USING IMPACT ASTHMA ECHO TO INFLUENCE PHYSICIAN SELF-EFFICACY AND GUIDELINE ADHERENCE

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by

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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

USING IMPACT ASTHMA ECHO TO INFLUENCE PHYSICIAN SELF-EFFICACY AND GUIDELINE ADHERENCE

presented by Danny Myers,

a candidate for the degree of Doctor of Philosophy of Information Science and Learning Technologies,

and hereby certify that, in their opinion, it is worthy of acceptance.

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DEDICATION

To my wife, Molly: Thank you for supporting me, not only throughout this process, but in everything that I do. You have given your whole self to ensure the health and happiness of our family. I could have never completed this endeavor without your love and encouragement.

To my son, Will: Your steadfast bravery and determination amaze me on a daily basis. You are my constant source of strength and encouragement. I'm proud to be your dad.

To my girls; Layla, Suzi, and Sadie: You girls are the reason for everything I have done, or ever will do. I love you all!

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Abstract

The purpose of this study was to examine the influence on provider self-efficacy and guideline adherence as a result of participation in Impact Asthma ECHO. The researcher addressed the following research questions: *How does participation in Impact Asthma ECHO influence primary care provider self-efficacy? How does engagement in the learning activities of Impact Asthma ECHO promote clinical guideline adherence?* Participants included 19 Primary Care providers participating in Impact Asthma ECHO via online video-conferencing. The researcher utilized a data-triangulation method, collecting data via self-efficacy surveys, Continuing Medical Education surveys, a Community of Inquiry coding template, and Medicaid Claims Data. While findings of the study were limited by a relatively small subset of participants, the significant contribution of the present research is the utilization of the modified Community of Inquiry coding template for the purposes of evaluating group engagement and learning in a synchronous, web-based videoconferencing educational session.

Chapter 1: Introduction

Background

One of the primary challenges facing healthcare in the US today is overall physician shortage and access to care. It is predicted that this maldistribution crisis will only worsen in the coming years, resulting in a shortage of 40,000 physicians by 2020 (Colwill, 2008). Of the over 6,000,000 residents of Missouri, 2.23 million, or 37 percent, are considered rural (Van Dyne, 2016). Access to healthcare for individuals in rural areas can be limited by factors such as travel time and distance to care (Chan, 2006). According to Van Dyne et al. (2016), currently 19.3 percent of Americans live within a rural community, while only 10 percent of physicians actually practice in these areas. Due to this limited access, primary care physicians (PCPs) are generally faced with treating patients with complex issues and multiple co-morbidities. PCPs are very often the first point of contact when parents have concerns about their child's health (Sandler, 2001). Thus, the PCP plays a major role in making clinical decisions, and when appropriate, performing triage to ensure that patients receive appropriate treatment (Mayer, 2014).

Asthma is the most common chronic pediatric disease, affecting an estimated 7 million children in the United States (Britto, 2014). The economic burden and public health costs related to asthma care and prevention are quite substantial, resulting in 649,000 emergency department visits, and 157,000 hospitalizations for children each year (Akinbami, 2016). A 2014 report from the Missouri Department of Health and Senior Services (HDSS) indicated that there were 152,007 children under the age of 17 living

with asthma within the state (MO HDSS, 2017). The primary goal of asthma treatment is to maintain control of clinical manifestations of the disease for extended periods (Britto, 2014). However, despite the recommendation of clinical practice guidelines and treatment options, large gaps exist between the care recommended by these guidelines, and the care that is actually provided (Britto, 2014). Although PCPs are generally capable of providing quality, community based healthcare, they often lack the self-efficacy to care for children with asthma (Cabana, 1999; Cloutier, 2016).

Clinical practice guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for their specific circumstances" (Field, 1990, p. 1). The goal of clinical guidelines is to decrease inappropriate variation in care and increase overall clinical effectiveness (Chassin, 1990). The National Heart, Lung and Blood Institute (NHLBI) release guidelines every ten years for the diagnosis and management of asthma. These guidelines are intended to serve as a conduit between current knowledge and practice, while improving quality of care (National Heart, 2007). While provider guideline adherence is essential in best practice care of pediatric asthma, poor adherence to these guidelines is well documented (Cabana, 2001). Guideline adherence can be affected by a number of barriers including lack of familiarity, lack of awareness, and lack of self-efficacy (Cabana, 1999). Of these barriers, the construct of self-efficacy has been shown to be particularly important factor with regard to clinical effectiveness (Hyman, 1992, Gulbrandsen, 2013).

Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations (Bandura, 1977). This concept has been thought to be a task-specific version of self-esteem (Lunenberg, 2011). Self-

efficacy theory suggests that individuals are more likely to engage in activities for which they have high self-efficacy and less likely to engage in those they do not (Van der Bijl, 2002). Self-efficacy is framed by Bandura's social cognitive theory. Bandura purported that unless people believe they can achieve something, they will lack the motivation to do it, and doubt that changing their behavior or taking action will make a difference (Bandura, 1986).

A number of contributory factors such as skill deficits and anxiety about negative consequences may lead to decreased provider self-efficacy (Parle, 1997). One of the most effective ways to curtail these barriers and develop a strong sense of self-efficacy is through mastery experiences (Ozer, 2004). According to Bandura (1977), performance outcomes or past experiences are the most important source of self-efficacy. Positive and negative experiences can influence the ability of an individual to perform a given task (Bandura, 1977).

Measures taken to strengthen one's sense of self-efficacy can augment goal attainment, motivation and behavior change (Bandura, 1986). One proposed way to attempt to increase providers' abilities, encourage guideline adherence, and increase self-efficacy levels is to require physicians to participate in continuing medical education (CME) activities (Wakefield, 2004). According to Fox and Bennett (1998), "CME is the systematic attempt to facilitate change in physicians' practices" (p. 466). Physicians typically spend between 1 and 3 weeks per year attending traditional educational meetings (Nylenna, 2000). They may utilize several methods for meeting their continuing medical education needs. A variety of both formal and informal CME activities have been reported in the literature (Mclaughlin, 1991). Informal activities

include attending grand rounds, reading articles, and discussing with peers, industry representatives and patients. Examples of formal activities include conferences, workshops and lectures (Kaufman, 1998).

Statement of Problem

Despite tremendous efforts, the goals of traditional CME to ensure that physicians are up to date on current guidelines and best practice care have not been met (Mansouri, 2007). Studies continue to demonstrate gaps between real and ideal performance in patient outcomes (Legare, 2015). On average, Americans receive appropriate, evidence-based care when they need it only 55% of the time (McGlynn, 2003). Criticism of traditional CME methods points out that it is too teacher-centered, sporadic, and involves minimal collaboration (Moore, 1995). Traditional CME delivery usually entails professional association sponsored learning activities consisting of short, lecture-based courses (Mcleod, 2004). The downfall of these methods is that they do not adhere to the primary principles of adult learning which consist of self-directed learning, problem-based learning, and learning in the practice setting (Knowles, 1980).

Purpose of the Study

An innovative way of delivering CMEs to primary care providers, while increasing provider self-efficacy is Project ECHO. Project ECHO (Extension for Community Healthcare Outcomes) was founded at the University of New Mexico Health Science Center in 2004 as a means to train rural PCPs to treat patients with chronic Hepatitis C (HCV) (Aurora, 2010). Using web-based videoconferencing technology, best practice protocols and case-based learning, Project ECHO trains and supports PCPs to develop knowledge and self-efficacy on a variety of diseases (Aurora, 2011). Rural

providers are recruited from around the state to participate in weekly sessions in which they present their own de-identified cases via web-based videoconferencing to a multi-disciplinary team of experts in a given field. These case-based learning sessions are supplemented with short didactic sessions, facilitated by experts in the field of interest. "Project ECHO strives to restore the balance of education and clinical work that characterizes residency training by using case-based, patient-centered learning that has been shown to be far more effective in building essential clinical knowledge and skills than traditional lecture of conference based CME" (Aurora, 2007).

The University of Missouri School Of Medicine and the Missouri Telehealth Network (MTN) have since replicated this model to train rural Missouri PCPs to diagnose and manage pediatric asthma patients. The aim of this program is to increase provider knowledge base in this specific disease process, and in turn, promote practice change with regard to appropriate and timely screening interventions. The other central goal of Impact Asthma ECHO is to influence patient outcomes by increasing provider self-efficacy. Research indicates that "physician self-efficacy is associated with self-reported preventative care delivery across both adult and pediatric settings" (Ozer, 2004, p. 102). Other studies have shown the relationship between guideline adherence and provider self-efficacy (Boekeloo, 1991; Cheng, 1999). Guideline adherence and decreased variation in care has been shown to improve healthcare quality and improve patient outcomes (Cicutto, 2014). It should be noted, however, that most of the research focusing on the relationship between provider self-efficacy and guideline adherence has relied primarily on physician self-report (Ozer, 2004). Subsequent studies have shown

that physician self-report may be subject to bias and should not be used as the primary measure for these particular variables (Adams, 1999; Weingarten, 1995).

The purpose of this study is to examine the influence on provider self-efficacy and guideline adherence as a result of participation in Impact Asthma ECHO. Subsequent evaluation will serve to address the following research questions: RQ1 – How does participation in Impact Asthma ECHO influence primary care provider self-efficacy? RQ2 – How does engagement in the learning activities of Impact Asthma ECHO promote clinical guideline adherence?

Theoretical Framework

Social Cognitive Theory and Self-Efficacy

Designing interventions to yield a desired behavior is best done with an understanding of behavior change theories and an ability to use them in practice. Theories help explain behavior, as well as suggest how to develop more effective ways to influence and change behavior (Glanz, 1990). Three theories are highly associated with behavior change, which includes social cognitive theory, goal setting theory and the health action process approach. Out of these, Bandura's Social cognitive theory is most common. Social Cognitive Theory proposes that individuals do not simply respond to environmental influences, but rather they actively seek and interpret information (Nevid, 2009). Individuals "function as contributors to their own motivation, behavior, and development within a network of reciprocally interacting influences" (Bandura, 1999, p. 169). In Social Cognitive Theory, learning is viewed as knowledge acquisition through cognitive processes of information in relation to environmental influences (Stajkovic, 1979).

In this framework, three aspects are considered – environmental, personal, and behavioral. Environmental factors can be either social (family, friends) or physical factors (room, temperature etc.). These factors constantly influence each other and hence provide models for behavior (Bandura, 2001). For goal realization, this theory is composed of four processes – self-observation, self-evaluation, self-reaction and self-efficacy. Self-observation with regularity and proximity can help to motivate and attain one's goals along with self-evaluation (either absolute or normative), self-reaction and with a strong belief in one's self-efficacy (Bandura, 1977).

Table 1. *Processes of Social Cognitive Theory (Bandura, 1977)*

Process	Definition
Self-observation	Process of observing oneself as an individual moves towards his goals.
Self-evaluation	Process by which person compares one's own performance with the desired performance needed to achieve the goal.
Self-reaction	Process of modifying the behavior based on the observation and evaluation of one's progress towards their goal.
Self-efficacy	Individual's belief in his/her capabilities to behave accordingly to get the desired outcome

The ECHO model of learning incorporates each of these components, with particular emphasis on enhancing provider self-efficacy. Aurora (2010) notes that "self-efficacy is reinforced through collaboration not only with a team of specialists, but also through the online learning network established with a cohort of their peers. Providers also develop self-efficacy as they learn best practice care and are, in turn, able to utilize that new knowledge to treat their most complex patients" (p. 1127).

Community of Inquiry

In order to describe the activities and interactions of both participants and instructors within Impact Asthma ECHO, the Community of Inquiry framework was implemented. The Community of Inquiry framework, as defined by Garrison, Anderson and Archer (2000), outlines three forms of individual presence or contribution to an educational experience (social, cognitive, and teaching), and sets out methods for analyzing online discussions to assess the contributions of each form of presence. The framework has primarily been utilized in various classroom settings and online discussion forums. Traditionally, as part of a community of inquiry study, the online discussion in a class is recorded, and latent content analysis is applied to codify key segments. Once coded, the discussion fragments are analyzed to determine the various contributions of social cognitive and teaching presences (Krippendorf, 1980).

Project ECHO's model of learning incorporates key elements of these theories in the context of activities and implementation. The self-efficacy component of Social Cognitive Theory is at the core of overall learning strategy. Provider self-efficacy is reinforced through collaboration and co-management of patients with interdisciplinary experts. Eventually, the consultative nature of the provider/expert (i.e. lead facilitator) relationship decreases as the learners' self-efficacy increases. The Community of Inquiry framework is supported by collaborative learning and mentoring with both experts and peers. Through iterative practice and expert feedback, participating providers establish a knowledge network in which the learning process can evolve through continuous participation.

Significance of Research

Many communities, especially those in the rural areas, are faced with a shortage of qualified healthcare professionals as a result of the increasing need for the management of patients with chronic disease (Ernst, 2014). Due to this phenomenon, primary care providers are very often faced with managing an aging population with multiple comorbidities (Mayer, 2014). Most primary care providers, however, lack the intensive training required to administer such highly specialized care to this particular population (Bodenheimer, 2013). Traditional methods of continuing medical education (CME) delivery have been shown to be ineffective in successfully training physicians in best-practice care for chronic diseases (Mansouri, 2007). Because of this lack of training, providers often lack the confidence to care for these patients (Cabana, 1999).

Asthma is the most common pediatric disease in the United States (Britto, 2014). The National Heart Lung and Blood Institute (NHLBI) has instituted clinical practice guidelines to provide evidence-based care for the treatment and management of children with asthma (Reddy, 2014). However, despite the recommendation of these clinical guidelines, adherence among primary care providers has been shown to be insufficient (Cabana, 1999). One of the reasons that providers fail to adhere to guidelines is a lack of confidence in their abilities (self-efficacy) to treat children with asthma (Cabana, 2001). Factors such as rapidly expanding medical knowledge and lack of sufficient continuing medical education can contribute to low self-efficacy in physicians (Aurora, 2007; Lee, 2009). According to self-efficacy theory, individuals are less likely to engage in activities in which their self-efficacy is low (Bandura, 1982).

Impact Asthma ECHO was established as an online learning collaborative designed to train primary care providers to treat and manage pediatric asthma patients according to evidence-based guidelines. Impact Asthma ECHO provides a mix of work and learning that is facilitated by a panel of specialists in asthma care. Individuals participating in this type of training have been shown to have increased self-efficacy in managing specific disease states (Aurora, 2010).

While studies have shown that increase in provider self-efficacy can lead to better guideline adherence (Farrell, 2017), these studies are generally based on self-reported data which can be biased (Ozer, 2004). In order to enhance the validity of this data, the results can be compared to MoHealthNet (Medicaid) administrative claims data to gain a better perspective as to the degree of provider practice change and guideline adherence (Lin, 2016). This study will examine the effectiveness of Impact Asthma ECHO on provider self-efficacy and guideline adherence.

Definition of Terms

- **Community of Inquiry** – Theoretical Framework that represents a process of creating a deep and meaningful learning experience through the development of three independent elements: social, cognitive and teaching presence.
- **Continuing Medical Education (CME)** – Educational activities that serve to maintain, develop, and increase provider knowledge in order to provide better services to patients.
- **Guideline adherence** – Conformity in fulfilling or following official, recognized or institutional requirements, protocols, pathways or other standards.

- **Medicaid Claims Data** - Primary data source for Medicaid statistical data. Person-level data files that report on Medicaid eligibility, service utilization and payments.
- **Primary Care Provider** - Physician chosen by or assigned to a patient for medical care of point of referral for specialty services.
- **Project ECHO** - Web-based videoconferencing educational model for primary-care physicians that focuses on guided practice and collaborative learning.
- **Self-efficacy** – Extent of one's belief in ability to complete tasks or reach goals.
- **Social Cognitive Theory** – Individual knowledge acquisition can be directly related to observing others within the context of social interaction and experiences.

Chapter 2: Literature Review

Self-efficacy

The essential idea behind the self-efficacy theory is that performance and motivation are in part determined by how effective people believe they can be (Bandura, 1982). Self-efficacy beliefs are an important aspect of human motivation and behavior as well as influence the actions that can affect one's life (Bandura, 1995). The understanding gained through research on self-efficacy theory is "the individual who is given the flexibility to try a task under various conditions builds a body of knowledge that increases both his natural ability to perform the task and the self-efficacy to believe in his ability to do it" (Peterson, 2013). The amount of research support for self-efficacy motivation is rather high, which shows that the theory is not only valid but also reliable (Majer, 2009).

Bandura (1986) defined self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances (p.391)." The choices people make, effort they exert, and how long they persist in a challenging task are strongly influenced by self-efficacy. While self-concept represents one's general perceptions of the self in given domains, self-efficacy would be the individuals' expectations and convictions of what they can accomplish in a given situation (Bong, 2003). Therefore, self-efficacy belief is a primarily cognitive assessment of competence (Bandura, 1995). Self-efficacy is a context-specific assessment of competence to perform a specific task, a judgment of one's capabilities to execute specific behaviors in specific situations. Self-efficacy perception does not necessarily encompass affective reactions as its components. Pietsch, Walker & Chapman (2003)

also suggested that efficacy judgment considers more about what individuals believe they can do with whatever skills and ability they have, and it is less involved with what skills and ability they possess. For example, efficacy beliefs are formed by asking "can" questions ("Can I perform this asthma assessment?"). Self-efficacy also relates to cognitive appraisals of competence (Pietsch, 2003).

