CLINICAL CONTINUING PROFESSIONAL EDUCATION IN DENTAL HYGIENE PRACTICE USING KOLB'S EXPERIENTIAL LEARNING THEORY

A Dissertation

by

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ABSTRACT

The purpose of this qualitative study was to understand how learning is facilitated in a dental hygiene clinical continuing education course designed using Kolb's experiential learning model. This study assessed the effectiveness of an experiential learning model of continuing professional education (CPE) for dental hygienists. A complimentary one-day, six-hour, hands-on clinical dental hygiene continuing education course on ultrasonic instrumentation was presented to 25 registered dental hygienists. Twelve participants were interviewed in the two weeks following the course; these interviews were audio-taped and transcribed. Designing a CPE course using Kolb's model of learning proved to be effective because participants reflected upon their past practice, were introduced to new information, and then were asked to develop an action plan to implement what they had learned.

Three findings emerged from the study. First, designing an interactive CPE format by taking the participants through their past, present, and future proved to be an excellent teaching method. Second, communities of practice played a crucial role in solidifying their learning. And third, there are barriers encountered when trying to implement what is learned from CPE programs when dentistry governs the practice of dental hygiene. This study concluded by presenting a series of recommendations to assist CPE providers in incorporating Kolb's experiential learning theory into CPE courses.

DEDICATION

This dissertation is dedicated to my parents, Valentino and Leticia Henson, who have supported me throughout this endeavor; it is also dedicated to my close family friends and mentors, Perla and Teresita Queyquep, who gave me inspiration and strength during this journey. I know they would be proud of my accomplishment. Finally, to my colleagues and friends, who at various times provided me with words of encouragement and support.

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CHAPTER I

INTRODUCTION

Background

Formal education is not the end but actually the beginning of one's journey in becoming a professional. The knowledge base of any profession will constantly change over one's practice. It is important that professionals maintain their knowledge, skills, and competencies to practice throughout their careers in their specific area of specialization. Licensing and accrediting agencies require that professionals take yearly CPE courses to maintain their respective licensures. These requirements are intended to encourage professionals to expand their foundations of knowledge and stay up-to-date on new developments.

According to Queeny (2000), "continuing professional education (CPE) is not a new concept. It is recognized as a component of adult education in the 1960s" (p. 375). CPE "enables practitioners to keep abreast of new knowledge, maintain, and enhance their competence, progress from beginning to mature practitioners, advance their careers through promotion and other job changes, and even move into different fields" (Queeny, 2000, p. 698). Research shows that the lecture format is still the predominant format for CPE delivery (Cervero 2000; Mazmanian & Davis, 2002). However, there is ample evidence that effective CPE needs to consist of more active and self-directing strategies in

order to promote the desired change in behavior (Mazmanian & Davis, 2002). Childers (1993) discussed that in order to have an effect on competence, CPE must address the practitioner's needs and understand the professionalization process. In addition, effective CPE must have sessions within the course to allow participants to practice what they have learned in order to clarify, reinforce, and reflect on the topic presented (Armstrong & Parsi-Parsi, 2005; Candy, 1989; Kolb, 1984).

For various professions, CPE is a pathway for continued competency. However, this is even more critical within the health professions where it can be a matter of life and death. Clinical continuing professional education (CCPE) remains the cornerstone for disseminating evidence-based practice to healthcare practitioners. Today's healthcare system has evolved into a complex arena in which a clinician must quickly adapt to multiple clinical decision-making variables. The body of healthcare literature continues to grow with the discovery of new pharmaceuticals, technologies, and techniques. Experienced healthcare professionals as well as recent graduates are now faced with keeping pace with the latest developments within their respective professions. CCPE courses provide the practitioner an opportunity to implement and practice new skills on their patients.

There is a general consensus among healthcare practitioners that changes in clinical practice are needed to improve patient outcomes based on applying the current scientific evidence (Haynes & Haines, 1998). Young and

Newell (2008) discussed that “change in practice cannot be expected from all health care professionals who are attending continuing education courses because not all practitioners are attending either with the intent or ready to address the change” (p. 2). Robertson, Umble, and Cervero (2003) posed the question about what kinds of CPE are effective in persuading a practitioner to change. Mazmanian and Davis (2002) analyzed the systematic reviews in continuing medical education (CME) and found the following strategies that promote behavior change are: (a) hands-on skills practice, (b) interaction with the faculty and other learners, (c) positive reinforcement, and (d) evaluation and feedback.

