respondents to this question 16 had no recommendation or did not identify any other resource as effective or more effective than the tech cadre listserv. Of the remaining respondents who recommended other tools that could be as effective or more effective than the tech cadre listserv for the purpose of informal learning the summarized results are listed in Figure 6 with the number of how many suggested the tool in parenthesis.

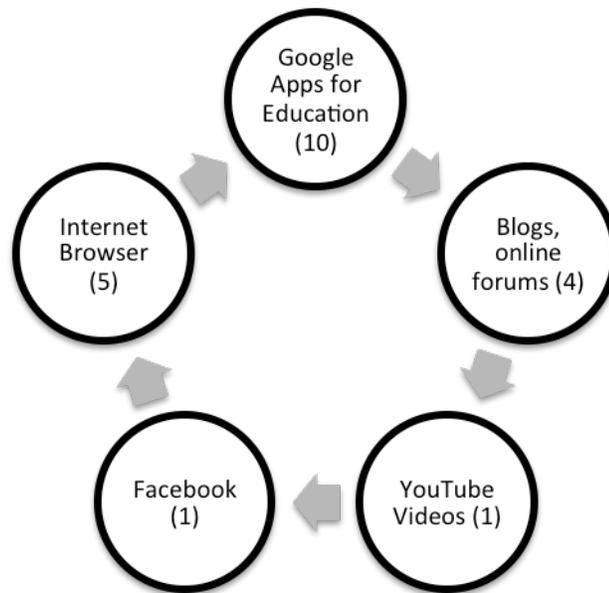


Figure 6. Other tools suggested

Factors Affecting Motivation

To find out for what purpose members use the listserv, Question #10 asked the participants to characterize their use. Users were asked to choose from a set of statements and identify what characterizes their use most accurately. The possible responses were 1)

I read subject headings and selectively read messages 2) I read posted messages regularly 3) I read messages regularly and occasionally post messages 4) I read and post messages regularly 5) I rarely read subject headings or messages. Results of this question are noted in Figure 8.

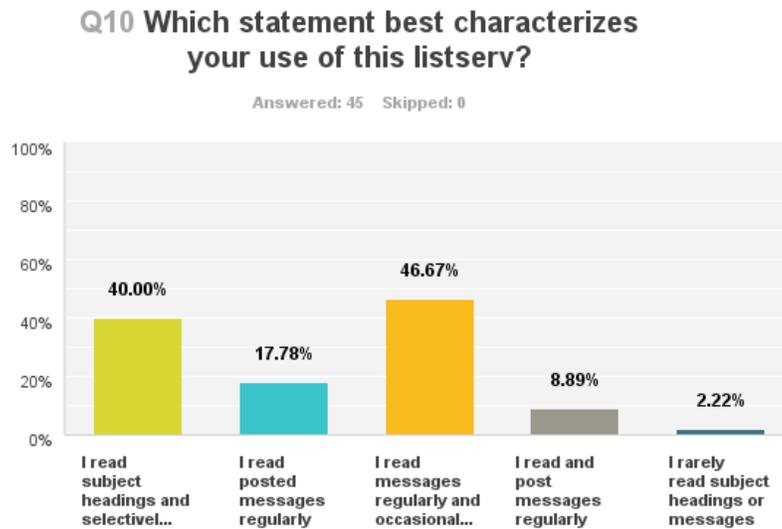


Figure 7. Listserv use

The results to question #15 are shown in Table 6. The choices for responding to the question “what influences your posting frequency” were limited to 1) need question answered 2) have answer to share or 3) would like to make an announcement.

Q15 What influences your posting frequency?

Answered: 45 Skipped: 0

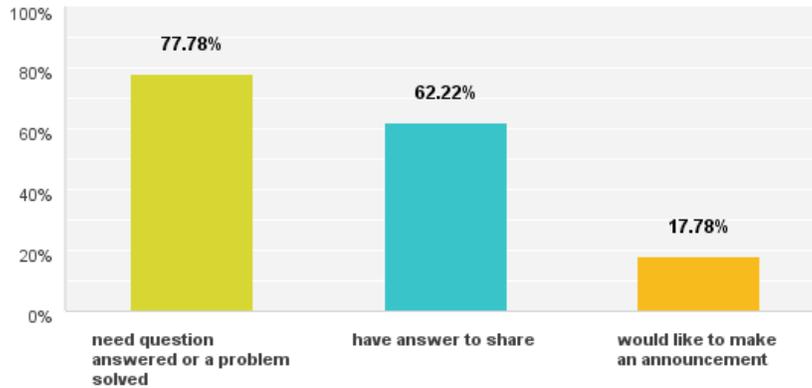


Figure 8. Posting frequency

Some open-ended responses to question # 15 revealed member perceptions or challenges with posting to the tech cadre listserv. The comfort level with using the listserv appears to be a factor for some members. Table 6 shows these open-ended responses.

Table 7. Member Perceptions of Challenges of Listserv Use

1	Unable to post to listserv so reply to individuals instead
2	I usually ask my complex colleagues first.
3	Never had the need to post a comment/question
4	have Q/response or info to share
5	NA
6	embarrassed so rarely post, will instead contact person directly.
7	There are very knowledgeable people on the listserv so I usually only post when there's departmental concerns. I leave the troubleshooting type of postings to the school level people.

Question #16 asked, “Do you find this listserv to be a helpful resource in your job”. The results indicating that the majority of tech cadre listserv members find it to be a helpful resource to their job with 43 responding yes and two responding no.

Question #17 of the survey required an open-ended response to the question “What motivates you to use (or not use) this listserv”? There were 45 open-ended responses to this question. The final coded (see Appendix E) categories identified as associated with motivation to use the tech cadre listserv are noted in Table 7. The number of times the category was mentioned by participants is noted in parenthesis.

Table 8. Motivational Categories

Problem-solving (13)	Efficiency (1)	Information (4)	Expertise (1)
Relevance (2)	Troubleshooting (2)	Seeking answers (4)	Collaboration (1)
Resources (2)	Knowledge sharing (5)	Solutions (7)	Discussion (2)

Question #13 asked participants to address the perceived value of the listserv as a computer-mediated communication tool. When responding to this question, there were four categories to choose from in addition to the option for providing an open-ended response. Figure 9 illustrates the selections made by survey respondents. Open-ended responses were few (4) and did not reveal any common theme.

Q13 What about this type of computer mediated communication do you value?

Answered: 45 Skipped: 0

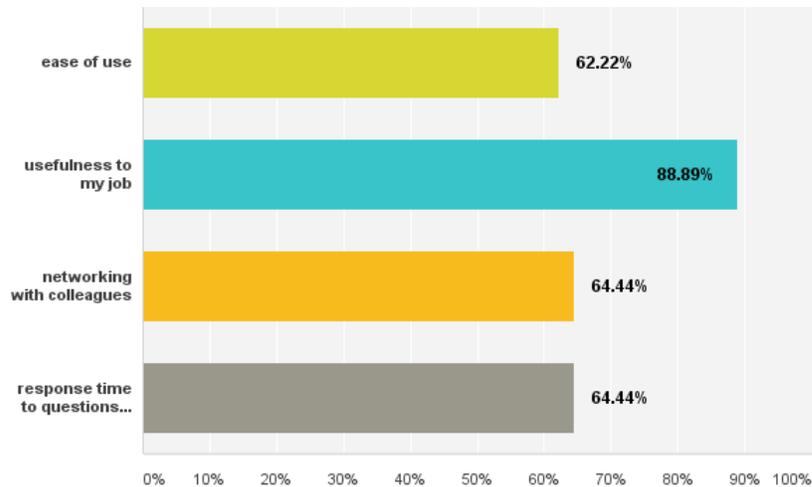


Figure 9. Perceived value of listserv

As evidenced by the charts above (Figures 8 and 9) nearly 90% of respondents indicated that usefulness to their job was a perceived value to the listserv. Also garnering over 60% of favorable responses were the categories 1) ease of use 2) networking with colleagues and 3) response time to questions.