Bandura's social cognitive theory integrates the concept of self-efficacy into a framework of triadic reciprocity: a model in which human performance consists of personal, behavioral and environmental factors and interactions between them (Bandura, 1986). Self-efficacy is considered a personal factor along with cognition and affect. Behavioral factors are how the individual acts in response to events and experiences. Environmental factors are elements external to the person that can affect and modify personal and behavioral factors. The individual's environment in turn can be influenced by behavioral and personal factors (Schunk et al., 2008, pp 126-128).

Bandura (1977) outlined four sources of information that individuals utilize to judge their self-efficacy: performance outcomes, vicarious experiences, verbal persuasion and physiological feedback. These components help individuals determine if they believe they have the ability to accomplish specific tasks.

Self-efficacy and Job Performance

There are a number of studies that examine the impact of self-efficacy on work related performance (Stajkovic, 1998). Self-efficacy theory itself suggests that increasing the self-efficacy of employees will boost motivation and performance. The basic idea behind this theory is that motivation and performance are determined by how successful individuals believe they can be (Bandura, 1982). This can be extremely useful in the

workplace because employers can develop and improve self-efficacy beliefs in their employees by focusing on its four primary sources: performance outcomes, vicarious experiences, verbal persuasion and emotional arousal (Gist, 1989). Williams (2010) noted that "individuals with high levels of self-efficacy approach difficult tasks as challenges to master rather than as threats to be avoided" (p. 45).

Increasing self-efficacy has been shown to decrease employee absenteeism in the workplace (Latham, 1989). Groups of employees who often missed work were taught how to more effectively manage their motivation and behavior, in addition to strategies to overcome obstacles that prevented them from attending work. Bandura (1988) was able to demonstrate that by setting short-term organizational goals for attendance, employees were able to increase their work attendance and were personally rewarded for reaching these goals.

In a comprehensive meta-analysis of 114 studies with a collective n=21,616, Stajkovic and Luthans (1998) found an average correlation of r=.38 ($p < .01$) between task self-efficacy and task performance. Converting this correlation to a common effect size metric gives a Cohen's d=.82, meaning that self-efficacy accounts for a 28% improvement in performance (1998, p. 252). The authors note that this figure may be conservative due to being suppressed by the tendency to avoid tasks that people judge to be beyond their perceived abilities. Another important finding of this analysis is the complexity of the task has a strong effect on the relationship between self-efficacy and performance, with the magnitude of the correlation strongest when the task was simple and weaker with more complex tasks. The self-efficacy perceptions have been shown to significantly and positively predict task performance, especially with simple tasks.

Self-efficacy can influence organizational productivity as well. Wood (1990) conducted a series of studies on organizational productivity as a result of managerial-perceived self-efficacy. In a simulated organization, MBA graduates were assigned manager positions and were tasked with matching employees to jobs, motivating the employees and establishing rules. The study found that perceived self-efficacy and personal goals have a direct effect on organizational performance (Wood, 1990)

Self-efficacy in Healthcare

One of the main barriers to continuity and overall quality in healthcare is lack of individual physician adherence to established clinical guidelines (Shaneyfelt, 1999). There are a number of factors that affect physician behavior with regard to adhering to guidelines within the clinical setting. These factors are familiarity, agreement, self-efficacy and outcome expectancy (Cabana, 1999). Self-efficacy influences whether a behavior will be initiated and sustained despite poor outcomes (Bandura, 1986). Low self-efficacy, due to lack of confidence in ability, may lead to poor guideline adherence. Cabana (1999) noted that sixty-eight percent of physicians surveyed regarding guideline adherence reported this barrier as a factor. While this study lists self-efficacy as one of several factors related to this particular phenomenon, the literature fails to address the specific importance of provider self-efficacy as it relates to the delivery of healthcare in general.

Various studies have identified a correlation between student self-efficacy and academic performance (Chemers, 2001). With regard to students in the healthcare field, a study by Opacic (2003) points out that in addition to academic performance, self-efficacy can be a significant predictor of students' clinical performance. Medical students with

higher self-reported self-efficacy have been shown to score above the mean in Objective Structured Clinical Exams (OSCE) than those with lower reported self-efficacy (Mavis, 2001). Outside of provider self-efficacy levels, patients' self-efficacy levels in the abilities of their physician can also lead to better clinical outcomes. As study by Lee (2008) noted that patients with greater confidence in their physician's abilities lead to overall patient treatment adherence and positive clinical outcomes.

Social Cognitive Theory in Information Science

Social Cognitive Theory (SCT) posits that "individual behavior is part of an inseparable triadic structure in which behavior, personal factors, and environmental factors constantly influence each other, reciprocally determining each other." (Compeau,1995; p.189). Environmental factors are physically external to the individual and provide opportunities and social support, personal factors are the cognitive and personality aspects that characterize an individual, which influence individual behavior (Compeau, 1995).

Social Cognitive Theory introduces a model of behavior that has been empirically validated in various fields of research such as mass media (Bandura, 1977; Cantor, 1994), public health (Bandura A. , 1998), and education (Zimmerman, 1989). Drawn from origins in social psychology, SCT has become a widely used theory in Information Science research (Carillo, 2010). Focusing on individual learning, SCT assumes that all facets of individual behavior, cognition and other personal factors, along with environmental influences operate as interacting determinants (Bandura, 1986). Information Science academics began to use SCT in the early nineties when realizing the relevance of the self-efficacy concept in understanding the use and adoption of

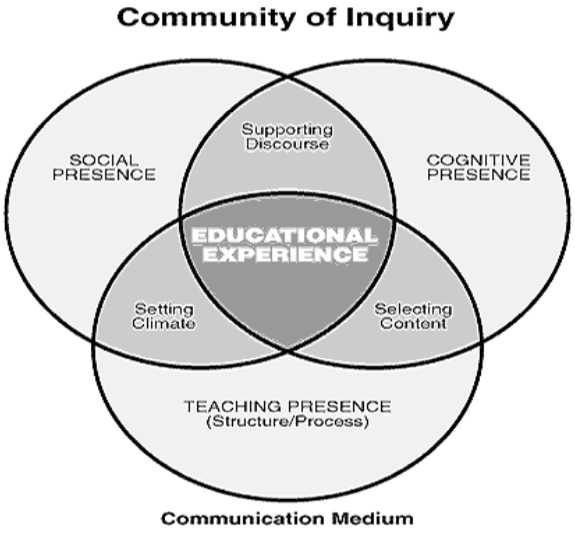
information technology (Carillo, 2010). Since then, SCT has proven to be insightful in information science research regarding software training and use (Hernandez, 2007; Klopping, 2006) and e-learning (Hayashi, 2004).

When computers started becoming more prevalent in the workplace, SCT was found to be particularly insightful in understanding individual behavior with regard to technology integration (Compeau, 1995; Bolt, 2001; Hasan, 2006). With the advent of the internet and web-based technologies, SCT began to be used from a different perspective in which the use of internet-based applications has been modeled as learning processes. Such processes are acquired by an individual in which their behavior, cognitive characteristics and environment and related, and mutually influence each other (Amin, 2007).

Community of Inquiry

The Community of Inquiry (CoI) framework described by Garrison, Anderson and Archer (2000) outlines three elements they argue to be essential to an educational transaction, namely social presence, cognitive presence and teaching presence. A Community of Inquiry is characterized by purposeful, open, and disciplined critical discourse and reflection. It is both a reflective and collaborative experience. Analysis of educational discourse using this model involves interpretation of computer-conferencing transcripts, using a set of indicators to signify contributions of each of the three elements within the context of a discussion.

Figure 1. Community of Inquiry Model (Garrison et al., 2000)



Social Presence is described as the ability to project one's self and establish personal and purposeful relationships. The main components of social presence are effective and open communication, and group cohesion (Picciano, 2005). Cognitive presence is defined by Garrison et al. (2000) as "the extent to which the participants in any particular configuration of a CoI are able to construct meaning through sustained communication" (p.89). While social presence was the focus of research in online learning, cognitive and teaching presence were initially omitted in these studies. Once social and cognitive presence were more closely studied, it was found that social presence becomes less important if the learning activities are primarily knowledge acquisition and there is no peer interaction (Picciano, 2005). Anderson et al. (2001) originally described teaching presence as having three components: (1) instructional design and organization; (2) facilitating discourse (or building understanding); and (3) direct instruction. With regard to teaching presence, there is a growing body of evidence that posits that this

factor is a significant determinate of successful online learning student satisfaction, perceived learning and sense of community (Swan, 2003; Swan, 2005; Vaughan, 2004).

The CoI template has been shown to be a valuable tool in analyzing and coding transcripts from online discussion boards and guiding research regarding the optimal use of computer-mediated communication for realizing learning goals (Anderson, 2001). Within this template, Garrison et al. (2000) looked for postings that displayed evidence of social presence, cognitive presence, and/or teaching presence. The postings contained key words or phrases that could then be grouped into a set of categories to indicate the stage or aspect of each element being demonstrated. Table 1 demonstrates the relationship among the three core elements in a CoI, as well as the categories into which the indicators have been grouped.

Table 2. *Community of Inquiry Coding Template (Garrison et al., 2000)*

Elements	**Categories**	**Indicators**
Social Presence	Emotional Expression Open Communication Group Cohesion	Emoticons Risk-free Expression
Cognitive Presence	Triggering Event Exploration Integration Resolution	Sense of Puzzlement Information Exchange Connecting Ideas Apply New Ideas
Teaching Presence	Instructional Management Building Understanding Direct Instruction	Defining and Initiating Discussion Sharing Personal Meaning Focusing Discussion

The CoI framework relies on content analysis to identify interactions between members of a community. Content analysis is the systematic quantification of symbols within messages communicated between individuals (Krippendorf, 1980). In order to provide useful data, it is essential to have a coding scheme with sufficient detail to allow

messages to be effectively identified and coded (Garrison, Cleveland-Innes, Koole & Kappelman, 2006).

Garrison (2000) developed the CoI framework to study how written language used in discussion board interactions can promote critical thinking. Since the framework was first published, it has been used by a number of researchers (Garrison, Anderson & Archer, 2010). However, one of the challenges initially with the CoI framework was the lack of common methodologies and measures for evaluation. In order to evaluate the level of importance of social, cognitive and teaching presence within an online CoI, a group of researchers from various academic institutions created, implemented and validated a survey that tested the level of each of these presences (Arbaugh, 2008). The CoI survey has since been used by a number of researchers as a supplement to the evaluation of framework implementation (Ice, 2011; Ke, 2010; Gorsky, 2010).

The CoI framework is interesting in the context of this study because it has been widely used in a range of various fields and disciplines (Shea, 2009). There is a level of validity to the framework, and to the strategies employed through its application (Akyol, Garrison & Ozden, 2009; Garrison, 2007). Xin (2012) describes a limitation of the framework, as coding and content analysis do not capture some of the fidelity of human communication, by abstracting the messages into single categories of presence indications. While this limitation may be true, it should be noted that the CoI framework has primarily been used to evaluate online discussion boards implemented within the confines of a particular class. For the purposes of this study, the researcher will be applying this framework to the social, cognitive and teaching interactions among the live video-conference participants in Impact Asthma ECHO.

Active Learning and Engagement

Active Learning has been defined as learning that requires students to engage cognitively and meaningfully with the presented materials rather than "receiving it" (Chi, 2014). Several studies have indicated that students learn more effectively when they are engaged in active learning than when they are recipients of passive information (Grabinger, 1996; Mayer, 2003; Pearce, 2005). Active learning occurs when a learner takes part in the learning experiences by engaging in activities such as organizing selected materials into a coherent structure and integrating that information with existing knowledge (Mayer, 2003). Exercises such as teamwork, debate. and self-reflection help to promote student engagement and motivate them to acquire more knowledge and enhance their skills (Prince, 2004).

Engagement is a key component in many theories of academic learning. Early studies regarding this concept defined engagement in terms of interest (Dewey, 1913), effort (Meece, 1988), motivation (Pintrich, 1990), and time on task (Lentz, 1998). Engagement, specifically in the learning process, pertains to the time and physical energy that students expend on activities in their academic experience (Jacobi, 1987). Attributes of engaged learning activity as proposed by John Dewey over a century ago, remain applicable to current learning environments such as web-based videoconferencing. Specific examples of an engaged learning environment (Dewey, 1913; Tanner, 1997) can be characterized as:

- Support of group collaborative decision making
- Stimulation of creative thought
- Incorporation of life experience

A common misconception is that online learners can only participate by active engagement and writing (Hrastinski, 2007; Romiszowski, 2004). “Those that contribute too little are labeled lurkers or passive recipients, rather than actively engaged in learning.” (Romiszowski, 2004, p. 399). Activities such as reading and observing, however, are not considered passive, because they include engagement, thought, and reflection (Kolb, 1984). The concept of vicarious learning states that learning may occur through observation of others engaged in active dialogues (McLendree, 1998).

Distance Education/Videoconferencing

The age of the internet has greatly increased both the speed and amount of accessible information that learners can receive in any given time. This phenomenon has brought about the popularity and expansion of distance education (Curran, 2006). Garrison’s *Understanding Distance Education* (1989) is one of the fundamental works in the field. Garrison focused on the interaction and communication between learners and instructors. By understanding the relationship between distance education, interaction and communication, Garrison noted that educators will be better able to meet the needs of the learners (Garrison, 1989).

To date, there is no single theory that is exclusive to the field of distance education. It is noted that due to the technological and societal advancements in the field, the practice of distance education will continue to be contested, resulting in a disservice to learners by limiting them to only one theoretical position (Simonson, 2009). There are, however, some specific theories that the literature points to for the description of distance education. Most noted is Moore’s (1991) Transactional Distance Theory. Moore (1991) explains that when referring to distance education, “there is more than a

geographic separation of learners and teachers; there is also a distance associated with understanding and perception also partially caused by geographic distance" (p. 2). Transactional Distance Theory encompasses both organizational and transactional issues without losing sight of the learner, the institution, and the nation altogether (Gokool-Ramdoo, 2008)

One of the most significant and supportive studies on distance education and its effectiveness was Thomas Russell's (1999) *The No Significant Difference Phenomenon*. In this publication, Russell cited several studies comparing distance education classes to face-to-face encounters. While it should be noted that several of the studies cited looked at distance correspondence methods of the last century, there were also a number of studies that he cited that compared more recent online classes with face-to-face classes. Based on his findings, Russell was able to determine, that with regard to learning outcomes, "distance education technology is no better, and no worse, than the classroom setting for delivering instruction." (Russell, 1999).

Among the various platforms used to deliver distance based education, videoconferencing is being utilized more than ever for interactive instruction (Heath, 2002). Videoconferences are most commonly used for meetings, but can also be utilized in other formats such as telemedicine, and various healthcare consultations. Videoconferencing is widely utilized for educational purposes because it allows for interactive communication. This allows instructors and students alike to receive real-time feedback which can contribute to a more robust discussion (Fiarbanks, 1995). Kaufman et al. (1998) discussed the various instances when videoconferencing is appropriate for educational use, which include: "geographic location of the participant, reduced time and

cost constraints, delivery of time-sensitive instruction, and relative cost-effectiveness" (p. 83).

A substantial amount of studies in computer-supported collaborative learning (CSCL) has highlighted the fact that synchronous video communication is superior to asynchronous communication in establishing discourse (Beers, 2005; Dierks, 2007). This is achieved by overcoming the lack of bodily communication, delayed feedback and barriers of meaning in asynchronous tools such as discussion forums (Dierks, 2007). The use of videoconferencing can increase a learner's ability in social and emotional expression and improve overall communication and educational satisfaction (Giesbers, 2009). These attributes, along with the interactive nature of videoconferencing, are key factors to the implementation of this platform for the delivery of CME, especially in rural settings.

CME Videoconferencing

The required commitment to continuing medical education is more difficult to fulfill for physicians in rural settings as they do not have ready access to medical lectures and grand rounds as those closer to academic medical centers (Gray, 2014). Traditional methods of CME have been widely criticized as ineffective based on the fact that the mere transmission of information regarding new research and best practice care is enough to influence physician performance and practice changes (Stein, 1981). Kaufman et al. (1998) points out that "one essential element needed to accomplish these changes, and consequently improve patient outcomes, is the use of teaching approaches that provide interaction among the participants and the instructor" (p. 82).

Inter-professional collaborative practice is considered to be the ideal means of medical education according to experts in the field (Shannon, 2016). Most providers, especially those in rural areas, have not had access to a combination of work and learning since their medical residencies. CME via interactive videoconferencing allows these providers to interact on a regular basis and increase their knowledge and expertise in specific disease states (Meins, 2015). This increased knowledge base provides confidence in their abilities to treat and manage their more complex patients (Lee, 2009). Confidence in abilities can increase the self-efficacy of the physician, as well as increase the patient's trust in their provider. This shared self-efficacy has been shown to positively affect outcomes (Lee, 2009). Self-efficacy influences whether a behavior will be initiated and sustained despite poor outcomes (Bandura, 1986). Davis (1999) points out that "videoconferencing-based CME interventions can greatly influence physician performance and, in some instances, healthcare outcomes" (p. 870).