The Texas State Board of Dental Examiners (TSBDE, 2014) requires a prerequisite to the annual renewal of a dental or dental hygiene license: the completion of 12 hours of acceptable continuing education.

1. At least 8 hours of coursework must be either technical or scientific as related to clinical care. The terms “technical” and “scientific” as applied to continuing education shall mean that courses have significant intellectual or practical content and are designed to directly enhance the practitioner’s knowledge and skill in providing clinical care to the individual patient.
2. Up to 4 hours of coursework may be in risk-management courses. Acceptable “risk management” courses include courses in risk management, record-keeping, and ethics.

3. Up to 6 hours of coursework may be self-study. (para. 2, Rule 104.1)

Texas dental hygiene continuing professional education courses are predominately delivered in a lecture format. These courses are usually given at regional dental conventions, local dental hygiene meetings, or in university/ community college settings. The typical lecture presentation can range from one to six hours. Occasionally, there are hands-on courses that are offered, but they have limited registration due to the need for equipment and faculty resources. Attendance typically ranges from 20-23 participants. Distance education is an additional pathway that can be used to obtain CPE credit. These courses are typically asynchronous and primarily content-focused. A variety of professional organizations provide continuing professional distance education courses in order to accommodate practitioners' various work schedules. Pre- and post-testing may be a component of the course. In general, Texas dental hygiene CPE courses do not have an assessment component. Participants take notes and stay at the end of the course for the completion code that documents their attendance. A completion code is a numerical value typically announced at the conclusion of a course that indicates a participant has taken the course in its entirety. The code is used in the event an individual is audited by the TSBDE as proof of completion of the minimum of eight hours of coursework.

Statement of the Problem

In today's rapidly changing healthcare environment, there is a pressing need to provide continuing professional education courses that can influence

clinical practice (Armstrong & Parsa-Parsi, 2005). Experiential learning has the greatest potential for creating effective CPE courses since the interactive element provides the clinician with an opportunity to connect theory with the newly acquired skill. Research shows that effective CPE uses active and self-directed strategies to affect change in clinical practice (Armstrong & Parsa-Parsi, 2005; Davis et al., 1999; Young & Newell, 2008). However, the lecture remains the predominant delivery format for the majority of CPE programs. Mazmanian and Davis (2002) and Cervero (2000) argued that this is an inadequate method in changing clinician's behavior. Armstrong and Parsa-Parsi (2005) proposed that using Kolb's experiential learning model in designing CPE would provide an active learning environment where clinicians could change their clinical practice behavior.

Kolb (1984) stated that learning involves the acquisition of abstract concepts that can be applied flexibly in a range of situations. In Kolb's (1984) theory, the impetus for the development of new concepts is provided by new experiences. Kolb's experiential learning style theory is typically represented by a four-stage learning cycle in which the learner touches all the bases. Effective learning is seen when a person progresses through a cycle of four stages: (a) having a concrete experience, (b) observing and reflecting on that experience, (c) forming abstract concepts (analysis) and generalizations (conclusions), and (d) testing hypothesis in future situations, resulting in new experiences. Kolb and Fry (1975) viewed learning as an integrated process with each stage being

mutually supportive of and feeding into the next. It is possible to enter the cycle at any stage and follow it through its logical sequence. However, effective learning only occurs when a learner is able to execute all four stages of the model. Therefore, no one stage of the cycle is an effective learning procedure on its own.

McCarthy (1987) developed the 4MAT system based on Kolb's learning types and recommended teaching in a cyclical process that addresses each phase of the learning cycle. The 4MAT system is an eight-step, sequential model based on Kolb's model of learning styles and the concept of brain hemisphericity. The eight-step model is derived by interacting each of Kolb's four "quadrants" with both the left brain and right brain (McCarthy, 1987). A description of this theoretical basis and of McCarthy's invention follows the natural cycle of learning suggested by Kolb (1981). McCarthy's system was to teach to each style in sequence for each lesson. For each lesson, the teacher was to answer the question most relevant for each quadrant: "Why?" (relevance), "What?" (facts and descriptive material)," How?" (methods and procedures), and "If?" (exceptions, applications, creative combination with other material). The 4MAT Model illustrates where humans learn and develop through continuous, personal adaptations as they construct meaning in their lives (Malmsheimer & Germain, 2002). There has been no research done using Kolb's model in dental hygiene continuing professional education.