Personal Reflection

The final question of the survey gave members an opportunity to share a personal reflection on their experience using the tech cadre listserv. An individual's personal perception of knowledge sharing is of value because it can reveal motivating factors attributed to membership engagement. It can also reveal characteristics of member behavior as well as informal learning taking place. Of the 45 respondents 33 opted to provide a personal reflection. Below are a few examples of what member's experiences have been.

"I think it's a great resource because, as I stated earlier, the knowledge base is voluminous and I know that there's a very strong chance I'll get a resolution to my question or issue normally the same day. I haven't

made "friends" with anyone via the list but do recognize many of the regular posters and identify them by their names as reliable resources".

"Living on Maui at a school with very limited means, I am not able to attend conferences held elsewhere. Reading listserv messages, I don't feel totally out of the loop".

"I joined the listserv when I was a school TC and at that time I found it very useful when needing answers to problems and it was a lifeline to others in the same position since at the school level I was the only TC. After leaving the school level I stayed on the listserv because it is a great resource of information, opportunities, and candid discussion. The only drawback at times is that since it is an informal learning experience/support participants at all levels need to be reminded at times and with certain situations concerns, announcements, etc. should also be reported/announced officially since it cannot be assumed that all schools/TCs are a part of the listserv".

"The listserv is my first line of communication when I have a tech issue I can not resolve on my own".

"I find the tech cadre listserv to be a valuable resource in my position as a Technology Coordinator. I am very surprised that there are not more TCs out there that participate in the listserv. But I do know that a lot of TCs simply lurk rather than respond, which is interesting to me and doesn't seem as valuable. I wonder why they feel the need to only lurk around".

"The HIDOE seems to lack any official method of distributing information to those of us on the front lines (or at least doesn't use any other means). TCadre is often the only place we hear of anything that's being planned or the issues occurring with those plans. And although many questions could be googled, it's often faster to get an answer that's specific to HIDOE school situations through TCadre".

"Generally, the listserv has been very helpful. I do not appreciate when certain TC are "snippy" and short with new TCs that are just starting out".

"As a new tech, I have found that other than personally networking, this is the only way I can get answers to many tech concerns".

"Have been a tech coordinator, am now classroom teacher. Still find listserv valuable for teaching and learning. If more TCs were involved in teaching (as opposed to just tech support), the listserv would be a richer resource".

"I would recommend every tech to subscribe to tech cadre listserv., esp. new techs. It has helped me do a better job in getting my work done a lot faster. There are techs out there that are willing to take the time to help others. The support from the tech cadre is great".

Summary

This Findings chapter collected and analyzed data related to demographics of the participant profiles and addressed the topic of informal learning revealing the types of informal learning that took place among listserv members. Members also responded to questioned related to perceived usefulness and value of the listserv in relation to job performance.

As mentioned earlier in this chapter, some participants who had previously provided contact information received the results of the survey and were asked to provide

general feedback. Of the 18 members who originally provided contact information and were asked to provide general feedback on the survey results, only three initially responded. The feedback that was received was limited yet all three felt the results of the survey reflected an accurate depiction of the use of the tech cadre listserv as an informal learning and knowledge-sharing tool. Member feedback from two people indicated that they found the responses to the survey questions reliable and accurate and mostly indicative of their own experiences. One member believed that overall the feedback was interesting but he felt that more open-ended questions might have provided more detailed results. Given that there were limited responses received another request for feedback on the survey results was sent to a district complex area information technology specialist who provides support to technology coordinators within the state and who has been a member of the listserv since it began. Below are some specific comments received from this member.

“although it’s a good resource, it lacks searching capability.”

“another listserv was created in Google, but only a handful of people transitioned.”

“I monitor the list, but I rarely respond. I do learn a lot.”

“I think it should be pulled and replaced with searchable Knowledge Base capabilities and an easy way to search past posts. I say replaced because if given a choice, only a handful will transition.”

Chapter 5 provides a more in-depth study of the implications of this qualitative study, including the methodology selected, how the chosen frameworks reflected the data, recurring themes in the data, and the limitations of this study. It also discusses emerging theories, recommendations for future research in the area of virtual communities of practice, knowledge management, knowledge sharing and computer mediated communication tools.

CHAPTER 5. DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

In Chapter 1, it was noted that geographical challenges exist in the state of Hawaii that limit formal training opportunities for the members of this community of practice. Given that the chain of islands presents few opportunities to engage in face-to-face learning/training the tech cadre listserv enables opportunities for its members to share work related knowledge despite these geographical limitations. It was also established that many technology coordinators rely on this computer mediated communication tool to support them in their jobs. Chapter 4 revealed the findings that emerged from the responses to the questions in the electronic survey. The purpose of these survey questions was to collect enough data to respond to the following two research questions:

Q1. How does participation, via a listserv, in the virtual community of practice of Hawaii K12 public school technology coordinators contribute to informal learning within this community?

Q2: What are the motivating factors that draw K-12 technology coordinators in the state of Hawaii to participate in a virtual Community of Practice via a listserv?

This chapter demonstrates how the Wenger and Sobrero frameworks helped guide this study and how using the divergent grounded theory model proposed by Strauss and Corbin (1990) was appropriate for this research. Finally, it includes a discussion on the conclusions including what suppositions emerged from this research, recommendations for future research in the area of virtual communities of practice, and computer mediated communication tools. It also addresses the limitations of this qualitative study.

Implications for Informal Learning

The survey results indicated that informal learning took place within this virtual CoP known as the TCL. Figure 5 in Chapter 4 identified the types of informal learning that members reported. The type of learning reported to have occurred was documented as learning that supports the professional within the workplace. Evidence suggested that common concerns, issues or challenges were most often posted to the listserv to either seek resolution or provide assistance within the community or to address an individual need. This is of importance because without access to a community resource for problem solving technology coordinators are likely to struggle to perform in their jobs, which leads to schools not having the support they need to function. What is also evident is that the role of technology coordinator might need to be redefined and establish a specific skill set to be associated with the job. That is not to imply that the technology coordinators are not performing in their jobs but rather that they are seeking out solutions and knowledge from other experts in the field (within the TCL) in order to perform their job. What may serve newcomers to this field is access to a training course, which provides guidance and support on basic and expected technical challenges. What might also benefit someone in this position is access to an online database of troubleshooting steps. One final recommendation that would likely be helpful for anyone in this role is to require a background, which includes technical training.

Question #18 asked the participant to provide an example of something that was learned as a member of the TCL. Table 7 in Chapter 4 describes the types of informal learning that respondents reported. The data fell into one of two categories: Resources or Troubleshooting/Problem-solving. The most identified resource was technology resources with 9 participants identifying this as an example of informal learning. There were an equal amount of participants who identified the electronic student information system (eSIS) [8] and the Hawaii State Assessment (HSA) [8] under the category of troubleshooting/problem solving as something they learned. There were also 6 participants who identified wireless network related issues as an example of informal learning. Other types of learning not mentioned here were reported in Table 7.