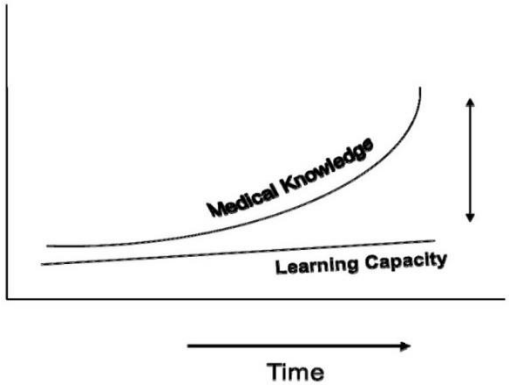
Guideline Adherence

One of the main barriers to continuity and overall quality in healthcare is lack of individual physician adherence to established clinical guidelines (Shaneyfelt, 1999). Sanchez (2012) noted that healthcare providers can become accustomed to the way they have practiced medicine for a number of years and even when familiar with established clinical practice guidelines, still seldom change their practice patterns. There are a number of factors that affect physician behavior with regard to adhering to guidelines within the clinical setting. These factors include familiarity, agreement, self-efficacy and outcome expectancy (Cabana, 1999). Lack of guideline adherence has been shown to lead to substandard care and poor clinical outcomes such as severe uncontrolled asthma

(SUA) (Flores, 2009). Patients with SUA require more intensive therapy and more specialized care, which increases both the clinical and economic burden on the healthcare industry (Zeiger, 2016).

Another important barrier that primary care providers face when attempting to manage complex diseases such as pediatric asthma is the rapid growth of medical information (Aurora, 2007). Very often, primary care providers, especially those in rural areas, have limited access to the proper tools and educational support that would allow them to increase their medical knowledge with regard to evidence-based medicine (Cicutto, 2014).

Figure 2. Medical knowledge vs Learning Capacity (Aurora, 2010)



In a survey of 429 primary care physicians, Finkelstein et al. (2000) observed that despite evidence of guideline awareness, poor adherence was still noted by underuse of asthma action plans and follow up visits. Okelo et al. (2013) conducted a meta-analysis of sixty-eight studies on potential interventions to increase guideline adherence and noted that clinical decision support tools, as well as expert feedback and audit were the most likely factors to improve adherence. In order to provide this expert feedback, Mold et al. (2014) suggested that organized learning collaboratives combined with academic detailing can be successful in attempt to increase guideline adherence.

One of the most effective ways for providers to manage their patients with uncontrolled asthma is improving guideline adherence to prescribing inhaled corticosteroids (Klok, 2015). The clinical practice guidelines of the NHLBI strongly encourage providers to discuss medication management at every follow-up asthma visit (National Heart, 2007). However, according to meta-analysis, the provider self-reported mean level of adherence to this particular guideline was found to be between 22 and 63% (Barnes, 2015). One of the key factors leading to this phenomenon is lack of provider self-efficacy in communicating with families during routine medical visits (Sleath, 2012). The NHLBI reports that proper use of inhaled corticosteroids is associated with higher FEV1, reduction in hospitalizations, and lower mortality rate (National Heart, 2007). In order to improve these outcomes, it is important for providers to improve their self-efficacy in communicating proper medication use to families of children with asthma (Sleath, 2012).

It has been previously noted that the majority of the research thus far regarding the relationship between provider self-efficacy and guideline adherence has primarily been self-reported (Ozer, 2004). Studies have indicated, however, that physician self-report is subject to bias and should not be used as the only measure with regard to guideline adherence (Echaiz, 2015; Adams, 1999). Previous literature has noted that provider self-reported data very often does not demonstrate what is actually seen in clinical outcomes (Lakshminarayan, 2014). However, linking administrative claims data to the self-reported data can leverage the advantages of each source to enhance study validity (Lin, 2016).

Medicaid Claims Data

Medicaid is the primary payer for low-income Americans and people with disabilities (Crystal, 2007). As of February 2017, nearly 75 million Americans were enrolled in Medicaid and of this current number; over 50% are children (medicaid.gov, 2017). Increasingly, Medicaid claims databases are utilized for healthcare research and evaluation. Claims data use has been recommended as an appropriate data source for key health care indicators such as quality improvement, pharmacologic research, and evaluation of medical care appropriateness (Quam, 1993). Because of its size and comprehensiveness, the Medicaid claims database has been utilized in numerous epidemiological studies (Bright, 1989). When linked with other sources of patient-level information, Medicaid claims data can serve as a powerful resource for evaluation of overall healthcare effectiveness (Crystal, 2007).

Primarily, data on disease treatments and diagnoses comes from providers, which can lead to self-report and non-response biases that are issues in interview based studies (Kendler, 1996). In order to circumvent these biases, detailed information extracted from Medicaid claims data can be used to determine specific episodes of care in order to track timing of events matching up with a specific provider (Crystal, 1999). Another key advantage of utilizing claims data for healthcare research is that individual; patient-level data can be aggregated to create provider-level estimates of treatment patterns (Crystal, 2007).

While utilization of claims data is an effective tool for healthcare research, there are associated limitations (Fisher, 1992). Federally Qualified Health Centers (FQHCs) very often provide services to uninsured patients whose medical records contain

information about care received that would not be indicated in claims data (Devoe, 2011). Beneficiaries who are also eligible for both Medicaid and Medicare can have claims histories in both systems, and Medicaid claims may not provide complete diagnostic information (Crystal, 2007). Other limitations may include receipt of services that do not appear in Medicaid claims files, non-medical considerations such as reimbursement policies and rates, and use of prescriptions not necessarily indicative by filling patterns (Holt, 2006).

Chapter Summary

Confidence in one's abilities can affect both motivation and productivity in the workplace. Individuals with higher self-efficacy levels are more likely to pursue difficult tasks that those with low self-efficacy. This phenomenon is specifically evident in healthcare where the delivery of evidence-based care and adherence to clinical guidelines is of the utmost importance. The Community of Inquiry Framework has primarily been utilized to evaluate participation of online learners in an asynchronous setting and has primarily been utilized for the evaluation of online discussion posts. While traditional methods of continuing medical education have been implemented in attempt to increase provider self-efficacy and guideline adherence, these methods have been shown to be unsuccessful. Educational methods implementing inter-professional collaborative practice are considered to be ideal for promoting best practice care in practicing medical providers. Utilization of Medicaid claims data has been recommended as an appropriate tool for evaluation of medical care appropriateness as a result of specific educational interventions.

Chapter 3: Methodology

Utilizing triangulation of both data and theoretical frameworks, this research builds upon what is currently known about physician self-efficacy, as well as community of inquiry in online courses, by studying participation of learners in Impact Asthma ECHO. The purpose of the present study was to examine the influence of participation in Impact Asthma ECHO on provider self-efficacy and practice change, thus the researcher examined if: 1) enhanced self-efficacy leads to better adherence to EPR-3 (Expert Panel Report-3) guidelines for the diagnosis and management of asthma care and 2) if adherence to these guidelines can impact clinical outcomes. The two research questions are as follows:

1. *How does participation in Impact Asthma ECHO influence provider self-efficacy?*
2. *How does engagement in the learning activities of Impact Asthma ECHO promote clinical guideline adherence?*

The following sections provide a description of the research design and methods for this study by including details regarding the following four areas: 1) research design; 2) instructional environment; 3) participants and setting for the study; 4) data collection and method of analysis.

Research Design

The self-efficacy information obtained in this study utilized a retrospective cohort approach to data collection and analysis. Retrospective cohort studies are a type of observational research in which the investigator looks back in time at archived or self-report data for purposes of evaluation (El-Masri, 2014). Four separate data sources (self-efficacy survey, CoI coding template, CME surveys, and Medicaid claims data) were

used to study the providers' level of self-efficacy in treating and managing children with asthma, their level of engagement in the educational intervention, as well as their adherence to clinical guidelines. For this study, the intervention was the educational model of Impact Asthma ECHO, while the examined outcome was provider self-efficacy, participant engagement, and subsequent guideline adherence.

Expert Panel Report 3(EPR-3) guidelines were developed by the National Asthma Education and Prevention Program (NAEPP) Coordinating Committee (CC), coordinated by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (National Heart, 2007). The guidelines are based on four essential components of asthma care, which consist of: 1) assessment and monitoring, 2) patient education 3) control of factors contributing to asthma severity, 4) and pharmacologic treatment (National Heart, 2007). Adherence to these guidelines has been shown to lead to better clinical outcomes for asthma patients (Cicutto, 2014).

Instructional Environment

Project ECHO is a telemedicine and distance-education based program designed by the University of New Mexico School of Medicine to deliver evidence-based training to primary care providers in rural and underserved areas (Aurora, 2007). Project ECHO utilizes videoconferencing, web-based assessment tools and online presentations to connect specialist teams with primary care providers to promote best practice care (Aurora, 2007). Project ECHO is different from telemedicine, in that the specialist teams do not assume care of the patient. Instead, the community providers are trained, via tele-mentoring, and are able to retain responsibility of their patients with increasing independence as their self-efficacy increases (Lopez, 2016). "Project ECHO's

methodology is based on 1) using telehealth technology to build healthcare resources where they are scarce; 2) sharing best practices to reduce variation in clinical care; 3) utilizing practice-based learning to develop specialty expertise among providers; and 4) monitoring and evaluating provider outcomes" (Shook, 2016, p. 5923).

The first tele ECHO clinic at the University of New Mexico was initially developed for the treatment and management of Hepatitis C virus (HCV) in New Mexico (Aurora, 2010). Providers from rural communities and prisons throughout the state participated in weekly sessions and presented their de-identified cases to a team of specialists who provided best-practice care recommendations in accordance with evidence-based guidelines. The effectiveness of this initial HCV ECHO clinic was evaluated utilizing a prospective cohort study of 407 chronic HCV patients, which compared the outcomes of patients treated by specialists at UNM with those being treated by primary care physicians participating in HCV ECHO (Arora, 2011). "There were no significant differences in sustained viral response between the UNM cohort (57.5%) and the ECHO cohort (58.2%). Furthermore, serious adverse events were higher in the UNM cohort (13.7%) than in the ECHO cohort (6.9%)" (Lopez, 2016, p. 2).

Since its inception, Project ECHO has expanded to almost 50 other chronic disease conditions, both within the United States and globally (Katzman, 2014). Project ECHO has been shown to be a cost-effective model that can safely and effectively expand capacity for management and treatment of complex chronic conditions, especially in medically underserved areas (Wong, 2013).

Each ECHO session is led by a multi-disciplinary panel of specialists with expertise in the management and treatment of pediatric asthma. The panel consists of a

pediatrician, pediatric pulmonologist, an advanced practice nurse specialist in asthma care, regional asthma educators, and an environmental specialist. Each specialist contributes to the planning and delivery of the curriculum, as well as providing recommendations for the case presentations. The make-up and participation of the expert panel remains constant throughout each cohort.

Impact Asthma ECHO sessions are facilitated via Zoom web-based video platform (zoom.us) which promotes synchronous discussion and collaboration. Zoom is a videoconferencing system that allows for multiple users at different sites to participate in synchronous, collaborative activities. Collaborative participants in these sessions include providers in Federally Qualified Health Centers (FQHCs), rural clinics, hospitals, private practice and health departments. Both participating providers and the expert panel join each session virtually via Zoom. The format of Impact Asthma ECHO consists of weekly, 1.5-hour sessions in 4-week cycles to engage cohorts of primary care clinical teams and regional specialists. There are six cycles per year running September and October, January and February and May and June. The topic for each week coincides with each of the four EPR-3 essential components for asthma care. Each cohort is presented with the same didactic lesson in each corresponding week. The primary goal of these didactics is to ensure that the participating providers are educated in evidence-based care of their asthma patients. Built within the didactic presentations are seven evidence-based clinical guidelines for routine asthma care that consists of:

1. Severity assessment
2. Assessment of airway control
3. FEV1 (Forced Expiratory Volume) assessment

4. Order and evaluation of spirometry
5. Assessment of medication inhalation technique
6. Utilization of asthma control test
7. Provide written asthma action plan (National Heart, 2007)

Along with the weekly didactic, a participating provider presents a de-identified case from their own clinic to present to the expert panel, as well as the other participants. Built within the case presentation are clarifying questions from the other participants, as well as best practice recommendations from the expert panel.

As previously stated, the majority of data related to provider self-efficacy and practice change relied primarily on self-report, which can be subject to bias (Ozer, 2004). In order to determine if these variables are correlated with positive clinical outcomes, the researcher utilized MO HealthNet (Medicaid) administrative claims data to gain a better understanding of participant practice patterns after participating in Impact Asthma ECHO. Both providers and patients enrolled in the Missouri Medicaid program must submit a claim for services such as clinical encounters and prescription refills. Medicaid claims data is useful in evaluating practice patterns in that it provides a snapshot of services provided to its beneficiaries for both inpatient and outpatient care (Reck, 2017). Claims data was evaluated utilizing individual clinic panel reports relevant to participant location.

In attempt to enhance the overall robustness of data collection, validate the findings from both the self-efficacy surveys, and data collected from the administrative claims data, separate data sources were utilized for triangulation purposes. In order to receive CME credit for participating in an ECHO session, providers are required to

respond to a brief survey that must be completed before the next scheduled session. These surveys are in Likert scale format and address the participants' thoughts on specific key takeaways from each session such as perceived self-efficacy, learning experience, peer collaboration, instructor knowledge, content effectiveness, and future practice implementation. In addition, the researcher reviewed recorded sessions of the cohort under investigation to evaluate the social, cognitive, and teaching presence demonstrated within the group. These elements are further discussed in the Data Collection section of this chapter.

Participants and Setting

The participants for Impact Asthma ECHO were recruited based on their participation in the MU School of Medicine's Asthma Ready® Communities (ARC). The ARC is a statewide program aimed at providing "standardized, evidence based educational programs for children with asthma, families, and health professionals" (Asthma Ready, 2017). For healthcare facilities, Asthma Ready® is a designation indicating that the facility has participated in asthma training, has the resources and is committed to delivering appropriate services, maintaining communication standards, and conducting quality improvement efforts to ensure best practices for the care of children with asthma (Asthma Ready, 2017).

For the purposes of this study, the participant cohort from October 2015 was evaluated as a sample group of the overall Impact Asthma ECHO project. This cohort was selected primarily based on the researcher's access to reviewable Medicaid claims data. The researcher was only able to gain access to clinic specific claims data based on calendar year. In order to determine if there was a change in practice behavior between

calendar years 2015 and 2016, the October 2015 cohort was the most reasonable choice for evaluation. Of the participants in this cohort, all of the prescribers from the queried clinic in the Medicaid claims data were represented, which provided an accurate representation of the data of interest. Table 3.1 outlines the participant/instructor characteristics of the October 2015 cohort:

Table 3. *Participant/Instructor Characteristics*

Session Week	**Number of Participants**	**Number of Instructors**
Week 1	19	4
Week 2	19	4
Week 3	19	4
Week 4	19	5

Instructional Methods

Impact Asthma ECHO was developed as a means to provide case-based educational opportunities to ARC participants via online, videoconferencing technology, while eliminating the need for the expert panel to travel to individual clinics for individual training. The pedagogy implemented in the instructional design of the program was validated by Aurora's (2010) study that examined outcomes of patients being managed by participants of Project ECHO. It was found that these patients had the same, and in some instances, statistically better outcomes than patients treated by specialists at the academic medical center at the University of New Mexico.

The curriculum incorporates a population-based approach (Carney, 2004; Rattner, 1999) to help clinicians and other health professionals identify and address asthma risk

and impairment in their patient population. The didactic portions of the curriculum are delivered via PowerPoint presentations, anchored by question and answer sessions. These structured presentations have been shown to be an effective tool for the delivery of information (Cook, 2010; Mayer, 2008), and reinforcement of teaching presence (Anderson, 2001). Four content areas are highlighted through didactic presentation and case-based dialogue. Overlapping themes include healthcare cost and reimbursement for necessary services. Each session is conducted by a lead community clinician as care presenter and moderated by an expert panel member with varying degrees of expertise in pediatric asthma care. Session content areas and program components are:

Table 4. *Impact Asthma ECHO Content outline*

<table>
<tr><td>Module 1 –
Introduction by expert team moderator</td><td>Module 2 -
Introduction by expert team moderator</td><td>Module 3 -
Introduction by expert team moderator</td><td>Module 4 -
Introduction by expert team moderator</td></tr>
<tr><td>Cases by featured clinic, community provider</td><td>Cases by featured clinic, community provider</td><td>Cases by featured clinic, community provider</td><td>Cases by featured clinic, community provider</td></tr>
<tr><td>Monitoring Asthma Risk & Impairment</td><td>Applying Best Practices</td><td rowspan="3">Assessing & Managing Environmental Triggers</td><td>Engaging preventive Asthma Services</td></tr>
<tr><td>Asthma Risk Panel Reports</td><td>EPR3 & new evidence</td><td rowspan="2">School-based
Home-based
Community-based</td></tr>
<tr><td>Population level trends in Missouri</td><td>One patient @ a time</td></tr>
<tr><td colspan="4">Healthcare cost and reimbursement for medically necessary services, evaluation of asthma services redesign</td></tr>
</table>

Participants are awarded 1.5 AMA PRA Category 1 Credit(s) ™ toward their yearly CME requirements. Curriculum content and didactic topics are pre-approved by The Office of Continuing Education, School of Medicine, University of Missouri. Didactic content was formulated by a planning and steering committee made up of three

members of the MTN and a pediatric subspecialist within the Department of Child Health. The planning and steering committee was chaired by the lead researcher on this project.