Purpose Statement

The purpose of this study was to understand how learning is facilitated in a dental hygiene clinical continuing education course designed using Kolb's experiential learning model.

Research Questions

1. Is Kolb's experiential learning model effective for dental hygiene continuing professional education?
2. How was the learning of the participants facilitated?
3. What are the barriers to learning in this context?

Significance of the Study

This study assessed the effectiveness of an experiential learning model of CPE for dental hygienists. It was significant in improving how CPE courses in this field are developed, implemented, and evaluated. This experiential learning model enabled practitioners to connect research and practice more effectively. Additionally, this model engaged practitioners in the process of reflective practice in order for them to evaluate if their ways of clinical practice have kept pace with current treatment guidelines.

Definition of Terms

Communities of Practice: "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2007, p. 1).

Experiential Learning: “the process whereby knowledge is created through the transformation of experience” (Kolb, 1984, p. 38).

Reflective Practice:

> The practitioner allows himself to experience surprise, puzzlement, or confusion in a situation which he finds uncertain or unique. He reflects on the phenomenon before him, and on the prior understandings which have been implicit in his behavior. He carries out an experiment which serves to generate both a new understanding of the phenomenon and a change in the situation. (Schön, 1983, p. 68)

Assumptions

My approach to this study was influenced by my own experiences as a dental hygienist and a dental hygiene educator. In addition, I believe that my educational, professional, and clinical experiences assisted me in relating to my colleagues’ experiences. I assumed that my participants were able to reflect on their learning and communicate their current clinical practice behaviors.

CHAPTER II

REVIEW OF THE LITERATURE

In this literature review, I reflected first on the field of continuing professional education (CPE) and on developmental models that underlie this practice. I also examined CPE in the health care professions. Then I addressed the three areas in the literature that informed my study: (a) experiential learning, (b) communities of practice, and (c) reflective practice. Scholarship in these areas is useful in understanding how continuing professional education (CPE) can be transformed from a passive learning experience to an active learning experience.

> Professionally active dentists are predominantly male, white, in private practice, practicing general dentistry…and over age 45. Some of these demographics are beginning to change, however. For example, women account for 39.6 percent of all dentists graduating since 1997 and 43 percent of current graduates. (ADA Survey Center, as cited in Valachovic, 2009, p. 29)

"Dental hygiene is predominantly a profession of Caucasian females. On average, dental hygienists are in their mid-forties with just under 20 years of experience. Most dental hygienists are in private practice" (Battrell, 2009, p. 31).

Continuing Professional Education

One of the main issues within the field of continuing professional education, according to Cervero (2000) and Nowlen (1998), is that the format of the courses is largely ineffective in improving the performance of the participant. “In what is typically an intensive two or three day short course, a single instructor lectures and lectures and lectures fairly large groups of business and professional people, who sit for long hours in an audiovisual twilight, making never-to-be read notes” (Nowlen, 1998, p. 23).

This type of format has been used since the field’s inception in the beginning of the 1960s. During the 1970s, CPE began to be used as a basis for licensure and recertification (Cervero & Azzaretto, 1990). As the 1980s emerged, many professional disciplines developed various organized and comprehensive programs for licensure (Cervero, 1998). Then in the mid-1980s, many professions developed respective accreditation guidelines for CPE providers (Kenny, 1995). During the 1990s, the current format of having “one instructor lecturing to large groups is still easily recognizable as the predominant form of continuing education” (Cervero, 2000, p. 4). This type of format continues today as many CPE developers look for innovative pathways to engage active learning in all levels of CPE. Cervero (2000), Davis et al. (1999), Young and Newell (2008), and Armstrong and Parsa-Parsi (2005) argued that meaningful methods of teaching CPE must be developed and evaluated in order for practitioners to make behavioral changes.

Mazmanian and Davis (2002) and Armstrong and Parsa-Parsi (2005) made the case that there is a significant body of literature that has shown the current lecture format does not necessarily lead to new behavior. The “evidence does exist in the CME literature that supports the implementation of more active and self-directed strategies which promotes the desired change in behaviors” (Mazmanian & Davis, 2002, p. 680).