What this type of informal learning reported implies is that technology coordinators are using the TCL to seek and share information in order to perform their duties thus supporting the overall needs of the school. It also indicates that there is a lack of formal training for technology coordinators for basic DOE enterprise infrastructure systems such as eSIS, HSA, Lotus Notes and other noted applications as evidenced from survey responses.

Motivation and Factors Influencing Participation

The research questions in this study sought to identify how participation in the TCL contributed to informal learning (RQ1) and what motivational factors influenced listserv participation (RQ2). The informal learning that was detailed above by survey participant's responses provided answers to research question #1 revealing the types of informal learning reported. Research question #2, which deals with motivation and factors influencing participation are discussed below.

Results from question #16 of the survey revealed that 96% of respondents found the listserv to be a helpful resource for their job. Question #15, which asked what influences posting frequency, revealed that 78% of the respondents post in order to get an answer to a question or a problem solved. Sixty two percent indicated that they post because they have an answer to share. Eighteen percent shared that they post to the listserv when they would like to make an announcement. When asked in question #17, "What motivates you to use (or not use) this listserv"? There were 45 open-ended responses to this question. The responses were compared, categorized and coded (see Appendix E) and are identified in Table 8 in Chapter 4. The most referenced category was problem solving with 13 indicating it as a motivating factor to use the TCL. Knowledge sharing (5) and solutions (7) were also referenced. Although other motivating factors are indicated in Table 8 it is with certainty that technology coordinators are motivated to use the TCL to find solutions to problems that they encounter in the work place. What this data revealed in terms of motivating factors and participation was that knowledge sharing occurs because, as reported, the need to exists. As indicated in the

personal reflections reported in the final survey question, this community of technology coordinators has no other dedicated resource to which acquire the needed skillset to successfully perform their duties.

In Sobrero's (2008) framework her established *motivation* component asks if there is knowledge-sharing occurring. What respondents revealed was that there was knowledge-sharing occurring and that it was in the form of support for specific tasks associated with their job performance. Specifically noted was assistance with the HSA, eSIS, Cisco wireless network and other resources. Wenger's (1998) framework includes the *shared repertoire* construct, which also lists knowledge sharing as one of its indicators.

Based on the data revealed in Table 3 of Chapter 4 some general information has been identified that can be associated with participant listserv behavior. The data do imply that all age groups utilize the listserv to varying degrees. Most of the users reported that they read and post monthly to the listserv. Some did reveal that they are more interested in reading but not posting while others simply review the subject line before deciding if they want to read the email. The implications of these responses reveal that individuals read email when they have an interest in the content that is within the subject line. Others acknowledge that they prefer to read for informational purposes but might not choose to respond.

Wenger's Framework and Constructs

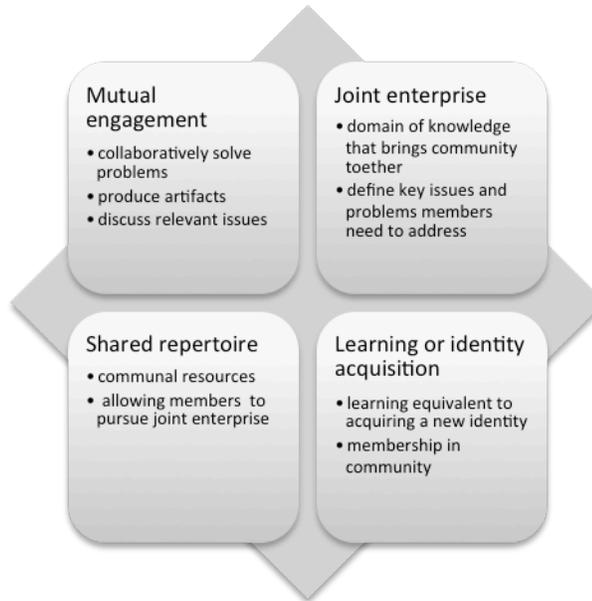


Figure 10. Wenger framework and constructs

Mutual Engagement

Wenger (1998) refers to the construct identified as *mutual engagement* when members' collaboratively solve problems, produce artifacts and engage in discussions that are relative to the needs of their community. Indicators of mutual engagement within this VCoP are evidenced in the findings in Chapter 4. Indicators supporting this construct are represented by samples of some open-ended responses shown in Figure 11 under the construct entitled Mutual Engagement: Peer Group/Collaboration/User Expertise.

Joint Enterprise

When a domain of knowledge brings a community together giving it an identity and defining the key issues and or problems that members have, Wenger (1998) defines this as *joint enterprise*. Members of the TCL who participated in this survey listed HSA testing, the eSIS attendance program, the use of Google Apps for Education, setting up

iPads and managing the Cisco wireless network as key issues that they found solutions to from posting to or reading messages on the TCL. These are examples of what would qualify as indicators within this particular construct. Figure 11 includes quotes from the open-ended responses as evidence to support the joint enterprise construct.

Learning or Identity Acquisition

The learning that occurs as a result of these interactions is an indicator of what Wenger (1998) describes as the *learning or identity acquisition* construct associated with a CoP. Providing a productive social relationship between long-term members and newcomers to the group builds a sense of community (or identity acquisition) for newcomers. “In general, research on CoPs has found that CoPs can integrate new employees into an organization or profession and help them develop an identity associated with that organization or profession, help people gain and maintain motivation, and improve a group or organization’s overall performance” (Allen, 2003, p.45). Some of the open-ended responses from the survey that align with Wenger’s learning construct are noted in Figure 11. Again, this reinforces that learning is occurring within this community.

Shared Repertoire

And finally, Wenger’s *shared repertoire* construct refers to communal resources that enable the effective pursuit of a joint enterprise. Similar problems identified and sharing of resources and tools qualify as indicators for this construct. Figure 11 illustrates how the informal learning reported from the survey aligns with some of Wenger’s (1998) constructs that define a CoP.

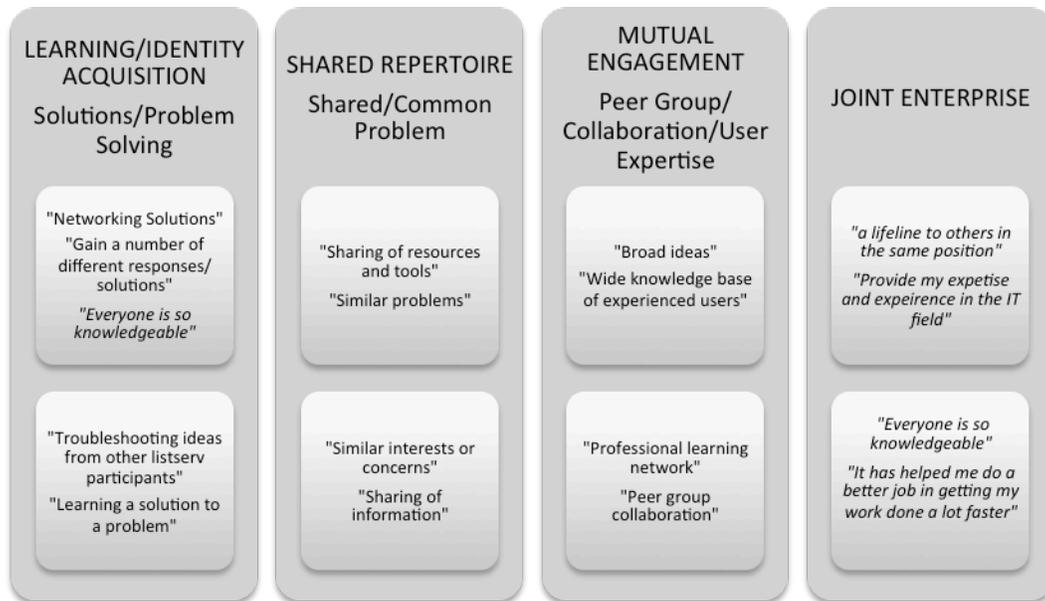


Figure 11. Wenger constructs and informal learning reported

Wenger's framework, as outlined in this study, identifies the constructs that are associated with cultivating a community of practice. It focuses more on the community as a whole rather than on the individual within the community. In this study the emphasis is on the value, usefulness and motivation to engage with the TCL from an individual perspective rather than on the success of the community as a whole.