Data Collection

Four separate sources of data capture were utilized for the purposes of this study. The section below outlines the specifics of each of the data collection methods and units of analysis (Table 3.3)

Table 5. *Instruments and Procedures for Data Collection/Analysis*

Research Question	Data Sources	Data Analysis
1. *How does participation in Impact Asthma ECHO influence provider self-efficacy?*	Pre/post-survey CME Survey	Wilcoxon signed rank test Logistic Regression Analysis
2. *How does engagement in the learning activities of Impact Asthma ECHO promote clinical guideline adherence?*	Medicaid Claims Data Community of Inquiry Template	Descriptive statistics Content Analysis

Self-Efficacy Survey

The self-efficacy survey (Appendix A) consists of a retrospective pre-post questionnaire that was administered to each provider who participated in the October 2015 cohort (n=19). Unlike the typical pretest-posttest, the retrospective pretest is administered only once. According to Davis (2003), "when participants are asked to

respond to a question about how much they know about a particular subject after they have some basic knowledge of the subject themselves, they are more able to accurately reflect on the degree of change in knowledge or attitude. Furthermore, respondents oftentimes overestimate their knowledge level on a particular subject when using the traditional pretest-posttest. With the retrospective pretest methodology, respondents are given the opportunity to learn how much they know about a subject prior to responding to a questionnaire" (p.146). Self-efficacy surveys were administered, and subsequent data was stored in Research Electronic Data Capture (REDcap) (Harris, 2009).

Method of Analysis: The retrospective pre-post surveys were individually analyzed using a statistical procedure which takes into account the paired nature of the specific measures. Due to the non-normality of the distributions, a non-parametric Wilcoxon signed rank test was used to examine the differences in the medians of the items.

CME Survey

In order for providers to receive continuing medical education credit for their participation in each ECHO session they are required to complete supplemental surveys (Appendix B) within a week of the conclusion of each session. These surveys provide insight into their level of perceived self-efficacy, instructional effectiveness, and influence on practice while they are participating in the four-week block. The surveys are formative in nature, in that they capture relevant information throughout the sessions. They are not meant as a summative assessment of participant knowledge. Participation in Impact Asthma ECHO is not contingent upon completion of the surveys, however, in order for the providers to receive their CME credit, they must complete this activity. All

surveys are completed online via Survey Monkey and data is compiled in a secure server and monitored by the Missouri Telehealth Network.

Method of Analysis: Statistical analysis using a logistic regression of the Likert scale data was utilized to determine if there was any change in participants' responses to the questions over the four weeks. Changes in responses over time can serve as a key indicator regarding their attitudes toward learning experience and instructional competence.

Community of Inquiry Coding Template

In addition to survey-generated data, video recordings of each session of the October 2015 cohort were analyzed using a coding technique based on the description of the Community of Inquiry coding protocol template published by Garrison, et al. (2000). To facilitate the analysis, the researcher coded each video session according to the categories established in the coding protocol. In order to establish consistency with prior research, the researcher chose to utilize pre-established categories set forth in Garrison's (2000) original coding schema.

Throughout the viewing of the video sessions, key participant engagement indicators were established by the researcher that lent themselves to each specific category established in the protocol (Table 3.4). Engagement indicators within the recordings were coded at the 3rd level of the coding template (e.g., S1A, S1B, etc.), to document all indications of presence identified in the recording rather than a single primarily indicated presence, in order to mitigate a loss of fidelity of the message (Xin, 2012). These indicators were then aggregated to give sum totals of social, cognitive, and teaching presences for each session.

Table 6. *Coding Template, Based on Community of Inquiry Coding Template (Garrison, 2000)*

CoI Presence	**Categories**	**Indicators**
Social Presence	S1: Emotional Expression	S1A: Humor (Laughter)
		S1B: Nodding in Agreement
	S2: Open Communication	S2A: Confirmation of Audio
	S3: Group Cohesion	S3A: Introductions
		S3B: Case Presentation
Cognitive Presence	C1: Triggering Event	C1A: Request Clarification
	C2: Exploration	C2A: Clarifying Question
	C3: Integration	C3A: Connecting Ideas
		C3B: Answering Question
	C4: Resolution	C4A: Recommendations
Teaching Presence	T1: Instructional management	T1A: Define Discussion Topics
		T1B: Technical Instruction
		T1C: Didactic Presentation
	T2: Building Understanding	T2A: Case Summary
		T2B: Clarifying Question (leading)
		T2C: Answering Question
	T3: Direct Instruction	T3A: Focusing Discussion
		T3B: Final Recommendation

To facilitate coding, the researcher viewed each video session and marked the start/stop times of when a specific indicator was determined within the context of the collaborative discussion. The coded sections were recorded to coincide with the specific category, indicator, and participant ID (Table 3.5 Appendix C). For instances where there was simultaneous participant engagement in the same indicator, the cumulative participant IDs were recorded in the same column of observation.

Table 7. *Snapshot of CoI coding table utilized for video recordings.*

Time Start	**Time End**	**Category**	**Indicators**	**Participant ID**
00:00	9:15	Group Cohesion	Introductions/Identification	All participants/Instructors
9:15	10:35	Instructional management	Defining and initiating discussion topics	I1
10:37	10:54	Instructional management	Technical Instructions (A/V)	I2
11:10	14:31	Group Cohesion	Case Presentation	P1
11:23	11:27	Open Communication	Confirmation of voice clarity	P1
13:52	13:55	Triggering Event	Sense of Puzzlement (Number of providers/humorous)	P1, I1, I2
13:52	13:55	Emotional Expression	Humor (laughing)	Group
14:32	17:29	Building Understanding	Case Summary	I1
17:54	17:58	Building Understanding	Clarifying Question (Leading)	I3
17:58	18:09	Integration	Answering question (Confirmation)	P1

Once the videos were coded, the data was copied to a separate spreadsheet (Figure 3.1, Appendix D) to aggregate sum totals of the specific categories represented in each session. By summing the cumulative data, it was possible to generate total time of engagement in a particular Community of Inquiry category and presence throughout the session.

Figure 3. Snapshot of spreadsheet indicating category aggregation

59:50:00	1:03:00	190.00	Building Understanding	Clinical Examples (Didactic Anecdotal supplementation)	I4
1:06:28	1:27:30	334.00	Building Understanding	Case Summary	I3
Total		743.17			
22:26	22:57	31.00	Direct Instruction	Focusing Discussion (Highlights of Presentation)	I1
25:33:00	25:50:00	17.00	Direct Instruction	Focusing Discussion	I1
28:59:00	37:24:00	505.00	Direct Instruction	Final Recommendation	I1, I4, I3
Total		553.00			

.

All video sessions were coded by the researcher. The consistency of coding using the template was validated with assistance from the researcher's advisor who assisted in viewing the first session to establish the indicators that were appropriate for future coding. Establishing a new set of indicators was necessary for this study as indicators established in previous research were developed for coding posts on online discussion boards. As the coding process can be somewhat subjective, the comparison of coding of the initial recording was used to determine the level of replicability in the researcher's application of the coding template.

A subset of the video sessions (Session 1) were coded by the researcher and a co-investigator. Through this process it was discovered that the indicators applied to the CoI categories were relatively consistent between the researchers. In order to calculate the percentage of agreement (PA) of the coding schema, the formula described by Holsti (1969) was utilized:

$$PA_o = \frac{2A}{n1 + n2}$$

Percent agreement is the ratio between the number of agreed upon codes and the total number (agree + disagree) codes. It is a simple reliability index and can

accommodate a number of coders (Weaver, 2006). It is considered a somewhat liberal index in that it fails to account for agreement by chance. In contrast, other agreement indices, such as Cohen's Kappa and Krippendorf's alpha, are considered overly conservative and too restrictive in that they are complex and are difficult when dealing with "by hand" calculations, especially for interval and ratio level variables (Lombard, 2004). The coding of the video sessions was completed by hand. The researcher and co-investigator chose to utilize the Percentage of Agreement index to code this particular portion of the study.

Potential values for the calculated PA can range from 0 (no agreement) to 1.0 (perfect agreement) between the coders (Neuendorf, 2002). In the formula, "A" refers to the number of agreements between coders, and "n1 and n2" refer to the number of coding values recorded by each investigator. Lombard (2004) describes Percentage of Agreement values above 0.70 being acceptable for exploratory studies, and values of 0.80 being acceptable in most situations. A "simple agreement" Percentage of Agreement (PA) calculation was performed, comparing exact matches in the coding values (indicators) recorded by the researcher and co-investigator and the PA was found to be 0.875, which falls within the range of acceptability.

Method of Analysis: The CoI template was evaluated via inductive analysis in which the raw, textual data was condensed into a summarized format in which to establish links to the research questions (Thomas, 2006). Total time of engagement in specific categories were calculated and compared across each session. For the purposes of this study, the researcher was not attempting to indicate statistical significance among changes in times of each category. The data point of interest in this portion of the study

was to determine emerging patterns in the cumulative group dynamic or behavior throughout the cohort.

Medicaid Claims Data

In order to evaluate clinical guideline adherence, the final phase of data collection consisted of evaluation of MoHealthNet asthma panel report from a specific clinic consisting of providers from the October 2015 cohort. This subset of data was chosen based on the fact that all pediatric prescribers from this particular clinic participated in all four sessions from this cohort. The criteria used to evaluate this variable consisted of four separate measures: 1) hospitalization rates, 2) emergency department (ED) visits, 3) outpatient visits, 4) use of inhaled corticosteroids. The NHLBI has suggested that increased guideline adherence can have an impact on these particular measures, most notably a decrease in measures 1 and 2, and an increase in measures 3 and 4 (National Heart, 2007). This data was obtained through the Office of Social and Economic Data Analysis (OSEDA), housed within the College of Agriculture, Food and Natural Resources at the University of Missouri-Columbia.

Method of Analysis: Administrative claims data was analyzed to determine if there were changes in hospitalizations, ED visits, outpatient visits, and use of inhaled medications. The claims data was evaluated for calendar years 2015 (January 1, 2015 – December 31, 2015) and 2016 (January 1, 2016 – December 31, 2016). Calendar year 2015 will provide a baseline of claims data pre-Impact Asthma ECHO. Calendar year 2016 data will capture potential practice patterns of participants in the October 2015 cohort.

Summary of Methodology

In order to address the research questions, several sources of data were gathered as part of this research study, namely:

1) Self-efficacy survey data
    a) Individual, self-reported data regarding provider self-efficacy in management of pediatric asthma pre/post participation in Impact Asthma ECHO
2) CME survey data describing self-efficacy, degree of learning, interaction with peers and instructors, perceived instructional effectiveness, and implications for future practice. Surveys administered immediately prior to participation in each session, providing data capture of participant perception throughout the series
3) Community of Inquiry coding template indicating level of group engagement relative to specific categories of social, cognitive, and teaching presence
4) Clinic-level Medicaid claims data establishing practice patterns of calendar years immediately prior to, and post Impact Asthma ECHO cohort participation

Through the analysis of each of these different forms of data, and the triangulation of these different data sources, the research aims to describe patterns in participant self-efficacy, group engagement in learning activities, and potential practice change in participants of the October 2015 cohort of Impact Asthma ECHO. The analysis of the data is presented in Chapter 4.

Chapter 4: Analysis of Data

This chapter presents an analysis of data collected in this study. The chapter is divided into four sections: 1) Analysis of self-efficacy survey data, 2) CME survey analysis, 3) Community of inquiry coding template analysis, and 4) Medicaid claims data analysis. The first section is an examination of the distributions associated with perceived self-efficacy of the respondents (n=6) before and after participating in Impact Asthma ECHO. The second section is a review of participant responses to the CME as to any change in perception of learning or instructional recommendations over the four-week period. Section three explains the application of the Community of Inquiry coding template to describe the indicators of various presences in the recorded video sessions. The fourth section provides an analysis of the differences of four key indicators (hospitalizations, ED visits, ICS use, and outpatient visits) between calendar year 2015 and 2016.

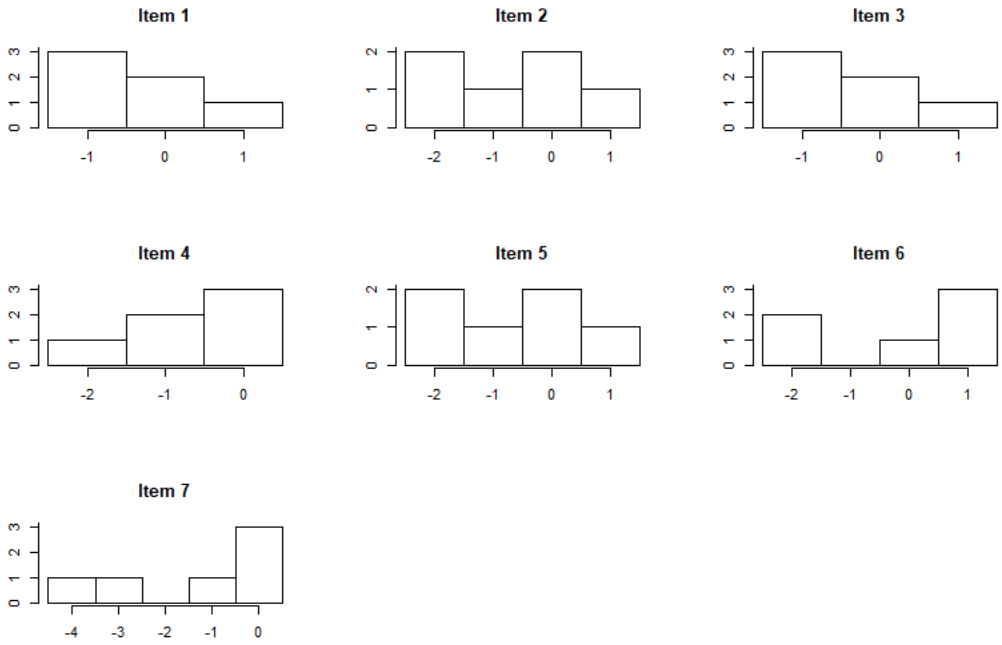
Self-efficacy Survey Analysis

Retrospective pre- and post-intervention measures of provider self-efficacy in managing pediatric asthma patients were analyzed using a statistical procedure which considers the paired nature of these measures. For each survey item, the nature of the distribution of the pre-post difference were examined via histograms. It was initially determined for those items whose differences appear to be normally distributed, a paired t-test would be used to examine the potential change in means. It was also determined that for those items whose differences did not reveal a normal distribution, the paired t-test would not be used. For these cases, a nonparametric Wilcoxon signed rank test will

be used. The Wilcoxon signed rank test examines medians instead of means and does not require an assumption of a normal distribution on the differences (McClave, 2014).

In the analysis of these data, it was found that none of the pre-post intervention differences exhibited a normal distribution. The plots below represent histograms of the difference between the pre-post intervention item scores. For example, Item 1 had 3 individuals whose response to the survey increased by 1 from pre->post (hence pre-post=-1 for those three) and item 7 had 3 individuals whose values from pre- to post did not change at all.

Figure 4. Histogram of difference between pre-post intervention scores.



The lack of a normal, bell shaped distribution is expected as the data are integers and the sample size is small, with only 6 surveyed individuals completing both the pre- and post-intervention surveys. Because of the non-normality and small sample size of

these data, a Wilcoxon signed rank test was used to compare the median score for pre- and post-intervention for each item of the survey. A significant p-value indicates an improvement in one's self evaluated efficacy from pre- to post survey. Table 4.1 describes the p-values for each item of the survey. Items 4 and 7 were significant at the .1 level.

Table 8. *p-values of individual survey questions (pre/post)*

Item	1	2	3	4	5	6	7
p-value	0.21186	0.1326	0.21186	0.08678	0.1326	0.39126	0.09072

Please refer to (Appendix A) for a full description of the content of the self-efficacy surveys. As demonstrated in Table 4.1, there was a statistically significant increase in participant self-efficacy related to items 4 and 7. The corresponding questions are as follows:

- *Question 4. Use objective measures to improve inhalation technique*
- *Question 7. Engage community-based healthcare workers to achieve better adherence and outcomes (e.g. school nurses, asthma educators, community health workers, and home visitors)*

The self-efficacy survey responses indicate that the 6 respondents in this cohort consistently reported that their self-efficacy increased in assisting patients and families with inhalation techniques. An overall increase was also indicated in engaging community healthcare providers to achieve better adherence improved after participating in Impact Asthma ECHO.

CME Survey Analysis

Appendix B provides a full description of the content of the CME surveys. Sessions 1 to 4 had 9, 10, 2, and 6 responses respectively. Upon examining all of the 13 questions across these 27 responses in the CME survey, it was found that only 13 out of 351 responses were of the "Neutral" category, and 0 were "Disagree" or "Strongly Disagree". Therefore, it was of interest to instead focus on factors contributing to respondents selecting "Strongly Agree" by pooling together the "Agree" (77 selections) and "Neutral" categories. Specifically, the attendees' attitudes towards the various Impact Asthma ECHO CME events was studied by question to see if differences could be found in the attitudes towards each of the 4 events. Below is a table indicating the percent of respondents who selected "Strongly Agree" for each question and event. It is interesting to note that questions 4, 7, 8, 10, and 11 all start and remain relatively high as the sessions progress from 1 to 4.