Developmental Models for Professional Education

Houle (1980) claimed that professionals learn through “study, apprenticeship, and experience, both by expanding their comprehension of formal disciplines and by finding new ways to use them to achieve specific ends, constantly moving forward and backward from theory to practice so that each enriches the other” (p. 1). Houle (1980) explained that continuing professional education consists of three modes of learning: (a) instruction, (b) inquiry, and (c) performance. The instruction mode is where the learning is typically passive and consists of the dissemination of knowledge and skills. In the inquiry mode, learning is exploratory and cooperative and results in the synthesis of new knowledge. Finally, the performance mode is active and involves practice in the actual working setting.

In addition to Houle’s discussion, there are several models that discuss how professionals learn within their workplaces. The Mental Schema Model is based on the idea that learning occurs when new knowledge is rearranged according to various easily recognizable interpretations or models (schemas) of

related information (Shuell, 1986). Learning is conceptualized as “an active, constructive, and goal-oriented process that is dependent upon the mental activities of the learner” (Shuell, 1986, p. 415). The work of Ausubel, Novak, and Hanesian (1978) and that of Novak (1998) argued that meaningful learning is more than learning the material but rather is the acquisition of new meaning. The researchers demonstrate that meaningful learning is retained longer, facilitates subsequent learning, and results in transferable experiences.

Another model is called the Skill Acquisition Model. Dreyfus and Dreyfus (1986) proposed that practitioners learn in the context of practice by developing their skills within a learning progression. The Dreyfus model (1986) emphasized that learners progress from novice to advanced beginner, to competent, to proficient, and finally to expert. Practitioners create knowledge out of their experiences from the context of their work environment (Daley, 1998; Mott, 1996, 1998). Novice practitioners depend and learn from authorities, while experienced practitioners learn from self-initiated, action-oriented, informal mechanisms such as constructing a knowledge base in their context of practice (Daley, 1998). This knowledge base results in a “deeper level of meaning and understanding in the process” (Daley, 1998, p. 431).

Continuing Professional Education in Healthcare

Continuing medical education (CME) was developed in the 1960s and its purpose was to encourage physicians to be lifelong learners (Dryer, 1962). Healthcare professionals are required to maintain their knowledge of new

information after graduating from their professional programs. One of the key issues that Leist and Green (2000) and Armstrong and Parsa-Parsi (2005) advocated for is that CPE needs to support more active and self-directed learning strategies to promote the desired change in behavior. Currently, the majority of the health CPE courses are one-day lecture-based programs. Participants typically sit in a classroom setting for the duration of the day with a one-hour lunch break. There is a growing movement for evidence-based care within the healthcare professions. Haynes and Haines (1998) argued that practitioners need to make changes in their practice using the most current scientific evidence in order to improve client outcomes. So how can the current lecture-based CPE courses implement this type of behavioral change when there is no active learning taking place within these types of learning formats?

Within health care professions, Robertson et al. (2003) analyzed 15 research studies that demonstrated that CPE did improve knowledge, skills, attitudes, behaviors, and patient health outcomes. They posed the question of "What kinds of continuing education are effective?" (Robertson et al., 2003, p. 154). Robertson et al. (2003) emphasized the need that CPE must be "ongoing, interactive, contextually relevant, and based on needs assessment which is more likely to improve knowledge, skills, and attitudes, behavior, and patient outcomes. Continuing education cannot simply target the patient-physician interaction but must consider the larger organizational system" (Robertson et al., 2003, p. 154).

Garcia and Newsom (1996) offered a model of learning and change in physicians that involves five stages. Stage 1 is Preparation; the professional is dissatisfied with his/her current knowledge or skills. Stage 2 is Focusing; the professional is aware that new knowledge and skill sets exist. Stage 3 is Follow-Up; the professional actively seeks new information. Stage 4 is Making Change; the professional begins to implement change. And Stage 5 is Solidifying Change; the professional is seeking support for change. Garcia and Newsom, found CPE to be the most effective method for delivering change for physicians, especially in Stage 3. They go on to note that clinicians cannot change their clinical practice from attending CPE courses unless the clinicians are ready to change.

Helminen, Vehkalahti, and Murtomaa (2002) argued that even though CPE is the common means for staying abreast of current clinical information, not all delivery methods for CPE result in a change in clinical practice. Grimshaw et al. (2001) and Khan and Coomarasamy (2006) found that interactive educational interventions were the most effective for changing clinical practice behavior. Interaction is the key for enabling clinicians to change. Roberston et al. (2003) conducted a narrative review of various health professions and found that the practice setting of the clinician must be understood when designing CPE courses. The greater the social activity, the greater the learning.