Sobrero's Framework and Components

Organizational Focus

One of the defining components of Sobrero's framework is referred to as *Organizational Focus*. When members within a VCoP who select their own topics to discuss and create their own structure and culture this is defined as having *Organizational Focus* (Wenger & Snyder, 2000). Wenger (1998) has a similar construct, which he calls *Joint Enterprise* whereby it is the domain of knowledge that brings the community together. The findings indicated that the topics and the questions/responses

posted to the listserv provided information for users on the common issues/challenges that many members were experiencing. Topics identified by survey respondents revealed common organizational issues that members found helpful and useful to discuss. Topics most often referenced included the Hawaii DOE student information system (eSIS), the online Hawaii State Assessment (HSA), issues related to Cisco equipment associated with the wireless network, working with and setting up mobile devices (iPads), issues related to the use of Google Apps for Education (GAFE), and finally solutions addressing the newly created Educator Effectiveness System (EES). At the time of the survey, knowledge sharing related to these topics were deemed most important and relevant to this community. The data also revealed that this VCoP engaged in knowledge sharing for the benefit of its members. The implications of this data reinforce the concept that there is obvious value to the TCL.

Membership and Purpose

Sobrero's (2008) framework associates traits that contribute to informal learning in a VCoP with specific components. This study revealed categories that most closely align with what Sobrero (2008) refers to as the *Membership & Purpose* component. This component defines a VCoP as being self-organized, self-managed with social learning that crosses structures, cultures, organizations, time and space so that they can learn from each other and develop new knowledge (Lueg, 2000). This component also aligns most closely to Wenger's (1998) construct referred to as *Shared Repertoire*. The concept of informal learning was defined for the members within the survey and they were asked to report on what types of informal learning they perceived as having occurred.

Motivation and Strength of Social Relationship

Sobrero defines her *Motivation* component within a VCoP as one where there is learning and co-learning for the sake of sharing new knowledge, and where there is motivation to learn and motivation to share knowledge with others. Again, when comparing this component to Wenger's (1998) constructs it most closely is aligned with *Mutual Engagement*. As evidenced in the analyzed data results collected from question

#17 of this survey motivation to participate in the tech cadre listserv was directly tied to the need to *acquire or share knowledge, problem solve, collaborate and engage in networking*. The exchanges provided members with a wealth of knowledge primarily related to problem solving within their discipline. This collaborative community support confirms the existence of another Sobrero component referred to as *Strength of Social Relationship*. Figure 12 details four of Sobrero’s components that have been addressed in this study and includes the language within each component that supports it. Although two additional components exist in Sobrero’s framework (Trust and Meeting Format) this qualitative study did not include survey questions related to these components.



Figure 12. Sobrero’s components

As evidenced in the data, members of the TCL select their own topics to discuss (HSA, eSIS, wireless support, for example) and engage in dialogue or knowledge exchange. This creates an organizational focus within the community. Members are able to learn from each other as they participate thus giving the community purpose. Members reported that there are several motivating factors (as evidenced in Table 8 in Chapter 4),

which contribute to sharing new knowledge. Commitment to the TCL is evidenced in the continuity of this community (years of membership) as well as the willingness to engage in co-learning. This reveals the strength of the social relationship among members.

Figure 13 (upper portion) illustrates what is required to be a successful VCoP, according to Sobrero (2008). The lower portion of Figure 13 identifies examples of participant responses that align with the components. Sobrero asks the questions within each construct to verify the existence of the VCoP. The lower portion of the illustration provides examples (from the data) that support the construct above.

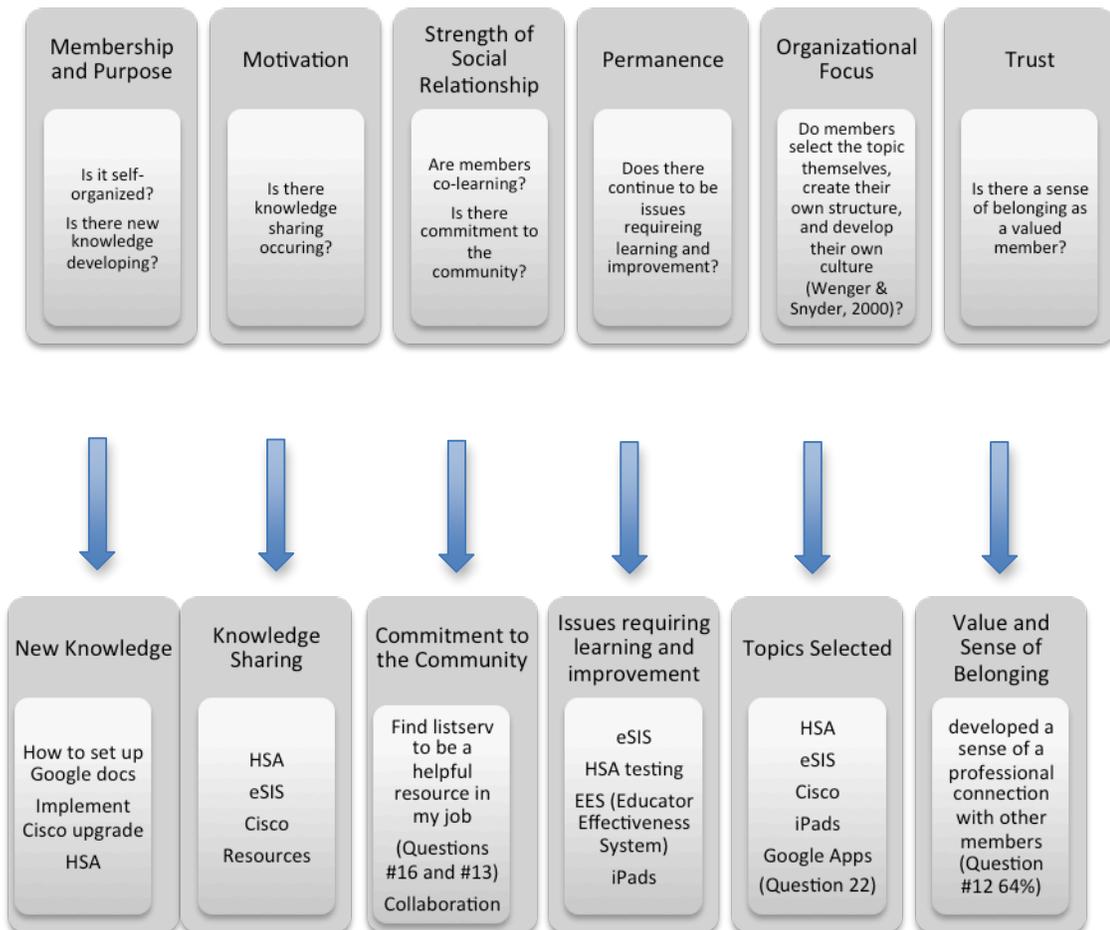


Figure 13. Sobrero VCoP components and examples aligned with components

The perception of most tech cadre members, as indicated in Chapter 4 on Findings, is that the listserv is efficient and useful and serves a purpose related to the ability to perform in one's job. As indicated in Table 5 in Chapter 4 the majority of respondents rated the tech cadre listserv as very useful or useful as a knowledge sharing/exchange tool (93%), for distributing information (86%), and as a resource for informal learning (87%). This implies that the TCL has tremendous value to its members.