Table 9. *Percentage of "Strongly Agree" responses among sessions 1-4.*

	Session			
Question	1	2	3	4
1	44.44	70	0	66.67
2	33.33	70	0	66.67
3	33.33	70	50	83.33
4	88.89	80	100	100
5	55.56	70	100	83.33
6	66.67	70	100	100
7	88.89	80	100	100
8	88.89	80	100	100
9	66.67	70	50	66.67
10	77.78	80	100	100
11	77.78	80	100	100
12	66.67	70	100	100
13	66.67	70	50	83.33

These questions correspond to:

Question 4*: ECHO Pediatric Asthma is an effective way for me to learn.*

Question 5*: I am connected with peers in the ECHO Pediatric Asthma clinic whose opinion I respect for professional advice and consultation.*

Question 8*: I respect the knowledge of the specialists involved with ECHO Pediatric Asthma.*

Question 10*: The presenters were knowledgeable.*

Question 11*: The presenters allowed feedback and discussion during the session.*

It appears that these questions represent, in a sense, the attendees' attitudes towards other individuals in their cohort, as well as the instructors. Consequently, Cronbach's alpha, when these survey items are considered together, is 0.98 compared to .95 for the entire set of 13 items. This indicates almost perfect consistency with respect to the different items. For a statistical analysis of Likert scale response data, the typical approach would be to conduct an ordinal multinomial logistic regression using the different events as the independent variable. However, because of the low proportion of neutral responses, this proved not feasible. Therefore, a logistic regression analysis was also run to see if, for each survey item, the probability of respondents selecting "Strongly Agree" increased as the events progressed. Results (Table 4.3) indicated that these increases, while qualitatively visible in the above table, were not statistically significant.

Table 10. *p-values for "strongly agree" responses*

Question	P-value
1	0.674172
2	0.413171
3	0.095853
4	0.415321
5	0.207866
6	0.124232
7	0.415321
8	0.415321
9	0.903603
10	0.224375
11	0.224375
12	0.124232
13	0.580397

Community of Inquiry Coding Template Analysis

The Community of Inquiry coding template provided the basis for a modified coding framework that was used to conduct a content analysis of the recorded video sessions. Through this analysis, the researcher was able to produce a separate set of interpretive metadata parameters that corresponded with the cognitive, social, and teaching presences observed in each recording. As recordings were observed and coded using the researcher's modified coding template (refer to Table 3.4), the start and stop times of specific indicators within the recording were noted, giving an overall aggregate time of each corresponding category within the session.

Session 1:

Session 1 consisted of 4 instructors and 19 video participants. The total running time of the session was 1:27:30. It should be noted, however that the recording was compromised beginning at the 1:07:10 mark, leaving the final 20 minutes of the session

unable to be properly evaluated. Table 4.4 indicates the total time devoted to each specific CoI category within Session 1.

Table 11. *Time devoted to specific CoI category in Session 1.*

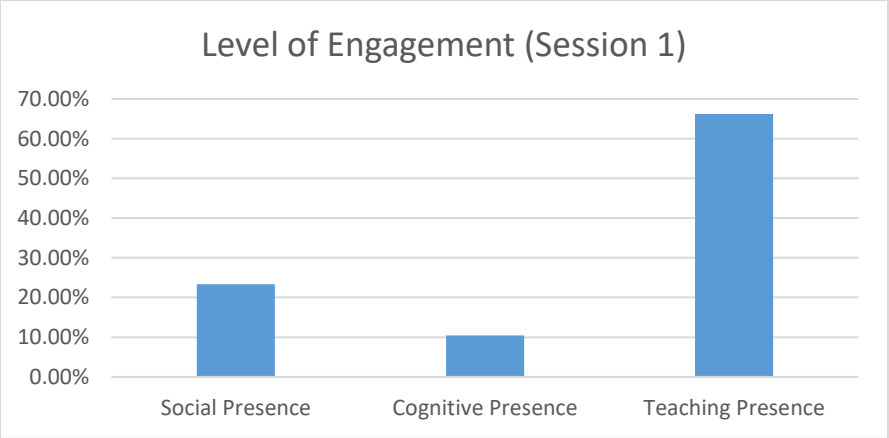
Category	Session 1: Total Time (Sec)	% of Total Engagement
Building Understanding	747	18.13%
Direct Instruction	553	13.42%
Emotional Expression	3	0.07%
Integration	251	6.09%
Open Communication	4	0.10%
Resolution	145	3.52%
Group Cohesion	955	23.18%
Exploration	35	0.85%
Instructional Management	1427	34.64%

As indicated in the above table, 34.64% of the time dedicated to Session 1 consisted of indicators that fell under the category of Instructional Management. This was primarily the result of facilitator-initiated clarifying questions (Appendix C). From an observational standpoint, the participants seemed to be reluctant to initiate questions or discussion. As a result, in attempt to facilitate a dialogue, the lead facilitator would ask leading questions such as:

- "What factors should we consider when assessing environmental risks for this kiddo?"
- "Who all needs to be involved in this child's care plan… school nurse, parents…?

Specific categories were then aggregated under the elements of social, cognitive, and teaching presence in order to indicate the percentage of time that Community of Inquiry coded values were engaged in by both the participants and instructors (Figure 4.2)

Figure 5. CoI level of engagement Session 1.



It should be noted that Teaching Presence, while decreasing slightly throughout the sessions, remained relatively high due to the fact that the indicator "Didactic Presentation" falls under this category. The didactic presentations are facilitator led and encompass roughly 20 minutes of each session. The fact that this activity occurs in each of the sessions automatically places less initial emphasis on social and teaching presences.

Session 2:

Session 2 consisted of 19 video participants and 4 instructors. The total running time of the recorded session was 1:18:01. It should be noted that the lead facilitator/ instructor presented the case for this session, as opposed to one of the participants. Table 4.5 indicates total time devoted to each specific category within Session 2.

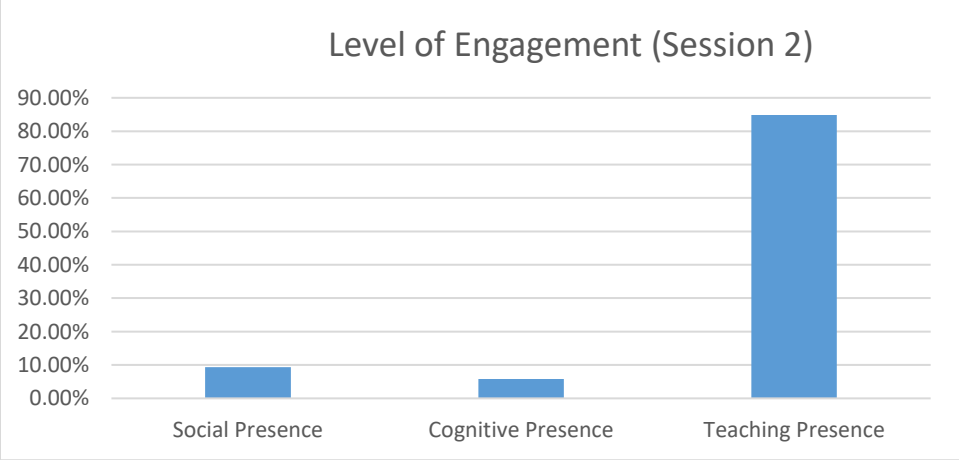
Table 12. *Time devoted to specific CoI category in Session 2.*

Category	Session 2: Total Time (Sec)	% of Total Engagement
Building Understanding	965	16.91%
Direct Instruction	500	8.76%
Emotional Expression	11	0.19%
Exploration	114	2.00%
Group Cohesion	522	9.15%
Instructional Management	3378	59.19%
Integration	96	1.68%
Resolution	119	2.09%
Triggering Event	2	0.04%

There were seven clarifying questions asked by the participants in this session, in comparison to the three questions asked in Session 1, resulting in an increase in the category of Exploration. Based on observation, it was interesting to note that while 2 separate participants (P2, P3) asked clarifying questions in Session 1, there were 4 different participants (P4, P9, P10, P7) that asked questions in Session 2.

Specific categories were then aggregated under the elements of social, cognitive, and teaching presence in order to indicate the percentage of time that Community of Inquiry coded values were engaged in by both the participants and instructors (Fig 4.3).

Figure 6. CoI level of engagement Session 2.



Session 3:

Session 3 consisted of 19 video participants and 4 instructors. The total running time of the session was 1:27:14, however, the recording was again compromised at the 54:40 mark, leaving the rest of the session unable to be evaluated. Table 4.6 indicates total time devoted to each specific category within Session 3.

Table 13. *Time devoted to specific CoI category in Session 3.*

Category	Session 3: Total Time (Sec)	% of total engagement
Exploration	259	4.75%
Group Cohesion	1535	28.16%
Instructional management	2624	48.14%
Integration	782	14.35%
Resolution	251	4.60%

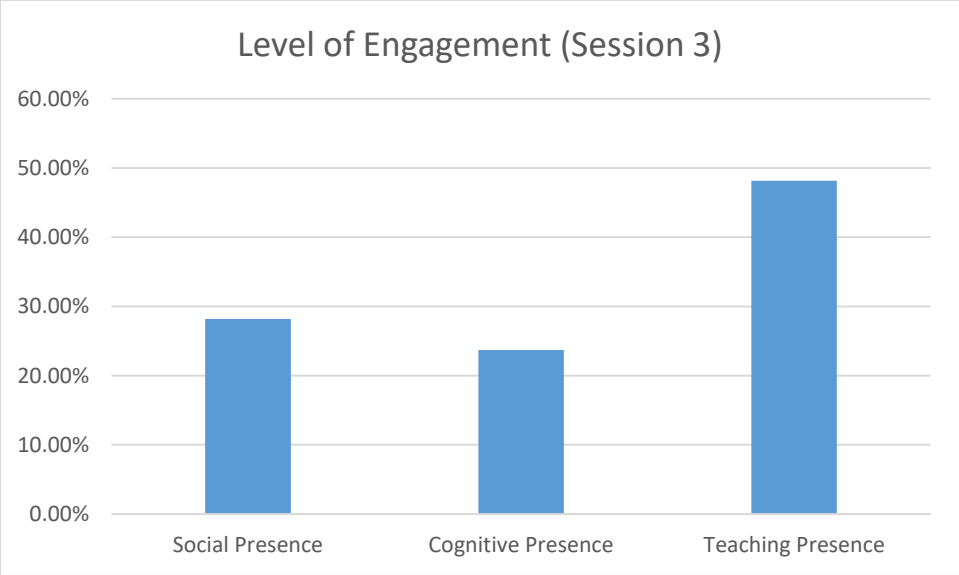
While the analysis of this session was skewed due to incomplete assessment of the recording due to technical difficulties, it should be noted that Exploration category during this session increased due to a higher number of participant-initiated clarifying questions. The increase in questions was a direct result of the topic covered in the didactic presentation, which was proper use and analysis of CyberAccess. CyberAccess is a tool provided by MO HealthNet (Medicaid) that allows prescribers to view prescription activities (refills, diagnosis data, frequency) of their patients enrolled in MO Medicaid (Mo Dept. of Social Services, 2007). The lead facilitator focused the didactic on navigation of the CyberAccess website, requesting provider login credentials, as well as viewing a patient medication profile. This exercise was of great interest to the providers, as many of them (indicate below) had never navigated the site on their own.

- "I usually have my nurse look this stuff up… the details are pretty eye opening."

- Will this show me if one of my patients is getting meds from another provider other than me?"

Specific categories were then aggregated under the elements of social, cognitive, and teaching presence in order to indicate the percentage of time that Community of Inquiry coded values were engaged in by both the participants and instructors (Figure 4.4).

Figure 7. CoI level of engagement Session 3.



Session 4:

Session 4 consisted of 19 video participants and 5 instructors. The total running time of the recording was 59:46. Approximately 30 minutes of the beginning of the recording were not captured due to operator error. The recording began mid-way through the first case presentation. Table 4.7 indicates total time devoted to each specific category within Session 4.

Table 14. *Time devoted to specific CoI category in Session 4.*

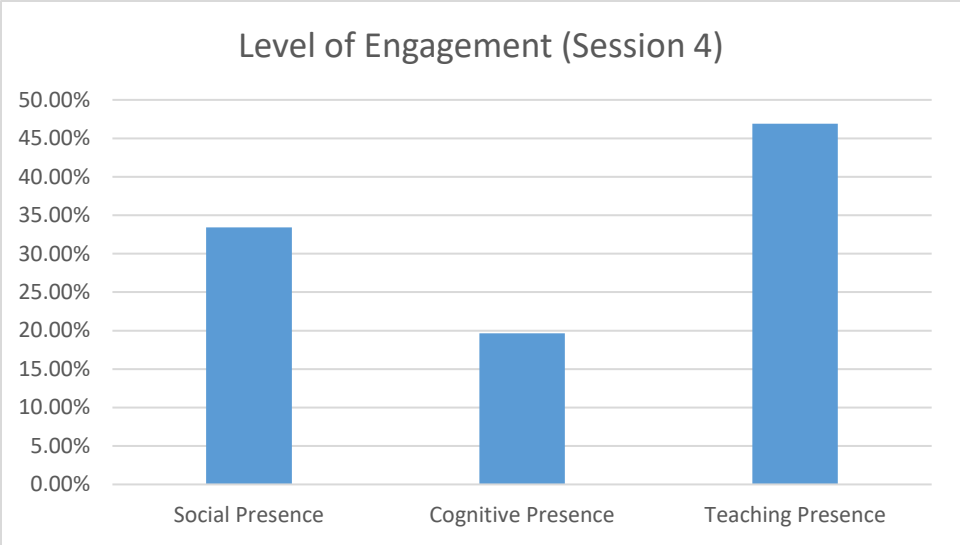
Category	Session 4: Total Time (Sec)	% of Total Engagement
Building Understanding	164	3.53%
Direct Instruction	138	2.97%
Emotional Expression	5	0.11%
Exploration	232	4.99%
Group Cohesion	1549	33.33%
Instructional management	1878	40.40%
Integration	317	6.82%
Resolution	365	7.85%

What was specifically interesting regarding the level of participant engagement in this session was the participant contribution to the category of Integration, via the indicator of "Answering Question." A discussion about patient inhalation technique began at the 8:15 mark and concluded at the 18:41 mark. Based on observation, it appeared that the participants had become much more comfortable opening up with each other regarding their personal, clinical experiences on this topic:

- P2 - *"I always tell my kids to blow out real hard like you're blowing out your birthday candles. Then, immediately after that big breath, take a puff on your inhaler."*
- P13 – "*A lot of times I have them show me exactly how they use their inhaler while they're at school. Not at home when they're with mom… at school."*

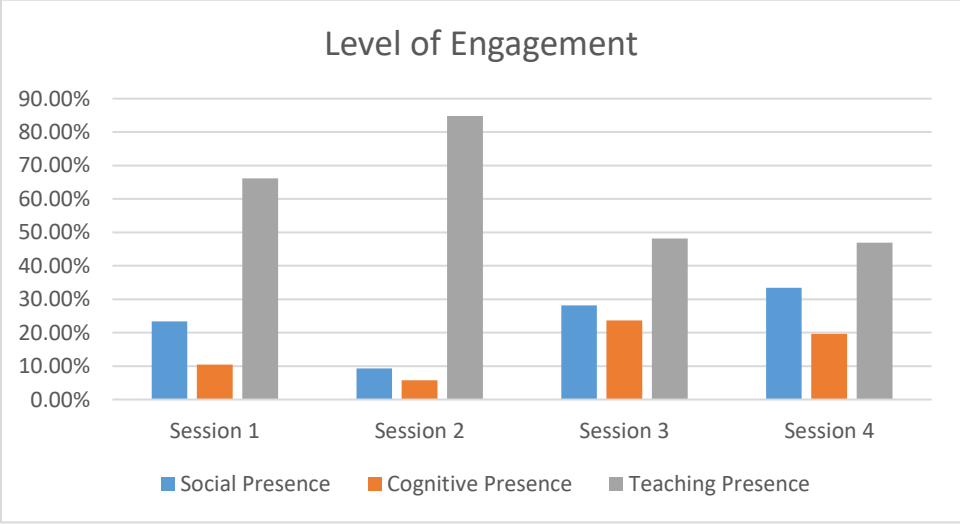
Specific categories were then aggregated under the elements of social, cognitive, and teaching presence in order to indicate the percentage of time that Community of Inquiry coded values were engaged in by both the participants and instructors (Figure 4.5).

Figure 8. CoI level of engagement Session 4.



In order to ascertain the level of engagement across the 4 sessions, and to detect changes in levels of the three Community of Inquiry presences, the categories were grouped and aggregated according to social, cognitive, and teaching presence. Figure 4.6 provides a visual for the changes in group engagement throughout the course of the October 2015 cohort.