Armstrong and Parsa-Parsi (2005) argued that while the lecture is still the more common format used in clinical CPE, they advocated that CPE providers

develop interactive sessions within their courses in order to facilitate evidence-based clinical practice. Research shows that once a change occurs, participants are committed to changes in practice: (a) asking what changes practitioners are intended to make from the covered material, (b) following up with what was the intended change in practice, and (c) identifying the barriers that prevented change (Davis et al., 1999; Houlden & Collier, 1999; Wakefield et al., 2003).

There are few studies that have been conducted in dentistry and dental hygiene that demonstrate if clinical continuing professional education courses can change clinical behavior practice. Most of these quantitative studies indicated that changes in clinical practice were not statistically significant (Grembowski et al., 2006); (Asadoorian & Locker, 2006). However, one study by Young and Newell (2008) suggested that interactive CPE can be an impetus for change in clinical practice. Their study used an interactive educational intervention during a three-day clinical course designed for dental hygienists. Surveys were used to determine if the knowledge and skills that were taught in the course were transferred to practice. The majority of participants reported moderate-to-high gains in knowledge and skills, as well as applying what they had learned to patient care. Young and Newell (2008) also found that reflection and a commitment to change was recognized among the participants. They concluded that

> asking participants what they intend to change in practice and to follow up with them on a later date about whether they implemented the changes

and if not, why, would also provide important information for continuing education developers and professional regulators. (Young & Newell, 2008, p. 8)

Experiential Learning Theory

One aspect of experiential learning theory is that there must be active involvement in the learning process. Researchers agree that most adults prefer to be actively involved in the learning process rather than being passive recipients (Caffarella, 1992; Knowles, 1980; Silberman, 1990). Caffarella and Barnett (1994) discussed that learners must be active participants in identifying and meeting their own learning needs. Adult learners "can no longer assume that instructors have the only one, or even the primary responsibility for their own learning…the responsibility lies by providing individualized learning methods" (p. 32).

A second aspect of experiential learning is the element of cognition. Adult educators must take into account the amount of prior experience and knowledge adult learners possess. Caffarella and Barnett (1994) argued that besides prior experience and knowledge that the breadth and depth of that experience and information must be explored.

It appears that experts not only have a greater storehouse of knowledge and experience, but also think in different ways than novices. Novices interpret their experiences literally and in very concrete terms, while

> experts tend to organize their experiences around principles and abstractions. (Caffarella & Barnett, 1994, p. 36)

Constructivist teaching is a third conceptual foundation of experiential learning. “This type of teaching assumes that learners are active knowers who participate in their construction of knowledge” (Caffarella & Barnett, 1994, p. 37). According to Candy (1989), constructivist teaching allows learners to give meaning to their experiences beyond the transmitted knowledge. This type of learning is important when designing and implementing a CPE course because the motivation to learn is strongly dependent on the learner’s ability to acquire the knowledge (Von Glasersfeld, 1989). In addition, Prawat and Floden (1994) discussed that learners will make meaning from their learning by reflecting on their past experiences to solve complex problems so it is imperative that as CPE developers, these components are present within the session to engage the learner’s critical-thinking ability. CPE courses need to challenge the conventional thinking process and allow the learner to explore new solutions to existing problems or concerns. Gamoran, Secada, and Marrett (2000) recommended that emphasis for learning is learner-centered rather than teacher-centered. The teacher now becomes the facilitator and creates an environment for learners to arrive at their own conclusions (Rhodes & Bellamy, 1999).

A major theory of experiential learning was created by Kolb in 1984; he believed “learning is the process whereby knowledge is created through the transformation of experience” (p. 38). Kolb’s four-stage learning cycle shows

how experience is translated through reflection into concepts, which in turn are used as guides for active experimentation and the choice of new experiences. The first stage, *concrete experience* (CE), is where the learner actively experiences an activity such as a lab session or field work. The second stage, *reflective observation* (RO), is when the learner consciously reflects back on that experience. The third stage, *abstract conceptualization* (AC), is where the learner attempts to conceptualize a theory or model of what is observed. The fourth stage, *active experimentation* (AE), is where the learner is trying to plan how to test a model or theory or plan for a forthcoming experience.