Some members did express an interest in using an alternative to listserv technology because they felt this CMC lacks certain components that could better support individual needs such as being more forum based or having a better database. The TCL does not have a searchable database thus members must revisit many of the topics. The repetition of problems that are posted can be annoying to some, at times, and members become frustrated. The overall perception however, is that informal learning takes place within this VCoP and that participation is directly related to the need for information or for knowledge sharing and that the information exchange is directly in support of their technology positions.

As noted in Wenger's framework, Sobrero too places much emphasis on the success of the organization as a whole rather from the individual perspective. She does augment Wenger's framework by including the additional constructs of *Trust* and *Organizational Focus* which do lend themselves to the importance of a members contributions and sense of self regarding the community. Neither framework, as indicated earlier, are guided by an individual member perspective but rather tend to identify their constructs and components with the value of the CoP or VCoP as a whole.

Recurring Themes as a New Framework

During the constant comparative analysis process there were many categories and recurring themes that emerged throughout the data. Since many of the survey questions were similar in nature but specific to a topic (motivation, usefulness, informal learning) responses often had overlapping and recurring themes. As indicated in the Findings in

Chapter 4, the recurring themes associated with use of the listserv are identified in Figure 14.

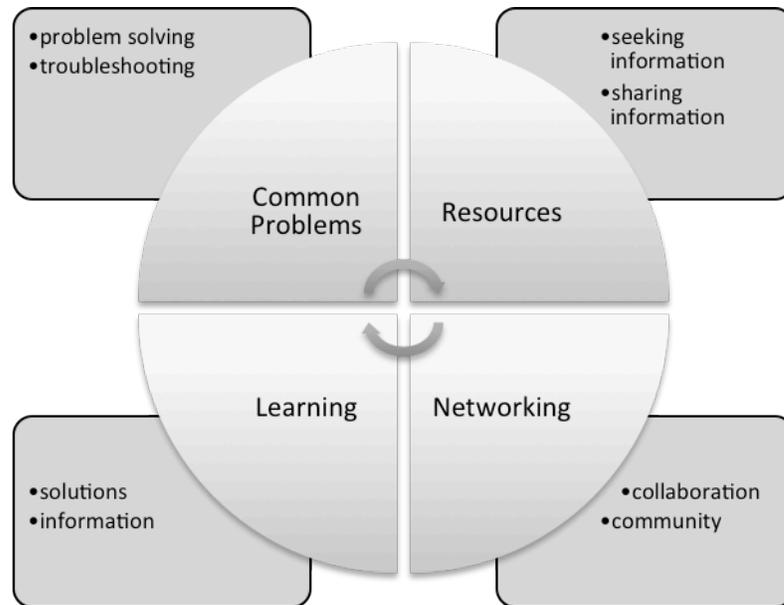


Figure 14. Recurring themes from member perspectives

The themes identified in figure 14 reveal what TCL members value about this particular communication resource and while some themes matched existing frameworks, others were unique to TCL membership. To indicate all themes that emerged, I developed this framework. The framework adds to existing theory by indicating what members most valued within the VCoP. However, it should be tested in other environments.

Both Wenger and Sobrero include constructs and components associated with what defines a successful CoP or VCoP to an organization. This study addresses the value and efficacy of the TLC community, as perceived by its members rather than aligning the success of the community with the benefit to an organization. This qualitative study asked questions that resulted in findings associated with member perceptions of the value and usefulness of the TLC to individual participants, not to the

Hawaii DOE. It provided detailed information on what motivated members to participate and the specific categories of informal learning acquired by those individuals.

Conclusions

Within this community called the tech cadre, certain conditions were determined to exist in order to establish it a successful VCoP . Behaviors and patterns of use were evaluated using the frameworks of Wenger (1998) and Sobrero (2008) to ensure that constructs and components aligned with both CoP's and VCoP's were met.

The members who belong to this community and the exchanges that were reported aided in identifying the type(s) of informal learning that was ongoing and the factors associated with membership motivation and engagement. What the data revealed was that the information exchanges that occurred most often via the listserv were often highly personalized. Members who shared or posted content were motivated to do so in order to meet a personal need related to their job requirements. The benefit of that exchange however, went beyond just the needs of that one individual, and extended to any and all other members in that community who reviewed said post(s). The result of a singular exchange resulted in the sharing of new knowledge with others. New knowledge that is not formally delivered but rather, revealed through this knowledge exchange community is deemed informal learning. Further, the analyzed data identified that the information shared most often contributed to providing assistance with key tasks critical to job performance. Information was either in the form of access to resources or related to members sharing personal experiences. On a smaller scale some member's involvement with the tech cadre listserv was not for the seeking of knowledge but rather the offering of information to the community. These were most often reported as posts shared for the purpose of making announcements to the community. Ultimately, what was revealed was the sharing of knowledge did not just benefit an individual but had the potential to benefit the community.

As the data in this study showed, not all members were motivated to participate in the same way. There were some who simply read and rarely or never posted while others took a much more active role. Despite the varied degrees of engagement, the community still benefited as a whole from member contributions.

Data collected and analyzed during this research process also determined that this resource proves to be the only reported resource available for knowledge sharing among tech cadre members and technology coordinators. What this implies is that technology coordinators who do not utilize the listserv or perhaps are unaware of its existence may in fact have less access to important job related resources.

It is also of interest to note that no responses were received from the islands of Lanai and Molokai and that most of the responses were received from Oahu. As noted in the Findings in Chapter 4 the survey response percentages per island (except Molokai and Lanai) did accurately represent the overall numbers of schools per island. A question that still needs to be answered is why there is no representation from the smallest and most isolated islands within the Hawaii island chain. Given that these schools may indeed need more support it would be of great value for them to have access to this highly useful resource.

What the data revealed about the backgrounds of the participants was that no common content area or specific academic credential was deemed necessary to be positioned in this critical role. The highly varied content areas and backgrounds associated with technology coordinators revealed that individuals within this community do need access to resources to be successful in their jobs. Given the complexity and evolving nature of information technology, instructional technology and management information systems it may be relevant to have a discussion about the skillset that would support this critical role of technology coordinator.

Listserv technology, although not a new technology, still appears to be relevant today and continues to provide members the resources needed for virtual communities of practice to engage in knowledge sharing. And although this CMC proves adequate for this particular VCoP there were suggestions that other tools may be as adequate if not more when engaging in knowledge sharing.

Recommendations for Supporting Informal Learning

What respondents reported as informal learning as a result of participating as a member of the TCL indicated that there is a need for a support structure to assist technology coordinators. What this support structure might look like is a question that needs further evaluation but based on the data in this study it is evident that such support is needed. Recommendations that support informal learning might include establishing an online course for newcomers that would include basic guidelines associated with the job. A searchable database with current solutions to technical problems might also benefit those new to the role. Finally, identifying the expertise among those within this VCoP is a tremendous resource. Given the length of time some TC's have been subscribed to this listserv there is the potential for opportunities for collaboration and sharing expertise through professional learning communities.