Figure 9. October 2015 cohort engagement



Medicaid Claims Data Analysis

Various metrics meant to indicate the overall proficiency in managing asthma were compared for calendar year 2015 and 2016. According to NHLBI guidelines, if individuals are managing their asthma more productively, the number of hospitalizations and emergency department visits should decrease over time, while the number of prescription refills of inhaled corticosteroids and number of times visiting their primary care doctor should increase. Individual patients with either a primary or secondary diagnosis of asthma (n=126) were measured in both 2015 and 2016. Because of this large sample size, the potential non-normality of the data does not affect the analysis, and paired t-tests can be used to compare the 2015 and 2016 group means. The p-values for the tests of interest are displayed below. As indicated in Table 4.8, the number of ICS refills increased significantly (at the .1 level).

Table 15. Statistical Significance of key indicators in Medicaid claims data.

Item	Number of Hospitalizations	Number of ED Visits	Number of ICS refills	Number of primary car visits
p-value	0.9313	0.7371	0.0531	.1199

Triangulation of Data Sources

The different data sources collected through this research (self-efficacy survey, CME survey, CoI coding data, Medicaid claims data) each describe different aspects of the Impact Asthma ECHO. The subset of participants that responded to the self-efficacy survey provided insight into the self-efficacy levels of the participating providers

regarding asthma care. The CME survey provided weekly snapshots of participant perceptions of the learning activities associated with ECHO. Community of Inquiry coding data provided additional descriptions of group engagement, whether indicating social, cognitive, or teaching presences (or some combination of the three.) Lastly, the Medicaid claims data demonstrated health outcomes of the patient population managed by participants of the October 2015 cohort, potentially indicating an increase in guideline adherence. By combining findings from these various data collection instruments, a more robust and complete description of the cohort, and its perceived interactions and engagement is provided.

Summary of Key Themes

This chapter presents an analysis of data collected in this study. Multiple sources of evidence were used, including retrospective pre/post self-efficacy surveys, metadata gathered from CME surveys, content analysis of recorded sessions as indicated in the Community of Inquiry coding template, and clinic specific Medicaid claims data. The data analysis revealed the following key trends:

1) Of the participants that responded to the self-efficacy survey, there was a statistically significant increase in the providers self-efficacy level, post intervention, to use objective measures in their clinic to improve inhalation technique, as well as engaging community-based healthcare workers to achieve better adherence and outcomes.
2) The over-arching theme of the "agree/strongly agree" feedback received from the CME surveys was primarily focused on the participants' favorable perception of their fellow group members and instructors.

3) The Community of Inquiry coding template showed a shift in the group dynamic over the course of the sessions from that of primarily instructor-focused teaching presence, to an increase in overall group social and cognitive presence.
4) The Medicaid claims data demonstrated a statistically significant increase in inhaled corticosteroid refills from calendar years 2015 to 2016 by patients managed by the participants in the October 2015 Impact Asthma cohort.

Description of the findings that emerged from the analysis of the data, recommendations for future studies, limitations, and the significance of this research are discussed in Chapter 5.

Chapter 5: Discussion, Recommendations and Conclusions

Introduction

The purpose of this chapter is to provide a summary of key findings from this research, outline limitations of the study, make recommendations for reproducing this type of research, and to discuss how the research questions were addressed by the methodologies utilized in this study.

Key Findings

1) With regard to self-efficacy, the surveys indicated that the self-efficacy levels of the responding participants in the October 2015 cohort increased in the areas of counseling families on effective inhalation techniques of ICS, as well as engagement of community healthcare workers.
2) While there were no statistically significant indicators for overall change in educational perception or practice modifications, there was an observational view of the data that indicated positive views of group interaction and learning effectiveness.
3) Observational video data acquired through the modified Community of Inquiry coding template demonstrated an increase in group cognitive and social presences throughout the series.
4) Medicaid claims data indicated a statistically significant increase in refills of inhaled corticosteroids by patients managed by the providers in this cohort.

Self-efficacy

Along with the didactic content presented by the instructors, inquisitive dialogue in the group setting appeared to be a key factor of group learning within the context of these sessions. With regard to the participants' increase in self-efficacy around inhalation technique, it was noted by the researcher during the viewing of sessions 2, 3, and 4 that this was a topic of great interest. Examples of the indicators of "Clarifying Question" were inquiries such as "How do I know if the kid is inhaling the right dosage of his med," and "How is the best way to coach mom to make sure they are using the puffer correctly?" This finding is consistent with Prince et al. (2004) assessment that learner engagement and debate can motivate students to acquire more knowledge and enhance their skills.

It was also noted that the indicator of "Answering Question" was not only addressed by the instructors, but by other participants who shared their own experiences and solutions with regard to inhalation technique. While this subject was touched upon during the didactic presentation of the second session "Applying Best Practices," it is the opinion of the researcher, which is supported by Bandura (1977), that the personal experiences shared by the group most likely led to increased self-efficacy in those that responded to the survey. In further support of this assumption, during Session 2, Participant 9 noted that she felt "more appropriately confident" counseling inhalation technique. This statement was noted at the 30:25 mark during an exchange with the lead facilitator.

The other indicator that noted an increase in perceived self-efficacy was that of self-efficacy in engaging preventative asthma services. This specific topic was the

primary focus of the final didactic presentation of the series. Being that this discussion was the most recent instruction in asthma care that the participants received prior to taking the survey, it could be assumed that their perceived self-efficacy level for this indicator would increase due to the freshness of the material.

CME Survey

Of the data sources collected in this study, the CME surveys proved to be the most challenging to aggregate into a meaningful analysis. The idea of analyzing these surveys was to capture the individual participants' overall perception of the quality of each session immediately following its completion. In examining the Likert scale analysis, it became evident that there were relatively few responses in the "Strongly Disagree/Disagree" or "Neutral" categories. It was then determined by the researcher to see what specific questions with "Agree or Strongly Agree" responses remained relatively high throughout the 4 sessions. It was interesting to note that these responses specifically referred to the knowledge-base and interactions among the participants and instructors, with strong participant agreement in the following statements:

- "I am connected with peers in the ECHO Pediatric Asthma clinic whose opinion I respect for professional advice and consultation."
- "I respect the knowledge of the specialists involved with ECHO Pediatric Asthma."

Through engagement in purposeful and critical discourse, with both their peers and instructors, the participants seem likely to develop a mutual understanding of the concepts presented throughout the course of the series.

Community of Inquiry Coding Template

In order to assess the level of engagement of the participants in the October 2015 cohort, Garrison's (2000) Community of Inquiry coding template was utilized to establish specific indicators and categories of participation. Of the specific data sources collected within this study, the CoI template yielded the most substantial information with regard to group activity. While the self-efficacy and CME surveys compiled participant data at the individual level, the CoI analysis specifically looks at the Social, Cognitive and Teaching presences of the cohort at the group level. Through the analysis of each of the recorded Impact Asthma ECHO sessions of the October 2015 cohort, the researcher was able to assess a number of themes with regard to group engagement.

The CoI element of Teaching Presence remained relatively high throughout the 4-week session. This phenomenon is most likely the result of two separate factors. 1) The didactic presentation given by the instructor is factored into the associated category of "Instructional Management," which falls under Teaching Presence (see Table 3.4). These presentations generally take 15-20 minutes, which is not an insignificant amount of time in a 90 minute session. 2) As is the case with many social settings or group interactions, the unfamiliarity of the environment led to a relatively significant amount of instructor-guided questions "Clarifying Question (Leading)" in the earlier sessions.

Dialogue centered around topics of mutual interest yielded the highest concentration of Cognitive Presence. The didactic presentations in Sessions 3 and 4, which dealt with CyberAccess utilization and inhalation technique respectively, yielded the most participant interaction with both their peers and the facilitators. There was a robust discussion regarding ICS inhalation methods during Session 4 that lasted for

approximately 11 minutes (see Appendix C). What was particularly significant about this discussion was that most of Integration or "Answering Questions," came from participating providers, rather than the instructors. From the self-efficacy surveys, it was observed that this particular data point (ICS inhalation methods) noted a statistically significant increase in provider self-efficacy, post intervention.

With regard to group engagement over the course of the four sessions, the percentage of time devoted to Teaching Presence decreased while both Social and Cognitive Presences increased. The CoI indicator of "clarifying question" was noted in 10 separate instances during Sessions 1 and 2, while the same indicator was noted 24 times during Sessions 3 and 4. Researcher observation of the recordings noted that as participants became more familiar with the ECHO model of learning, as well as becoming more familiar with their peers and instructors, they were much more open to asking questions and establishing a working dialogue around the topics of the day. This assessment is in line with Shea (2009) who posits that "the extent to which students believe that they achieve significant learning and the effort that they expend depends greatly on their sense of self-efficacy" (p. 1727).

Another significant finding was the increase in Social Presence from Sessions 1 and 2 to Sessions 3 and 4. The category of "Group Cohesion" was indicated by the case presentation given by the participants. The case presentations in Sessions 1 and 2 lasted for 6:40 and 7:31 respectively, while the case presentations in Sessions 3 and 4 lasted for 14:21 and 25:49 respectively. The increase in the amount of time for these sessions was the result of the increased amount of "clarifying questions" asked by the other participants during the presentation. The increase in both Social and Cognitive Presences

over the course of the sessions are an important concept to note. As Picciano (2005) points out, Social and Cognitive presences become more important to the learning process as focus shifts from basic knowledge acquisition to interactive peer collaboration.

Medicaid Claims Data

Of the four indicators of interest in the Medicaid claims data (hospitalizations, ED visits, outpatient visits, and ICS prescription refill), the only indicator that demonstrated a significant positive change between calendar years 2015 and 2016 was the number of ICS refills. It is interesting to note that feedback received from the self-efficacy survey indicated a significant increase in provider self-efficacy in counseling family members on inhalation technique. Cabana (1999) noted that increased provider self-efficacy, due to better confidence in their abilities, can lead to better guideline adherence. The CoI analysis also saw the most cognitive presence focused around a discussion on patient medication inhalation.

The increase in ICS refills indicator is of note when considering provider guideline adherence. When managing patients with uncontrolled asthma, EPR-3 guideline #5 recommends provider "assessment of medication inhalation technique" (NHLBI, 2007). As both providers and families become more aware of the amount of medicine a child is, or is not receiving in a single inhalation, it could stand to reason that more medication might be needed to supplement the appropriate dosage. By making these observations, the researcher is not implying causation of this phenomenon. However, provider self-efficacy, aided by the learning opportunities afforded in Impact Asthma ECHO, could potentially be a factor leading to this observation.

Limitations of the study

There were several key limitations resulting from the design and application of this research. These limitations included low response rate to distributed surveys, small sample size of participants, technical issues with recorded ECHO sessions, access to Medicaid claims data. All of these factors make it a challenge to extrapolate the findings of this study to other contexts, and result in the data being used primarily to support the description of the activity carried out by the cohort in this research project.

Low Response Rate/Sample Size

The October 2015 Impact Asthma cohort had 19 total participants, and of those, 6 responded to the self-efficacy survey, resulting in a 30% response rate. Participant responses to the CME surveys each of the four weeks was 9, 12, 2, and 6 respectively. Again, these are common response rates for distributed surveys, but the small cohort size resulted in a sample size that is likely too small to provide sufficient data to meaningfully describe the study group.

Historically, with regard to survey response rate, physicians are generally among the lowest of all professional groups (Cunningham, 2015). Physicians often note that too many survey requests and growing time constraints contribute to non-response (Nakash, 2006). Also, the sensitive nature of the research topic (self-efficacy) very likely contributed to a lower response rate as well. Previous research has shown that survey topics which are sensitive in nature, and concern responder attitude are likely to affect response rates (Fan, 2009; Edwards, 2002).

Regarding the self-efficacy surveys, the small sample size could potentially be mitigated by submitting surveys to each of the six, 4-week Impact Asthma ECHO cohorts that take place throughout the calendar year. For the purpose of this particular study, however, it was necessary to only survey the October 2015 cohort as this was the only group that would coincide with the availability of Medicaid claims data for subsequent comparison. Another limitation to consider is the length of elapsed time between the conclusion of the October 2015 cohort and the distribution of the retrospective pre-post survey. The surveys were distributed approximately 18 months after the series completion. While the retrospective nature of this methodology has been noted for its effectiveness in research (Davis, 2003), the extended amount of time post-intervention could be a limitation with regard to participant recollection.

CME surveys are only available online for a week prior to the corresponding session. In order to increase participation in this activity it should be considered to leave these surveys open throughout the course of the 4-week activity, as well as two weeks after.

Technical Issues

After obtaining permission from MTN to view the recorded sessions of the October 2015 cohort, it was discovered by the researcher that specific portions of 3 of the 4 recordings had been compromised due to either technical issues, or failure of MTN staff to start the recording at the appropriate time.

- Session 1: Audio/visual was compromised at the 1:07:30 mark of the recording. Final 20 minutes were unable to be viewed by researcher.

- Session 2: MTN Staff did not begin recording until after initial introductions of participants. Approximately 9 minutes were unable to be viewed.
- Session 3: Audio/visual was compromised at the 54:40 mark of the recording.

Due to the disturbances in the integrity of the recordings, it can be assumed that the researcher was unable to capture all of the pertinent CoI indicators of social, cognitive, and teaching presences of the group. The analysis and findings presented within this study are the aggregation of the observed times of group engagement in the specific CoI categories outlined in Table 3.4.

Access to Medicaid Claims Data

In order to evaluate specific measures of participating provider guideline adherence, it was imperative that the researcher have access to claims information on which to assess changes in manifested health outcomes over time. Medicaid claims data is obtained through the Office of Social and Economic Data Analysis (OSEDA), housed within the College of Agriculture, Food and Natural Resources at the University of Missouri-Columbia. Obtaining this data is a very expensive and time intensive process, with multiple stipulations for both data request and data analysis.

Ideally, for the purposes of this study, it would have been beneficial to view provider specific data regarding asthma care (total number of visits, prescriptions, follow ups, etc.). At the time of data collection for this study, however, clinic level data was the only option for analysis of the specific measures of interest. Also, data for calendar year for 2017 was not yet available for analysis. This led to the decision to evaluate the October 2015 cohort, which had baseline data pre-intervention for 2015, and data for calendar year 2016, following their participation in the ECHO session.

It should be noted that there are a number of variables that can contribute to changes in health outcomes. Specifically, in pediatric asthma patients, factors such as socio-economic status, environmental factors, and adverse medication issues can contribute to changes in ones' overall health pattern (Cabana, 1999). It is the opinion of the researcher that the educational tools obtained by providers during Impact Asthma ECHO can also be a contributing factor in this phenomenon.

Implication of Findings

The findings of the current study may have some implications for practice. Kaufman (1998) points out that in order to promote provider behavior change and influence patient outcomes, CME practices should be implemented that provide participant interaction. The results of this study demonstrate that participant engagement with their peers, especially on specific clinical topics of interest, can have an impact on practice implications. The collaborative learning efforts associated with programs like Project ECHO offer providers the ability to measure their clinical knowledge against that of their peers. The goal of this learning methodology is to increase the practice of evidence-based medicine and reduce the variability of treatment across patient populations.

As previously stated, through observation of the group interaction during the sessions it was evident that the most significant participant engagement occurred during discussions that they deemed were clinically relevant to their individual practices. As noted by Pearce (2005), students learn more effectively when they are engaged in active learning, rather than when they are recipients of passive information. Regarding instructional design of future ECHO programs, the researcher would submit that the

sessions be much more participant driven, with limited engagement by the facilitator. Instead of the facilitator presenting the didactic presentations for each session, a group of participants could be given a topic to research collaboratively and present to the rest of the cohort. This method would allow for better exchanging of clinical ideas and experiences in a more structured Problem-based Learning environment (Shannon, 2016; Meins, 2015).

The most significant implication that the present study contributes to the literature is the use of Garrison's (2000) Community of Inquiry coding template for the evaluation of web-based videoconferencing educational sessions. Previously, the CoI template has been primarily utilized for transcript analysis of online discussion boards to better guide the use of technology driven learning goals (Anderson, 2001). The modified template put forth in this study can not only aide researchers in future evaluation of similar projects, but it can also assist facilitators in quality improvement initiatives in instructional delivery and design. By reviewing recorded sessions with the aid of the modified template, facilitators can potentially pinpoint specific instances in their sessions that elicit the strongest examples of social, cognitive, and teaching presences, and can then modify their delivery methods accordingly.

Recommendations

Through the planning and implementation of this research, as well as the analysis of the data, several recommendations for reproducing and improving the research design were identified, as well as areas for future research.

1) In order to gain a broader understanding of provider self-efficacy as a result of participation in Project ECHO, it would be beneficial to survey learners

participating in other sessions that focus on separate disease states (Dermatology, Hepatitis C, Autism). Conduct traditional pre- surveys before attendance, and a post survey upon completion to compare with findings from this study. This tactic would most likely increase sample size and produce more meaningful study data.

2) Utilize qualitative research methods (participant interviews) to better gauge insight into learner perception of the program, and assessment of their self-efficacy level in managing their specific patient population. Replace CME surveys with qualitative data for a more robust description of the intervention.
3) For better assessment of guideline adherence, work with OSEDA to obtain provider-specific claims data. This data can be compared with overall clinic panels to assess best practice care.