Kolb (1984) identified four learning styles that correspond to these stages. The styles highlight conditions under which learners learn better. These styles are:

- assimilators, who learn better when presented with sound logical theories to consider;
- convergers, who learn better when provided with practical applications of concepts and theories;
- accommodators, who learn better when provided with “hands-on” experiences;
- divergers, who learn better when allowed to observe and collect a wide range of information.

Kolb’s (1984) Experiential Learning Theory, while somewhat dated among adult learning theories, is useful in a clinical context because it engages

the learner at a personal level by addressing the needs of the individual. The theory requires learners to set a goal through experimentation and observation. Finally, the theory requires self-evaluation, resulting in implementing an action plan.

Reflective Practice

Schön's (1983) Reflective Practitioner Model explained that practitioners rely on practical experience and reflection-in-action to solve the problems of professional practice. Reflection-in-action is a developmental process in which practitioners first learn a system of rules and procedures, then apply it to particular situations, then develop new forms of knowledge to use in actual practice situations. Reflection and reflective practice are frequently noted in the literature. According to Mann, Gordon, and MacLeod (2009), reflective capacity is an essential characteristic of professional competence. They indicated that

> educators assert that reflective practice is part of the change that acknowledges the need for students to act and think professionally as an integral part of the learning process throughout their courses of study, integrating theory and practice from the outset. (Mann et al. 2009, p. 599)

Within the adult education literature and healthcare literature, reflection and reflective practice are essential attributes to lifelong learning. Several definitions of reflective practice can be found in the literature. Dewey (1933) defined reflection as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that supports it and

furthers conclusion to which it tends" (p. 9). Boud, Keogh, and Walker (1985) defined reflection as a "generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to a new understanding and appreciation" (p.19). Boud et al.'s definition focused on one's personal experience as the object of reflection and is more explicit about the role of emotion in reflection. Schön (1983) defined reflective practice as the capacity to reflect on action so as to engage in a process of continuous learning. He also introduced the concept of the "reflective practitioner" as one who uses reflection as a tool for revisiting experience both to learn from and for the framing of complex problems of professional practice (Schön, 1983).

Most models of reflective practice depicted reflection as activated by the awareness of a need or a disruption in usual practice. The literature discussed two major models of reflection. Boud et al. (1985) and Schön (1983) called reflection an iterative process where reflection is caused by an experience that produces a new understanding with the potential or intention to act in response to a future experience. The second is called the vertical dimension. This model focused on the depth and quality of reflective thinking (Hatton & Smith, 1995; Moon, 1999). This level is more difficult to reach and is less frequently demonstrated.

Mann et al. (2009) advocated that interactive components must be incorporated into continuing education to promote reflection. Mamede and Schmidt (2004, 2005) surveyed 202 Brazilian physicians to study the structure of

reflection in practice and the process of encountering complex problems. Their research indicated that reflective practice appeared to decrease with increased years of practice and especially in practice settings where evidence-based practice was not reinforced. It would be beneficial to expose these physicians to continuing professional education courses that had reflective practice components in to order to prevent its decrease use. Mamede and Schmidt (2004) also found that the physicians who were reflective practitioners were willing to engage in meta-reasoning, which means that a physician is able to think critically about his or her own thinking processes.

Communities of Practice

According to Lave and Wenger (1991), communities of practice (CoP) are groups of people who share a concern and passion for something they do and learn how to do it better as they interact regularly. Through these interactions, practical information and problem-solving strategies are shared. Through this process, gaps in practice are identified and solutions are proposed. These informal communications become the means for sharing information to improve practice and generate new knowledge and skills (Lave & Wenger, 1991). Using the concept of communities of practice in CPE enables learners to engage in the following activities: (a) problem solving, (b) seeking out new information, and (c) learning about other's experience. Jenkins and Brotherton (1995) studied an occupational therapy curriculum that used communities of practice and found that the therapists did consolidate their knowledge and skills very effectively and

recommended that this be implemented through the early phases of their clinical training. Lindsay (2000) also reported that occupational therapy students gained experience and confidence in a variety of intermediate to advanced cases. Haas, Aulbur, and Thakar (2003), Jonassen and Henning (1996), Tolson, McAloon, Hotchkiss, and Schofield (2005), and Wild, Richmond, de Merode, and Smith (2004) discussed that learning and sharing information appeared to be the central characteristic of communities of practice. Li et al. (2009) found CoP groups demonstrated the following characteristics:

1. Social interaction – interaction of individuals in formal or informal settings, in person or through the use of communication technologies.
2. Knowledge-sharing – the process of sharing information that is relevant to the individuals involved.
3. Knowledge-creation – the process of developing new ways to perform duties, complete a task, or solve a problem
4. Identity-building – the process of acquiring a professional identity, or an identity of being an expert in the field. (p. 5)

Parboosingh (2002) argued that CoP would be beneficial to CPE courses since traditional continuing medication (CME) consists of didactic lectures presented by experts. His research indicated that physicians who utilize CoP find it a stimulus to learning. They have access to mentors within the CoP as opposed to traditional CME, where this may be difficult to accomplish due to the passive nature of the format. Parboosingh (2002) also stated that CoP provides

a “continuous process when community members work in an environment that encourages the exchange of knowledge and where the outcomes of practice are used on a daily basis to identify organizational and educational needs” (p. 231). Traditional CME tends to be designed to update physicians’ knowledge and increase their awareness of their practice guidelines, while CoP not only addresses deficiencies in practice of evidence-based medicine, but it guides them to acquire practical information to deal with the uncertainties and ambiguities of clinical practice, which in turn enhances their clinical judgment (Coles, 2002).

Summary

Upon examination of the literature, the current CPE format needs to be redesigned from being a traditional lecture to an interactive learner-centered format (Cervero, 2000). Mazmanian and Davis (2002) and Armstrong and Parsa-Parsi (2005) discussed the prevailing body of literature that indicates that the current lecture format does not lead to a change in one’s practice behavior. Roberston et al. (2003) and Garcia and Newsom (1996) emphasized the need for a learner-centered approach when designing CPE courses. Experiential learning, communities of practice, and reflective practice are critical components that need to be designed within current CPE programs to engage the learner in becoming an evidence-based practitioner in today’s ever-changing environment.

CHAPTER III

METHODOLOGY

I selected a qualitative design for my study to understand how learning is facilitated in a clinical continuing education course designed using Kolb's experiential learning model. Qualitative research is an effort to understand situations in their uniqueness as part of a particular context and the interactions there (Patton, 1985). Merriam (2009) discussed the following four characteristics to describe qualitative research. The first characteristic of qualitative research lies in the purpose of qualitative research, to understand the meaning attributed to individuals' experiences. The focus of meaning people attribute to their experiences is on the process rather than the outcome. Likewise, the intent of qualitative research is used to study individuals' understanding of their experiences, not researchers' perceptions of individuals' experiences.

The second characteristic common to qualitative research is that the primary instrument used to collect and analyze data is the researcher. As can be expected, certain biases might occur when researchers act as the data collection instrument. Rather than attempting to remove such biases, qualitative research operates on the belief that biases presented by the researcher must be considered, accounted for, and monitored to determine their impact on data collection and analysis. Third, qualitative research is regarded as an inductive

process as researchers often use qualitative studies to gather evidence in order to establish theories and hypotheses that previous research has neglected.

Finally, qualitative research provides highly descriptive data in the form of words and pictures rather than the numbers produced by other types of research (Merriam, 2009). Patton (1985) also iterated this point that it is “the analysis strives for depth of understanding” (p. 1). It is the ability for participants to respond to these semi-structured questions that provides them the opportunity to discuss these experiences in their own words.

This study was based on the work of Armstrong and Parsa-Parsi (2005) who argued for the incorporation of more interactive learning strategies within CPE programs. These authors advocated using a curriculum planning framework based on Kolb’s theory of experiential learning in designing interactive CPE courses. Kolb (1984) argued that learning is a process whereby knowledge is created through transformation of experience. Armstrong and Parsa-Parsi (2005) used Kolb’s experiential theoretical framework to provide the curriculum planner with an understanding of the learning process for the participants:

> Learners start with a concrete experience and involve themselves fully, openly, without bias. Then they reflect upon it and observe it from many perspectives. They make comparisons with existing theories and create concepts that integrate their observations into logically sound theories.

Then they actively test the theories and use them to make decisions and solve problems. (p. 682)

It is important that CPE providers design courses for the learner to progress in sequence from quadrants one through four. This process is shown in Figure 1.