Recommendations for Future Research

There is ample research on communities of practice but less research on virtual communities of practice that engage in knowledge sharing through listserv technology. Future research could certainly focus on professional growth that occurs within this type of community or perhaps the peer mentoring relationship between long-standing members and newcomers to the community. Addressing the incentive mechanisms associated with participation in a VCoP might also prove to be valuable research for any organization that relies on employees engaging in knowledge exchange communities. Discovering what makes a VCoP successful and how to engage members is always a promising case for research. In addition, identifying appropriate theoretical frameworks and testing them would contribute to our understanding of factors influencing informal learning environments. This new framework outlined in this study should also be tested in future studies.

Suggestions made by members of this VCoP included utilizing another computer mediated communication tool that might be more effective than a listserv, including a forum that is more easily searchable. This might be an area where further research is warranted.

Virtual Communities of Practice

The community studied in this qualitative study consisted of individuals who chose to engage or not engage in knowledge sharing. There was neither an expectation to participate, nor job requirement tied to membership. Other research on informal learning and motivation within VCoP's who use something other than a listserv for knowledge sharing might prove interesting.

Computer Mediated Communication

As noted throughout this study, listserv technology is not cutting edge new technology that supports informal learning. It is a time-tested tool that has managed to maintain its value and usefulness among knowledge sharing communities despite other options available. That is not to say that listservs are superior to other CMC tools or that there are not better more efficient ways to engage in knowledge exchanges. Whatever communication tool is selected it is important that the characteristics associated with that tool meet certain expectations for effectiveness among its members. These characteristics might include a tool that is user friendly, offers a sense of belonging to a group, and perhaps enables a sense of trust within the community.

Limitations of this Study

The qualitative study referenced in this work, was guided by Strauss and Corbin's (1999) grounded theory approach, consisting of purposeful sampling which by its very nature presents the first challenge to being generalizable. This does not, however rule it out entirely as the findings are still representative of a population who communicate via listserv technology.

Given the limited amount of research available on informal learning associated with virtual communities of practice that communicate via listserv technology there is potential for this qualitative study to be generalizable. The size of a sample being studied and the variance in the population are two main factors that affect any study. If a sample

size were relatively small this would not be representative of a significant population therefore the findings would likely not be generalizable. Taber (2000) notes that, although grounded theory should be testable, only certain aspects of findings are readily open to statistical generalization.

Although these findings are likely to be useful there are limitations to this qualitative study that require further examination. Additional research could examine other VCoP's to determine member behavior and posting frequency. Culture of the community and practice shared may also be further examined in additional research.

The findings of this research may indeed be transferable to other VCoP's who engage in knowledge sharing through listserv technology. It could also be transferable to other VCoP's using other CMC tools however that would depend on the features associated with the selected communication tool.

The percentage of respondents based on community size may have limited this research as well. It is also a consideration that those who responded to this survey may have been biased or lacking objectivity in their personal perspectives. Although 45 members responded there are approximately 288 schools that could have been represented in this survey and among those 288 schools there are a total of 334 DOE employees subscribed to the listserv. Detailed demographic information on membership of the TCL, such as how many members represent each island, or how many are technology coordinators, was limited.

Other factors that may have contributed to the sample size being small include the fact that the survey was sent out near a holiday when people were perhaps busier than normal and did not have the time to take the survey. There also may have been a significant number of listserv members that simply overlooked or elected not to open the email containing the survey.

The lack of involvement by other members must be taken into consideration when identifying what emerged from this analyzed data. If there had been more of a response in the follow up with members for the purpose of member checking then there might be more certainty associated with the findings but given that few participants provided feedback to this researcher limitations to the study findings exist.

It is also important to note that the process of gaining research approval from the

Hawaii DOE data governance office and ultimately the Superintendent of schools is one that presents its own limitations. Research applications undergo a strict review process performed by designated content area specialists, who assess, among other things the potential value of the research and its impact on students, employees or resources. It must also be deemed to have some degree of alignment with DOE priorities.

Further restrictions are put in place for Hawaii DOE employees who engage in research within the DOE and limitations are placed on the types of data that can be collected. Such restrictions include the use of any personally identifiable data about Hawaii DOE employees who participate in the study.

Summary

The results of this survey provided the necessary information to gauge participant behavior, community structure, identify the traits that contribute to informal learning and identify levels of social engagement related to sustaining this VCoP.

This chapter discussed the implications of this qualitative study, which included the types of informal learning identified and what motivational factors were revealed. It addressed, in detail, the selected Wenger (1998) and Sobrero (2008) frameworks, their respective constructs and components aligned with the indicators of each of these frameworks and how the data aligned with said frameworks to confirm the existence of a successful VCoP. This researcher noted the recurring themes that presented from the analyzed data and addressed, in detail, how using the divergent grounded theory model proposed by Strauss and Corbin (1990), which used the inductive process, was not only appropriate for this qualitative analysis but lead this researcher to identify and report on what additional theoretic implications emerged from the data beyond the established frameworks. This chapter provided recommendations for future research in the area of virtual communities of practice, and computer mediated communication tools and finally, addressed the limitations of this qualitative study.

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APPENDIX A – CONSENT TO PARTICIPATE

University of Hawai'i

Consent to Participate in Research Project:

Informal Learning and Motivation in a Virtual Community of Practice

My name is Polly Quigley. I am a doctoral student at the University of Hawai'i at Manoa (UH), in the College of Education. The purpose of this qualitative study is to examine how informal learning takes place in a specific virtual community of practice. The objective of this research will be to analyze the components associated with the Tech Cadre listserv as they relate to informal learning and identify the motivating factors that contribute to membership engagement.

Project Description - Activities and Time Commitment: If you choose to participate, I will be collecting data from a survey sent to you through the tech cadre listserv. The survey will consist of 25 questions that are related to your experiences using the tech cadre listserv.

Benefits and Risks: I believe there are no direct benefits or risks to you in participating in my research project. However, the results of this project might help me and other researchers learn more about the types of informal learning that can occur and the factors associated with motivation as they pertain to using a listserv in a community of practice.

Confidentiality and Privacy: During this research project, I will keep all data from the survey in a secure location. Only I and one other researcher assisting with this study will have access to the data, although legally authorized agencies, including the University of Hawai'i Human Studies Program, have the right to review research records.

I will not use your name or any other personally identifying information in this study. If you would like a summary of the findings from my final report, please contact me at the number listed near the end of this consent form.

Voluntary Participation: Participation in this research project is voluntary. You can choose freely to participate or not to participate. In addition, at any point during this project, you can withdraw your permission without any penalty of loss of benefits.

Questions: If you have any questions about this project, please contact me at via phone (808) 783-2881 or e-mail (pollyq@hawaii.edu). If you have any questions about your rights as a research participant, in this project, you can contact the University of Hawai‘i, Human Studies Program, by phone at (808) 956-5007 or by e-mail at uhirb@hawaii.edu.

Please keep the top portion of this consent form for your records.