Areas for future research

Through an investigation of the literature, it became evident that the primary use for the Community of Inquiry coding template has been primarily used for establishing levels of social, cognitive, and teaching presences within discussion forums in online learning communities (Garrison, 2000; Gorsky, 2010). The researcher was unable to find any instances where this particular tool had been utilized to assess engagement levels of learners participating in synchronous, online videoconferencing. The template utilized by the researcher in this study was created in order to describe multiple CoI indicators that associated with specific presences within the group. It would be beneficial to attempt to use this newly established tool in future videoconference-based learning sessions. The

indicators established by the researcher are subjective in nature. Thus, future studies to validate the quality and fidelity of the tool for this specific purpose need to be examined.

While the utilization of the CoI coding template in this study primarily focused on total time of participant engagement, it would be interesting to leverage the information obtained in this project to assess the overall quality of learner engagement and cognitive presence in future studies. By assessing the quality of participant questions, rather than aggregating the time devoted to a specific indicator, researchers could better evaluate the participants' ability to construct meaning from their interactions within the group. Assessment of the quality of cognitive presence among future participants could provide further insight into the relationship between active learning and guideline adherence.

Conclusion

The purpose of this study was to examine the influence on provider self-efficacy and guideline adherence as a result of participation in Impact Asthma ECHO, and to apply the Community of Inquiry framework to document and describe levels of participant engagement within the October 2015 Impact Asthma cohort. The main focus of this study was to utilize the collected data to establish an assessment of the effectiveness of Impact Asthma ECHO as a synchronous, online learning environment.

Regarding the research questions of this study, the data collected from the self-efficacy surveys, while from a limited sample size, indicated a statistically significant increase in a specific measure of interest (inhalation technique) relative to pediatric asthma care. The literature suggests that as individuals become more confident in their abilities, they are more likely to engage in new or challenging endeavors (Williams, 2010; Bandura, 1986). The Community of Inquiry coding template demonstrated that

participant engagement in both elements of social and cognitive presence increased throughout the four weeks of the cohort, and the CME surveys indicated positive interactions with both instructors and peers. Additionally, the Medicaid claims data indicated a significant increase in the number of ICS refills by patients managed by participants in the October 2015 cohort, which can be an indicator of better adherence to NHLBI guidelines associated with "assessment of medication inhalation technique."

Several questions remain that may be addressed in future research of this kind. With a more robust number of participants, across multiple disease-state specific ECHO sessions, a better perception of the effect on provider self-efficacy may be described. In future studies of the effectiveness of Project ECHO, participating providers should be followed longitudinally to assess self-efficacy levels, knowledge base, and implementation of best practice care. Utilizing the Community of Inquiry framework and taking a broader look at these measures over an extended amount of time would help to build on the concepts established in this research study.

The findings in this study, while limited in scope to a small cohort of participants in Impact Asthma ECHO, suggest a benefit to the participants in terms of self-efficacy, social and cognitive awareness, and practice change. Future research is needed to qualify the results and establish future protocols for additional ECHO projects.

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Appendix A: Self-Efficacy Survey

Peds Asthma - Self Efficacy Pre and Post Survey

Please complete the survey below.

Thank you!

On a scale of 1-7 (described below) please rate your skills, knowledge or competence to address the following topics related to self efficacy before you participated in the Show-me Asthma ECHO, and currently

1 = none or no skill
2 = vague knowledge, skills or competence
3 = slight knowledge, skills or competence
4 = average among my peers
5 = competent
6 = very competent
7 = expert, teach others

Pre Survey

I rate my ability to:

1)	Diagnose asthma by severity	○1 ○2 ○3 ○4 ○5 ○6 ○7
2)	Use objective measures of airflow to assess lung function impairment, responses to treatment and level of control	○1 ○2 ○3 ○4 ○5 ○6 ○7
3)	Use standardized asthma impairment and symptom scores to assess asthma control	○1 ○2 ○3 ○4 ○5 ○6 ○7
4)	Use objective measures to assess and improve inhalation technique	○1 ○2 ○3 ○4 ○5 ○6 ○7
5)	Assess and intervene to reduce environmental triggers	○1 ○2 ○3 ○4 ○5 ○6 ○7
6)	Assess and intervene to reduce asthma burden in my population of patients	○1 ○2 ○3 ○4 ○5 ○6 ○7

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7)	Engage community-based health care workers to achieve better adherence and outcomes (eg. school nurses, asthma educators, community health workers and home visitors)	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7

Post Survey

I rate my ability to:

8)	Diagnose asthma by severity	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
9)	Use objective measures of airflow to assess lung function impairment, response to treatment and level of control	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
10)	Use standardized asthma impairment and symptom scores to assess asthma control	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
11)	Use objective measures to assess and improve inhalation technique	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
12)	Assess and intervene to reduce environment triggers	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
13)	Assess and intervene to reduce asthma burden in mu population of patients	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7
14)	Engage community-based health care workers to achieve better adherence and outcomes (eg. school nurses, asthma educators, community health workers and home visitors)	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7

Appendix B: CME Survey

ECHO Pediatric Asthma CME Evaluation

Please rate the extent to which the following objectives were met by choosing:
Strongly Agree, Agree, Neutral, Disagree or Strongly Disagree

- Participants will have increased self-efficacy in identifying asthma symptoms in children.
- Participants will have increased self-efficacy in assessing and treating common medical comorbidities in children with asthma.

Please rate the extent to which you agree with the following by choosing:
Strongly Agree, Agee, Neutral, Disagree or Strongly Disagree

- I learned new information during this ECHO Pediatric Asthma.
- ECHO Pediatric Asthma is an effective way for me to learn.
- After attending the ECHO Pediatric Asthma Clinic I am better able to care for patients in my practice with asthma.
- Through ECHO Pediatric Asthma I am learning best-practice care in asthma.
- I am connected with peers in the ECHO Pediatric Asthma clinic whose opinion I respect for professional advice and consultation.
- I respect the knowledge of the specialists involved with ECHO Pediatric Asthma.

Please rate the extent to which you agree with the following by choosing:
Strongly Agree, Agree, Neutral, Disagree or Strongly Disagree

- The technology was effective in viewing this activity.
- The presenters were knowledgeable.
- The presenters allowed feedback and discussion during the session.
- This information is likely to have an impact on my practice.
- Conflict of activity Disclosure was made prior to start of activity.

Appendix C: Community of Inquiry Video Analysis Coding Book

Session 1

Time Start	Time End	Category	Indicators	Example
00:00	9:15	Group Cohesion	Introductions/Identification	Identification of each of the facilitators and participants.
9:15	10:35	Instructional management	Defining and initiating discussion topics	I1 provides overview of topics of the day and, outlines protocol and identifies case presenter.
10:37	10:54	Instructional management	Technical Instructions (A/V)	I2 "Please turn down your volume, there is an echo."
11:10	14:31	Group Cohesion	Case Presentation	P1 presents de-identified case.
11:23	11:27	Open Communication	Confirmation of voice clarity	P1 "Am I loud enough?"
13:52	13:55	Triggering Event	Sense of Puzzlement (Number of providers/humorous)	P1, I1, I2 "Number of asthma prescribers was 13."
13:52	13:55	Emotional Expression	Humor (laughing)	Group "Laughing at number of prescribers."
14:32	17:29	Building Understanding	Case Summary	I1 summarizes details of the case.
17:54	17:58	Building Understanding	Clarifying Question (Leading)	I3 "What factors should we consider when thinking about the child's medication reconciliation list?"
17:58	18:09	Integration	Answering question (Confirmation)	P1 "I don't have that information in the note."
18:19	18:38	Exploration	Clarifying Question	P2 "Has mom identified a PCP, or does she only go to the ER?"

Time Start	Time End	Category	Indicators	Example
18:40	18:55	Integration	Answering Question (Confirmation)	P1 “She doesn’t make scheduled appointments.”
19:00	19:12	Exploration	Clarifying Question	P3 “Is there any info on the environmental setting?”
19:13	19:32	Integration	Answering Question (Confirmation)	P1 “Environmentally, they deny any smoking in the home.”
19:32	19:42	Building Understanding	Clarifying Question (leading)	I3 “Who all needs to be involved in care plan?”
19:43	19:55	Integration	Answering Question (confirmation)	P1 “School nurse.”
20:00	20:04	Exploration	Clarifying Question	P3 “have you done any education with them about device technique?”
20:04	20:10	Integration	Answering Question (Confirmation)	P1 “Not really. They really don’t stick around for training.”
20:43	21:00	Building Understanding	Clarifying Question (leading)	I4 “Is she missing a lot of school?”
21:02	21:11	Integration	Answering Question	P1 “I don’t have access to that information.”
21:34	21:49	Building Understanding	Clarifying Question (leading)	P3 “has it been addressed as t who is using the albuterol?”
21:55	22:20	Integration	Answering Question	P1 “It’s really hard to get anything out of mom.”

Time Start	Time End	Category	Indicators	Example
22:26	22:57	Direct Instruction	Focusing Discussion (Specific points of pres)	I1 “Why don’t we talk a minute and talk about missing data. In the real world it’s hard to get all info on what is driving the asthma.”
23:02	25:37	Integration	Connecting ideas	I3, P3, P4, P5, P1, P6, “Takeaways from case.”
25:33	25:50	Direct Instruction	Focusing Discussion	I1 “Ok, let’s put our heads together and come up with a treatment approach.”
25:58	26:27	Resolution	Recommendations	P3 “It would be beneficial to involve the school nurse.”
26:27	27:19	Resolution	Recommendations	P5 “It’s a red flag that she has both Flovent and Advair.”
27:18	27:37	Integration	Answering Question (Confirmation)	P1 “The med list only has Flovent. The girls found Advair on Cyber-access.”
28:04	28:38	Resolution	Recommendations	P2 “A lot of pharmacies have people on automatic refill and any prescription with an automatic refill, they will dispense.”
28:59	37:24	Direct Instruction	Final Recommendation	I1, I4, I3 summarize recommendations

Time Start	Time End	Category	Indicators	Example
31:05	31:35	Resolution	Recommendations	P6 "level of impairment when she's using the meds would be helpful."
37:47	59:18	Instructional management	Didactic Presentation	I1 gives didactic presentation.
59:50	1:03:00	Building Understanding	Clinical Examples (Didactic Anecdotal supplementation)	I4 "Recommendations for similar patients."
1:03:18	1:06:27	Group Cohesion	Case Presentation	P1 presents case
1:06:28		Building Understanding	Case Summary	I3

Session 1 Summary

- Total running time of recording is 1:27:30. However, recording compromised and stops at 1:07:10. Final 20 minutes not viewable.
- 4 Instructors
- 19 video participants

Session 2

Time Start	Time End	Category	Indicators	Participant ID
00:00	2:57	Building Understanding	Clinical Examples (Anecdotal supplementation)	I1 "I did have a lesson learned a few years ago. We taught a group of mental health professionals to use inhalation equipment."
2:58	4:20	Group Cohesion	Introductions/Identification	ID of each of participants and facilitators.
4:20	4:33	Instructional Management	Defining and initiating discussion topics	I2 "We will discuss one of the common comorbid conditions."

Time Start	Time End	Category	Indicators	Participant ID
5:00	11:40	Group Cohesion	Case Presentation	I2 presents case.
4:51	5:00	Emotional Expression	Head Nodding (Acknowledgment	P3, P8 nod in acknowledgment of statement.
11:55	12:06	Building Understanding	Clarifying Question (Leading)	I3 “As we think about contributing factors, what questions do you have?”
12:08	12:49	Building Understanding	Answering Question (Confirmation)	I2 “She had allergy scratch testing in August.”
12:54	13:07	Exploration	Clarifying Question	P4 “Why was she categorized as not well controlled?”
13:08	14:45	Building Understanding	Answering Question (Confirmation)	I2 “References quick reference guide for answer.”
15:29	17:30	Resolution	Recommendation	P7 “To me this is interesting, nasal spray technique.”
17:39	17:56	Exploration	Clarifying Question	P9 “Was she given a sinus rinse packet?
17:57	18:29	Building Understanding	Answering Question (Confirmation)	I2 “Not at the initial visit, but eventually.”
18:30	18:32	Triggering Event	Requests clarification on terminology	P4 “What is cobble stoning?”
18:32	18:55	Building Understanding	Answering Question (Confirmation)	I2 “Bumps on the back of the throat.”
18:59	20:44	Building Understanding	Clinical Examples (Anecdotal Supplementation)	I4 “It’s small swollen nodes that plump up.”

Time Start	Time End	Category	Indicators	Participant ID
20:50	21:25	Exploration	Clarifying Question	P2 “What is the significance of her PICU admission?”
21:27	22:08	Building Understanding	Answering Question (Confirmation)	I2 “We have to look at risk for exacerbation.”
23:26	23:30	Exploration	Clarifying Question	P3 “How did you feel about compliance.”
23:30	24:30	Building Understanding	Answering Question (Confirmation)	I2 “Hard to access Cyberaccess because she has commercial insurance.”
24:35	25:06	Integration	Connecting Ideas (Clinical Example)	P3 “Parents need to be there to coach the child of inhalation technique.”
25:09	25:14	Exploration	Clarifying Question	P10 “How do we coach parents?”
25:15	26:29	Building Understanding	Answering Question	I2 “Big breath in… now blow out, birthday candles.”
26:30	26:56	Building Understanding	Answering Question	I3 “There is a handout with the mask that provides instructions.”
26:56	29:28	Building Understanding	Answering Question	I1 “We underestimate the importance of blowing out all the old air first.”
29:30	30:12	Direct Instruction	Final Recommendation	I2 “We need to give her a peak flow meter examination.”

Time Start	Time End	Category	Indicators	Participant ID
30:12	30:24	Exploration	Clarifying Question	I1 “Was there any evidence from the first visit where adding (sp) might be appropriate?”
30:25	30:50	Integration	Answering question	P9 “Yes, as none of the other attempts at ICS worked.”
32:15	32:35	Exploration	Clarifying Question	I2 “Was there anything that would make you consider GERD?”
32:35	33:15	Integration	Answering Question (Clarification)	P7 “Chronic cough alone, cobble stoning.”
33:25	41:03	Direct Instructions	Final Recommendation	I1, I2, I4 “Should consider chronic sinusitis.”
35:28	35:30	Emotional Expression	Nodding in agreement	P9, P3, P2, P10 Agreement with recommendation
41:10	41:35	Instructional management	Defining and initiating discussion topics	I2 “With the remainder of our time we’re going to discuss preventative services.”
41:40	1:15:40	Instructional management	Didactic Presentation	I2, I1, I4, P9 Group didactic presentation.
1:15:42	1:15;50	Exploration	Clarifying Question	P2 “Is there a feedback loop for school-based programs?”
1:15:55	1:18:01	Building Understanding	Answering Question	I1 “MPCA is providing a summary for care.”

Time Start	Time End	Category	Indicators	Participant ID
Session 2 Summary • Initial introductions not captured on video • I2 presented case rather than participant. Only 1 case presented • 19 video participants • 4 instructors				

Session 3

Time Start	Time End	Category	Indicators	Participant ID
00:00	5:35	Group Cohesion	Introduction/Identification	Participants/facilitators introduce themselves.
5:35	7:15	Instructional management	Defining and Initiating discussion topics	I1 "Theme today is taking a population level view of asthma."
7:15	49:19	Instructional management	Didactic Presentation	I1 presents didactic presentation.
16:35	16:40	Exploration	Clarifying Question	P10 "Can you export the data from cyberaccess."
16:40	17:10	Integration	Answering Question (Confirmation)	I1 "You can, you can print it."
17:11	17:22	Exploration	Clarifying Question	P10 "What's the criteria for getting on cyberaccess."
17:22	18:47	Integration	Answering Question (Confirmation)	I1 "You have to have a relationship that's defined as patient care."
18:50	19:03	Exploration	Clarifying Question	P12 "I was successful at gaining access."
19:03	20:00	Integration	Answering Question (Confirmation)	I1 "Panel reports will reveal concerning relationship about patient."
26:28	27:19	Exploration	Clarifying Question	P12 "Why did this patient never have an asthma diagnosis?"

Time Start	Time End	Category	Indicators	Participant ID
27:20	27:54	Integration	Answering Question (Confirmation)	I1 “Part of our worry is that the parents aren’t as concerned about their uncontrolled asthma.”
29:17	29:26	Exploration	Clarifying Question	P12 “If the patient is on our list, why could we not find them in cyberaccess?”
29:27	30:30	Integration	Answering Question (Confirmation)	I1 “You have to look by provider.”
30:30	31:42	Resolution	Recommendation	P14 “MoHealthNet changing the way they are collecting data.”
31:43	31:58	Exploration	Clarifying Question	P12 “How do we go about trying to reach the family?”
31:58	33:45	Integration	Answering Question (Confirmation	I1 “Honestly don’t have a good answer for you.”
33:45	34:01	Exploration	Clarifying Question (Leading)	I3 “Is that the number of inhalers filled or prescriptions?”
34:02	36:00	Integration	Answering Question	I1 “It’s SABA units.”
36:01	36:50	Exploration	Clarifying Question	P12 “How do we track down this child’s provider?”
36:50	39:04	Integration	Answering Question (Confirmation)	I1 “Obviously this child is seeing numerous providers.”
39:35	42:36	Resolution	Recommendation	P13 “Set up follow up phone call to find a provider…”
43:45	43:38	Exploration	Clarifying Question	P12 “What about Pulmicort?
43:38	44:59	Integration	Answering Question (confirmation)	I1 “It would be counted as a dispensed unit.”
45:00	45:00	Exploration	Clarifying Question	P12 “Why are ER visits not adding up?”
45:21	45:38	Integration	Answering Question (Confirmation)	I1 “I think we’re having a labeling problem on this spreadsheet?”

Time Start	Time End	Category	Indicators	Participant ID
45:39	45:47	Exploration	Clarifying Question	P14 “Do you have an explanation for patient 6’s ER visits?”
45:38	46:34	Integration	Answering Question	P13, P12 “That was the patient we looked up in cyberaccess. He had multiple providers listed”
50:22		Group Cohesion	Case Presentation	P13 presents case.
Session 3 Summary • Recording again compromised at 54:40 • Session lasted 1:27:14 • 19 video participants • 4 instructors				

Session 4

Time Start	Time End	Category	Indicator	Participant ID
00:00	25:49	Group Cohesion	Case Presentation	I1, P2 presents case.
1:55	2:38	Resolution	Recommendations	I3 “We need to determine his normal lung function.”
2:42	3:10	Resolution	Recommendations	P4 “Really good to monitor specific allergens.”
4:50	5:25	Resolution	Recommendations	P10 “I would recommend piggy backing his inhaler with other tasks.”
5:25	6:34	Resolution	Recommendations	I5 “I’m worried about outdoor problems and allergens to cats, dogs, turkeys.”

Time Start	Time End	Category	Indicator	Participant ID
6:58	7:00	Emotional Expression	Humor (laughing)	Group laughing at idea of allergens to turkeys.
8:15	8:20	Building Understanding	Clarifying Question (leading)	I5 “How to close to defoliants do they live.”
8:21	8:40	Integration	Answering Question (confirmation)	P2 “About a mile and a half to the east.”
8:41	10:15	Building Understanding	Clarifying Question (leading)	I5 “Are you going to have allergy testing done at some point?” Multiple questions
10:15	10:29	Integration	Answering Question	P2 “His high school is in the middle of town.”
10:31	10:45	Exploration	Clarifying Question	P7 “Does he smoke?”
10:45	11:11	Integration	Answering Question	P2 “He does not and says he never has.”
11:12	11:23	Exploration	Clarifying Question	P7 “Can you speak to COPD in kids?”
11:23	12:29	Integration	Answering Question (Confirmation)	I1 “This isn’t classic COPD as you would see in the adult smoker.”
12:30	13:14	Exploration	Clarifying Question	P13 “Is there a family history of asthma?”
13:15	13:52	Integration	Answering Question (Confirmation)	P2 “There is no family history of asthma?”
14:10	16:39	Exploration	Clarifying question	P15 “Was this child born premature?”

Time Start	Time End	Category	Indicator	Participant ID
16:40	17:27	Integration	Answering Question (confirmation)	P2 “He was not born premature, normal birth weight.”
17:28	18:29	Resolution	Recommendation	P15 “Need to get a peak flow measurement.”
18:29	18:41	Integration	Connecting Ideas	P15, I1, I4, P2 agree they would like to see follow up on this case.
18:44	19:10	Building Understanding	Clarifying Question (leading)	I2 “Do you have him on a call list?”
19:10	19:30	Integration	Answering Question (Confirmation)	P2 “His appointment is a week from today.”
19:36	20:09	Building Understanding	Clarifying Question (leading)	I1 “What should we do to reduce risk of exacerbation?”
20:11	20:40	Integration	Answering Question (Confirmation)	P2 “Six puffs of albuterol if he has a severe attack.”
20:40	20:46	Building Understanding	Clarifying Question (leading)	I1 “Where did six puffs come from?”
20:47	20:55	Integration	Answering Question (Confirmation)	P7 “That is the national guidelines for home use.”
20:56	23:14	Direct Instruction	Focusing Discussion	I1 Discussion about asthma plan for albuterol use for exacerbation.
23:14	23:23	Exploration	Clarifying Question	P10 “Why would he be on Claritin and singulair?”

Time Start	Time End	Category	Indicator	Participant ID
23:23	24:19	Integration	Answering Question (Confirmation)	I1, P2 "Desperation is the answer."
24:40	24:45	Exploration	Clarifying Question	P13 "Do we start singulair at night or morning?"
24:45	25:28	Integration	Answering Question (Confirmation)	I1 "For exertional asthma it should be given in the morning."
25:32	27:01	Resolution	Recommendations	I5 "We would like to come visit before he goes to the pulmonologist."
27:01	27:41	Resolution	Recommendation	I4 "Need to find out who his friends are."
28:32	59:46	Instructional Management	Didactic Presentation	I5, I2, I1 deliver didactic presentation.
32:24	32:27	Emotional Expression	Humor/laughing	P10, I5 laughing at idea of chicken for pet.

Session 4 Summary

- 19 video participants
- 5 instructors.

Appendix D: Aggregation of Community of Inquiry Categories

Session 1

Time Start	Time End	Total Time (sec)	Category	Indicators	Participant ID
14:32	17:29	177.00	Building Understanding	Case Summary	I1
17:54	17:58	0.17	Building Understanding	Clarifying Question (leading)	I3
19:32	19:42	10.00	Building Understanding	Clarifying Question (leading)	I3
20:43	21:00	17.00	Building Understanding	Clarifying Question (leading)	I4
21:34	21:49	15.00	Building Understanding	Clarifying Question (leading)	P3
59:50:00	1:03:00	190.00	Building Understanding	Clinical Examples (Didactic Anecdotal supplementation)	I4
1:06:28	1:27:30	334.00	Building Understanding	Case Summary	I3
Total		**743.17**			
22:26	22:57	31.00	Direct Instruction	Focusing Discussion (Highlights of Presentation)	I1
25:33:00	25:50:00	17.00	Direct Instruction	Focusing Discussion	I1
28:59:00	37:24:00	505.00	Direct Instruction	Final Recommendation	I1, I4, I3
Total		**553.00**			

Time Start	Time End	Total Time (sec)	Category	Indicators	Participant ID
13:52	13:55	3.00	Emotional Expression	Humor (laughing)	Group
Total		**3.00**			
18:19	18:38	19.00	Exploration	Clarifying Question	P2 (phone)
19:00	19:12	12.00	Exploration	Clarifying Question	P3
20:00	20:04	4.00	Exploration	Clarifying Question	P3
Total		**35.00**			
0:00	9:15	555.00	Group Cohesion	Introductions/Identification	All participants/ Instructors
1:03:18	1:06:27	189.00	Group Cohesion	Case Presentation	P1
11:10	14:31	211.00	Group Cohesion	Case Presentation	P1
Total		**955.00**			
9:15	10:35	85.00	Instructional management	Defining and initiating discussion topics	I1
10:37	10:54	17.00	Instructional management	Technical Instructions (A/V)	I2
37:47:00	59:18:00	1325.00	Instructional management	Didactic Presentation	I1
Total		**1427.00**			
17:58	18:09	11.00	Integration	Answering Question (Confirmation)	P1
18:40	18:55	15.00	Integration	Answering Question (Confirmation)	P1

Time Start	Time End	Total Time (sec)	Category	Indicators	Participant ID
19:13	19:32	19.00	Integration	Answering Question (Confirmation)	P1
19:43	19:55	12.00	Integration	Answering Question (confirmation)	P1
20:04	20:10	6.00	Integration	Answering Question (Confirmation)	P1
21:02	21:11	9.00	Integration	Answering Question	P1
21:55	22:20	5.00	Integration	Answering Question	P1
23:02	25:37:00	155.00	Integration	Connecting ideas	I3, P3, P4 (phone), P5, P1, P6,
27:18:00	27:37:00	19.00	Integration	Answering Question (Confirmation)	P1
Total		**251.00**			
11:23	11:27	4.00	Open Communication	Confirmation of voice clarity	P1
Total		**4.00**			
25:58:00	26:27:00	29.00	Resolution	Recommendations	P3
26:27:00	27:19:00	52.00	Resolution	Recommendations	P5
28:04:00	28:38:00	34.00	Resolution	Recommendations	P2 (phone)
31:05:00	31:35:00	30.00	Resolution	Recommendations	P6
Total		**145.00**			

Session 2

Time Start	Time End	Total Time (sec)	Category	Indicators	Participant ID
0:00	2:57	177.00	Building Understanding	Clinical Examples (Anecdotal supplementation)	I1
11:55	12:06	11.00	Building Understanding	Clarifying Question (Leading)	I3
12:08	12:49	41.00	Building Understanding	Answering Question (Confirmation)	I2
13:08	14:45	97.00	Building Understanding	Answering Question (Confirmation)	I2
17:57	18:29	32.00	Building Understanding	Answering Question (Confirmation)	I2
18:32	18:55	23.00	Building Understanding	Answering Question (Confirmation)	I2
18:59	20:44	105.00	Building Understanding	Clinical Examples (Anecdotal Supplementation)	I4
21:27	22:08	41.00	Building Understanding	Answering Question (Confirmation)	I2
23:30	24:30:00	60.00	Building Understanding	Answering Question (Confirmation)	I2
25:15:00	26:29:00	74.00	Building Understanding	Answering Question	I2

26:30:00	26:56:00	26.00	Building Understanding	Answering Question	I3
26:56:00	29:28:00	152.00	Building Understanding	Answering Question	I1
1:15:55	1:18:01	126.00	Building Understanding	Answering Question	I1
Total		**965.00**			
29:30:00	30:12:00	42.00	Direct Instruction	Final Recommendation	I2
33:25:00	41:03:00	458.00	Direct Instructions	Final Recommendation	I1, I2, I4
Total		**500.00**			
4:51	5:00	9.00	Emotional Expression	Head Nodding (Acknowledgment	P3, P8
35:28:00	35:30:00	2.00	Emotional Expression	Nodding in agreement	P9, P3, P2, P10
Total		**11.00**			
12:54	13:07	13.00	Exploration	Clarifying Question	P4
17:39	17:56	17.00	Exploration	Clarifying Question	P9
20:50	21:25	35.00	Exploration	Clarifying Question	P2 (now on video)
23:26	23:30	4.00	Exploration	Clarifying Question	P3
25:09:00	25:14:00	5.00	Exploration	Clarifying Question	P10
30:12:00	30:24:00	12.00	Exploration	Clarifying Question	I1
32:15:00	32:35:00	20.00	Exploration	Clarifying Question	I2
1:15:42	1:15:50	8.00	Exploration	Clarifying Question	P2(now on video)
Total		**114.00**			

2:58	4:20	122.00	Group Cohesion	Introductions/Identification	P3, P7(phone)
5:00	11:40	400.00	Group Cohesion	Case Presentation	I2
Total		**522.00**			
4:20	4:33	13.00	Instructional Management	Defining and initiating discussion topics	I2
41:10:00	41:35:00	25.00	Instructional management	Defining and initiating discussion topics	I2
41:40:00	1:15:40	3340.00	Instructional management	Didactic Presentation	I2, I1, I4, P9
Total		**3378.00**			
24:35:00	25:06:00	31.00	Integration	Connecting Ideas (Clinical Example)	P3
30:25:00	30:50:00	25.00	Integration	Answering question	P9
32:35:00	33:15:00	40.00	Integration	Answering Question (Clarification)	P7 (phone)
Total		**96.00**			
15:29	17:30	119.00	Resolution	Recommendation	P7
Total		**119.00**			
18:30	18:32	2.00	Triggering Event	Requests clarification on terminology	P5
Total		**2.00**			

Session 3					
Time Start	Time End	Total Time (Sec)	Category	Indicators	Participant ID
16:35	16:40	5.00	Exploration	Clarifying Question	P10
17:11	17:22	11.00	Exploration	Clarifying Question	P10
18:50	19:03	13.00	Exploration	Clarifying Question	P12
26:28:00	27:19:00	51.00	Exploration	Clarifying Question	P12
29:17:00	29:26:00	9.00	Exploration	Clarifying Question	P12
31:43:00	31:58:00	15.00	Exploration	Clarifying Question	P12
33:45:00	34:01:00	16.00	Exploration	Clarifying Question (Leading)	I3
36:01:00	36:50:00	49.00	Exploration	Clarifying Question	P12
42:36:00	43:38:00	62.00	Exploration	Clarifying Question	P12
45:00:00	45:20:00	20.00	Exploration	Clarifying Question	P12
45:39:00	45:47:00	8.00	Exploration	Clarifying Question	P14
Total		**259.00**			
0:00	5:35	335.00	Group Cohesion	Introduction/Identification	All participants/Instructors
50:22:00	1:12:00	1200.00	Group Cohesion	Case Presentation	P13
Total		**1535.00**			
5:35	7:15	100.00	Instructional management	Defining and Initiating discussion topics	I1

7:15	49:19:00	2524.00	Instructional management	Didactic Presentation	I1
Total		**2624.00**			
16:40	17:10	30.00	Integration	Answering Question (Confirmation)	I1
17:22	18:47	85.00	Integration	Answering Question (Confirmation)	I1
19:03	20:00	57.00	Integration	Answering Question (Confirmation)	I1
27:20:00	27:54:00	34.00	Integration	Answering Question (Confirmation)	I1
29:27:00	30:30:00	63.00	Integration	Answering Question (Confirmation)	I1
31:58:00	33:45:00	107.00	Integration	Answering Question (Confirmation	I1
34:02:00	36:00:00	118.00	Integration	Answering Question	I1
36:50:00	39:04:00	134.00	Integration	Answering Question (Confirmation)	I1
43:38:00	44:59:00	81.00	Integration	Answering Question (confirmation)	I1
45:21:00	45:38:00	17.00	Integration	Answering Question (Confirmation)	I1

45:38:00	46:34:00	56.00	Integration	Answering Question	P13, P12
Total		**782.00**			
30:30:00	31:42:00	72.00	Resolution	Recommendation	P14
39:35:00	42:36:00	179.00	Resolution	Recommendation	P13
Total		**251.00**			

Session 4					
Time Start	**Time End**	**Total Time (sec)**	**Category**	**Indicator**	**Participant ID**
8:15	8:20	5.00	Building Understanding	Clarifying Question (leading)	I5
8:41	10:15	94.00	Building Understanding	Clarifying Question (leading)	I5
18:44	19:10	26.00	Building Understanding	Clarifying Question (leading)	I2
19:36	20:09	33.00	Building Understanding	Clarifying Question (leading)	I1
20:40	20:46	6.00	Building Understanding	Clarifying Question (leading)	I1
Total		**164.00**			
20:56	23:14	138.00	Direct Instruction	Focusing Discussion	I1
Total		**138.00**			
6:58	7:00	2.00	Emotional Expression	Humor (laughing)	Group
32:24:00	32:27:00	3.00	Emotional Expression	Humor/laughing	P10, I5
Total		**5.00**			

10:31	10:45	14.00	Exploration	Clarifying Question	P7
11:12	11:23	11.00	Exploration	Clarifying Question	P7
12:30	13:14	44.00	Exploration	Clarifying Question	P13
14:10	16:39	149.00	Exploration	Clarifying question	P15 (phone)
23:14	23:23	9.00	Exploration	Clarifying Question	P10
24:40:00	24:45:00	5.00	Exploration	Clarifying Question	P13
Total		**232.00**			
0:00	25:49:00	1549.00	Group Cohesion	Case Presentation	I1, P2
Total		**1549.00**			
28:32:00	59:46:00	1878.00	Instructional Management	Didactic Presentation	I5, I2, I1
Total		**1878.00**			
8:21	8:40	19.00	Integration	Answering Question (confirmation)	P2
10:15	10:29	14.00	Integration	Answering Question	P2
10:45	11:11	26.00	Integration	Answering Question	P2
11:23	12:29	6.00	Integration	Answering Question (Confirmation)	I1
13:15	13:52	37.00	Integration	Answering Question (Confirmation)	P2
16:40	17:27	47.00	Integration	Answering Question (confirmation)	P2

18:29	18:41	12.00	Integration	Connecting Ideas	P15, I1, I4, P2
19:10	19:30	20.00	Integration	Answering Question (Confirmation)	P2
20:11	20:40	29.00	Integration	Answering Question (Confirmation)	P2
20:47	20:55	8.00	Integration	Answering Question (Confirmation)	P7
23:23	24:19:00	56.00	Integration	Answering Question (Confirmation)	I1, P2
24:45:00	25:28:00	43.00	Integration	Answering Question (Confirmation)	I1
Total		**317.00**			
1:55	2:38	43.00	Resolution	Recommendations	I3
2:42	3:10	28.00	Resolution	Recommendations	P4
4:50	5:25	35.00	Resolution	Recommendations	P10
5:25	6:34	69.00	Resolution	Recommendations	I5
17:28	18:29	61.00	Resolution	Recommendation	P15
25:32:00	27:01:00	89.00	Resolution	Recommendations	I5
27:01:00	27:41:00	40.00	Resolution	Recommendation	I4
Total		**365.00**			

Vita

Danny Myers currently holds two Masters Degrees from the University of Missouri-Columbia in Health Sciences (2004) and Health Administration (2006). He earned his Ph.D. in Information Science and Learning Technologies (2018) from the University of Missouri-Columbia, with research interests in the utilization of technology for the delivery of medical education.

Dr. Myers is currently the Research Strategist for the Tiger Institute for Health Innovation where his primary responsibility is fostering research efforts among clinical investigators affiliated with MU Health Care, the MU School of Medicine, and Cerner Corporation.