If you agree to participate in this project, please acknowledge your consent by clicking “agree” on the first question in the electronic survey

APPENDIX B – SURVEY INSTRUMENT

Tech Cadre Survey

*** 1. Please acknowledge that you have read the consent form emailed to you and that you agree to participate in this survey.**

I agree to participate in this survey

I do not agree to participate in this survey

*** 2. How long have you been a tech cadre listserv member? Please type in the years/months in the box below.**

*** 3. How many years have you been working in the DOE?**

one to five years

six to ten years

ten to fifteen years

more than fifteen years

*** 4. What is your job title? Check all that apply.**

Technology Coordinator

Classroom teacher

Administrator

Other (please specify)

*** 5. What is your age group?**

20-30 years

30 - 40 years

40-50 years

50-60 years

over 60 years

6. What is your gender?

Female

Male

Tech Cadre Survey

7. On which of the Hawaiian islands do you work?

- Oahu
- Kauai
- Lanai
- Maui
- Molokai
- Hawaii
- Ni'ihau

Other (please specify)

8. Can you please provide the content area, if you are a certified teacher, that you would associate your background with? For example, Science, Math, English, etc.

*9. For what purposes do you use the tech cadre listserv? Please check all that apply.

- Learn about relevant events and/or resources
- Learn about issues and developments in technology
- Find solutions to problems
- Network and engage with colleagues

Other (please specify)

*10. Which statement best characterizes your use of this listserv?

- I read subject headings and selectively read messages
- I read posted messages regularly
- I read messages regularly and occasionally post messages
- I read and post messages regularly
- I rarely read subject headings or messages

Other (please specify)

Tech Cadre Survey

***11. To what extent do you send individual messages to members with shared interests?**

- occasionally
 often
 never

***12. What have been the outcomes from being subscribed to this listserv? Please check all that apply.**

- attended a conference I read about on the listserv
 found a solution to a technical problem
 kept informed about what is happening in my field
 used resources posted by listserv members in my work
 gathered information used in research and teaching
 developed a sense of a professional connection with other members

Other (please specify)

***13. What about this type of computer mediated communication do you value?**

- ease of use
 usefulness to my job
 networking with colleagues
 response time to questions posted

Other (please specify)

***14. How often do you post messages to the tech cadre listserv?**

- daily
 2-3 times weekly
 once a week
 2-3 times monthly
 once a month
 less than once a month
 never

Tech Cadre Survey

*** 15. What influences your posting frequency?**

- need question answered or a problem solved
- have answer to share
- would like to make an announcement

Other (please specify)

*** 16. Do you find this listserv to be a helpful resource in your job?**

- Yes
- No

*** 17. What motivates you to use (or not use) this listserv? Please describe below.**

18. Please provide an example(s) of something that you have learned as a member of this listserv.

*** 19. Informal learning is defined as learning that takes place outside of a structured classroom and is often self directed and unintentional. Studies have shown that informal learning is difficult to gauge since there is no summative assessment. Do you find that listserv technology can contribute to informal learning? If so, can you provide an example of how the tech cadre listserv contributes to informal learning?**

- Yes
- No

example

*** 20. Do you perceive listservs to be a useful communication tool for Informal Learning to take place?**

- Yes
- No

Tech Cadre Survey

***21. How would you rate the following categories as they relate to the usefulness of the tech cadre listserv?**

	very useful	useful	somewhat useful	somewhat useless	useless	very useless
as a knowledge sharing/exchange tool	<input type="radio"/>					
for distributing information	<input type="radio"/>					
as a resource for informal learning	<input type="radio"/>					

***22. Can you provide an example of a specific discussion you found to be useful on the listserv? For example, the listserv discussions on HSA testing have been helpful in resolving many challenges in schools across the state.**

***23. Do you think that there are other tools that could support informal learning opportunities that are currently as effective or more effective than listserv technology that could be used within the DOE? Can you describe any of these tools that you currently use or would use to get answers to your questions? Please describe below.**

***24. How often do you delete the listserv messages without reading them?**

- Never
- Rarely
- Sometimes
- Often
- Always

25. Please feel free to share a personal reflection on your experience using the tech cadre listserv.

APPENDIX C. University of Hawaii Human Studies Program – IRB



UNIVERSITY
of HAWAII*
MĀNOA

Office of Research Compliance
Human Studies Program

January 2, 2013

TO: Polly Quigley
Principal Investigator
Educational Technology

FROM: Denise A. Lin-DeShetler, MPH, MA
Director

A handwritten signature in black ink, appearing to read "Denise A. Lin-DeShetler".

Re: CHS #20894- "Informal Learning and Motivation in a Virtual Community of Practice"

This letter is your record of the Human Studies Program approval of this study as exempt.

On January 2, 2013, the University of Hawai'i (UH) Human Studies Program approved this study as exempt from federal regulations pertaining to the protection of human research participants. The authority for the exemption applicable to your study is documented in the Code of Federal Regulations at 45 CFR 46.101(b) (1, 2).

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at <http://www.hawaii.edu/irb/html/manual/appendices/A/belmont.html>

Exempt studies do not require regular continuing review by the Human Studies Program. However, if you propose to modify your study, you must receive approval from the Human Studies Program prior to implementing any changes. You can submit your proposed changes via email at uhirb@hawaii.edu. (The subject line should read: Exempt Study Modification.) The Human Studies Program may review the exempt status at that time and request an application for approval as non-exempt research.

In order to protect the confidentiality of research participants, we encourage you to destroy private information which can be linked to the identities of individuals as soon as it is reasonable to do so. Signed consent forms, as applicable to your study, should be maintained for at least the duration of your project.

This approval does not expire. However, please notify the Human Studies Program when your study is complete. Upon notification, we will close our files pertaining to your study.

If you have any questions relating to the protection of human research participants, please contact the Human Studies Program at 956-5007 or uhirb@hawaii.edu. We wish you success in carrying out your research project.

1960 East-West Road
Biomedical Sciences Building B104
Honolulu, Hawaii 96822
Telephone: (808) 956-5007
Fax: (808) 956-8683

An Equal Opportunity/Affirmative Action Institution

APPENDIX D. Hawaii Department of Education – IRB

NEIL ABERCROMBIE
GOVERNOR



KATHRYN S. MATAYOSHI
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

November 25, 2013

Ms. Polly Quigley
427 Ilimano St
Kailua, HI 96734

Dear Ms. Quigley:

I am pleased to approve your Hawaii State Department of Education (HIDOE) research application for the study "Informal Learning and Motivation in a Virtual Community of Practice" (Study #201286040969), which seeks to examine how informal learning takes place in a virtual community of practice.

As described in your application, the objective of your study is to analyze the components associated with the public K-12 technology coordinators' "Tech Cadre" listserv as they relate to informal learning and to identify the motivating factors that contribute to membership engagement.

Specifically, you hope to answer the following questions:

1. What components of a virtual community of practice contribute to informal learning among its members?
2. What are the motivating factors that draw members of a community to engage in the inward and outward flow of information via a listserv?

HIDOE technology coordinators who agree to participate in your study will:

- Take a 27-item anonymous online survey that will be distributed by email via the listserv. This survey should take about 20 minutes to complete.

As you proceed with your study, please be aware of the following:

- Participants may not complete the survey during instructional or work hours or at HIDOE facilities (i.e., schools or offices).
- The only HIDOE data that you are authorized to use for your study are those resulting from the research activities stated above.

Although you may have access to other non-public HIDOE data in your role as a HIDOE employee, you may not use these data for your study without the prior written consent of the appropriate individuals or an approved data request.

Should you wish to use additional non-public HIDOE data beyond those described above, you must submit a research application modification request to the HIDOE Data Governance Office. You may

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

Ms. Polly Quigley
November 25, 2013
Page 2

only use these additional data for your study after I have approved your modification request and, if applicable, your data request has been approved by the appropriate data steward.

- You are required to conduct your research project in accordance with both the conditions of approval described in this letter and the document “Affirmation and Acknowledgement of the Processes, Procedures, and Conditions for Conducting Research in the Hawaii State Department of Education” (the “Affirmation Form for Researchers”), which you signed and submitted as part of your research application.
- You are responsible for ensuring that all individuals involved in this research project — both those affiliated with your organization and those contracted by your organization and affiliated with external entities or vendors — adhere to all of the conditions of my approval, including those detailed in this letter and those stipulated by the Affirmation Form for Researchers.

Included for your reference below are some of the processes, procedures, and conditions for conducting research in HIDOE that are included in this form; please note, however, that this list is not exhaustive. For the full contents of the form, please refer to your signed copy, which you have attached to Tab 6 of your research application, or to the blank copy available for download from the HIDOE Research website at <http://apps.hidoe.k12.hi.us/research/Pages/FormsResources.aspx>.

As stipulated by the Affirmation Form for Researchers:

- Participation in the research project by HIDOE students and personnel will be strictly voluntary and contingent upon obtaining — prior to their participation in the research project:
 - a. The written approval of the relevant school or office administrator(s),
 - b. The written consent of all adult participants (which includes students 18 years and older),
 - c. The active assent of participants who are minors, and
 - d. The written consent of the guardians of all minor participants;
- Oral instructions must be provided for all participant activities related to the research project that involve minor students;
- After consenting to participate in the research project, participants (and, in the case of minor participants, their guardians on their behalf) may withdraw at any time, for any reason;
- All activities related to the research project must take place at dates, times, and locations agreed upon by the administrators of the participating schools and offices;
- Any compensation provided to HIDOE personnel for participation in the research project must be for activities completed outside of instructional and work hours;
- Copies of the research project’s data collection instruments (e.g., surveys, interview schedules) must be presented to the administrators of the participating schools and offices for review prior to the implementation of the research project;
- If the research project will involve participants who are minor students, a copy of the relevant data collection instrument(s) must, upon request, be made available to the students’ guardians for review in the office of the participating school prior to the implementation of the research project;
- All data collected during the course of implementing the research project or made available to you by HIDOE for the research project (including, but not limited to, completed surveys, interview responses, video recordings, audio recordings, and HIDOE data sets) must be destroyed when the

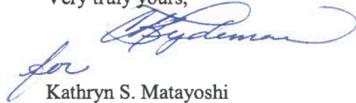
Ms. Polly Quigley
November 25, 2013
Page 3

- final report on the research project is complete or at the end of your research project's one-year approval period (which ends 12 months from the date of this letter), whichever date is sooner;
- At least two (2) weeks prior to printing, publishing or otherwise publicly releasing the final report on the research project, electronic copies of a final draft must be submitted to:
 - a. The administrators of the participating schools and offices for their review, and
 - b. If the research project involves either participants who are HIDOE students or personnel or the collection and/or receipt of personally identifiable HIDOE student or personnel data, to the Data Governance Office to be screened for the inclusion of personally identifiable HIDOE student and personnel data; and
 - Upon request, electronic copies of the final report on the research project must be shared with:
 - a. Participants in the research project,
 - b. The complex area superintendents of the participating schools, and
 - c. The assistant superintendents/directors of the participating HIDOE offices.

Should you have any questions about the above, please contact Jennifer Higaki, HIDOE Data Governance Office, at DOEresearch@notes.k12.hi.us or (808) 440-2854.

Best wishes for a successful research project. We look forward to receiving your findings and recommendations.

Very truly yours,



Kathryn S. Matayoshi
Superintendent

KSM:bk

- c: Lea Albert, Complex Area Superintendent, Castle-Kahuku Complex Area
William Arakaki, Complex Area Superintendent, Kapaa-Kauai-Waimea Complex Area
Heidi Armstrong, Complex Area Superintendent, Campbell-Kapolei Complex Area
Lindsay Ball, Complex Area Superintendent, Hana-Lahainaluna-Lanai-Molokai Complex Area
John Brummel, Complex Area Superintendent, Leilehua-Mililani-Waiialua Complex Area
Mary Correa, Complex Area Superintendent, Kau-Keaau-Pahoa Complex Area
John Erickson, Complex Area Superintendent, Aiea-Moanalua-Radford Complex Area
Rodney Luke, Complex Area Superintendent, Pearl City-Waipahu Complex Area
Ann Mahi, Complex Area Superintendent, Nanakuli-Waianae Complex Area
Suzanne Mulcahy, Complex Area Superintendent, Kailua-Kalaheo Complex Area
Calvin Nomiyama, Complex Area Superintendent, Farrington-Kaiser-Kalani Complex Area
Alvin Shima, Complex Area Superintendent, Baldwin-Kekaulike-Maui Complex Area
Ruth Silberstein, Complex Area Superintendent, Kaimuki-McKinley-Roosevelt Complex Area
Arthur Souza, Complex Area Superintendent, Honookaa-Kealakehe-Kohala-Konawaena Complex Area
Valerie Takata, Complex Area Superintendent, Hilo-Waiakea Complex Area
Leila Hayashida, Acting Assistant Superintendent, Office of Curriculum, Instruction and Student Support
Data Governance Office

APPENDIX E. CODEBOOK FOR OPEN-ENDED QUESTIONS 17-19

QUESTION 17		
	WHAT MOTIVATES YOU TO USE (OR NOT USE) THE LISTSERV?	
Code	Explanation	Example
<i>Problem Solving</i>	Responses that address resolving an issue	"opportunity to get assistance in resolving tech issues"
<i>Relevance</i>	Responses that address the relevance of a topic	"issues shared either questions or answers are relevant to my job"
<i>Resources</i>	Responses that provide information or access to resources	"it's nice to have a place to network, share and receive information"
<i>Efficiency</i>	Responses that address the efficiency of the listserv	"posts are emailed directly to me in real time so that makes my use of the listserv very convenient"
<i>Troubleshooting</i>	Responses that discuss troubleshooting	"troubleshooting and ideas being passed around"
<i>Knowledge Sharing</i>	Responses including the sharing of knowledge	"to find out that others are having the same issues as me"
<i>Information</i>	Responses that provide instruction or information	"Keeps me informed of the solutions to DOE wide problems"
<i>Seeking Answers</i>	Responses that seek answers	"need answers"
<i>Solutions</i>	Responses that include solutions	"find a solution"
<i>Expertise</i>	Responses that address user expertise	"Everyone is so knowledgeable and more experienced than me!"
<i>Collaboration</i>	Responses that discuss or mention peer collaboration	"collaboration"
<i>Discussion</i>	Responses that include the topic of discussion	"This listserv really should be a Forum based application that supports discussion"
QUESTION 18		
	PROVIDE EXAMPLES OF LEARNING FROM THE LISTSERV	
Code	Explanation	Examples
<i>Resources</i>	Types of learning from event announcements, links, memos ,	"Hawaii DOE announcements" "equipment vendors"
<i>Troubleshooting/Problem Solving</i>	Discussions on common issues and/or instructions for solving a problem	"troubleshooting HSA", "fix an ESIS problem"
QUESTION 19		
	PROVIDE EXAMPLES OF LISTSERV TECHNOLOGY CONTRIBUTING TO INFORMAL LEARNING	
Code	Explanation	Example
<i>Learning</i>	Responses including learning, solutions and problem solving	"learning to change an IP address on a printer"
<i>Sharing</i>	Responses including shared or common problems	"sharing of resources and tools"
<i>Expertise</i>	Responses including peer group, collaboration and experienced users	"broad ideas", "peer group collaboration"