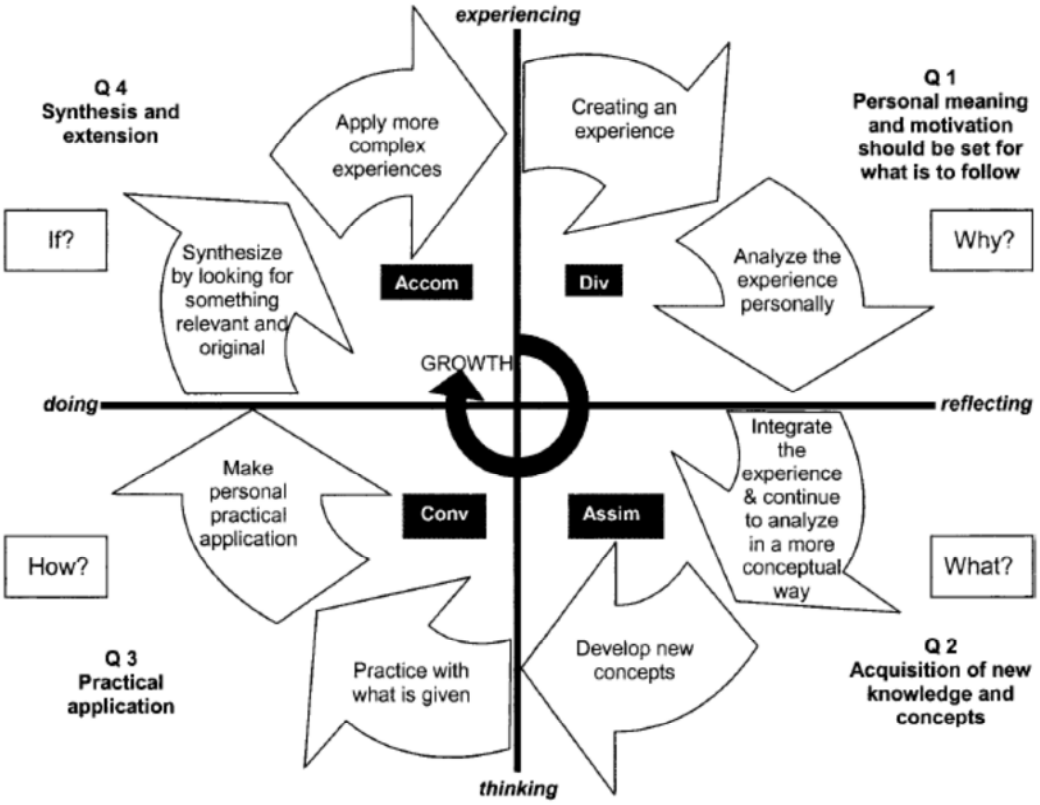

Figure 1. *A concrete curriculum planning framework adapted from Kolb: Experience as the Source of Learning and Development*.

Source. Adapted from “How can physician’s learning style drive educational planning?” by E. A. Armstrong and R. Parsa-Parsi, 2005, *Academic Medicine, 80*(7), 680-684.

For this study, I designed a CPE module that uses the method described by Armstrong and Parsa-Parsi (2005). Participants in this study were presented with the latest evidence-based information on ultrasonic instrumentation (Appendix A and B). Each participant moved through the quadrants as a collective and completed their respective activities. Marie George, RDH, MS, is a Clinical Educator from Dentsply Professional and was a co-presenter. Ms. George and I met prior to the CPE course to design and plan the session. We discussed how we were going to implement the various interactions within all the four quadrants. For Quadrant One, we emailed a pre-survey to the participants to determine what they knew about ultrasonic instrumentation, then used their responses to facilitate discussion. In Quadrant Two, evidence-based research was presented with a question and answer session. For Quadrant Three, we planned a hands-on activity in the simulation center and had the participants practice the various techniques and work on case studies. In Quadrant Four, the participants developed an action plan for implementation of what they had learned into their respective practice settings. All course participants received a certificate stating that they had completed six hours of continuing education.

Two days prior to the course, participants completed an online survey about their practices of ultrasonic instrumentation. The purpose of this survey was to assist the participants in recalling their prior knowledge of ultrasonic instrumentation. In addition, I used the survey's results to facilitate the activity indicated in Quadrant One.

The following survey questions were asked about their knowledge about ultrasonic instrumentation:

1. How many years have you practiced?
2. What type of ultrasonic unit do you use: Magnetostrictive or Piezoelectric?
3. What type of magnetostrictive inserts or piezo tips do you use? Examples: Universal, thin/slim, left or right, etc. List all inserts/tips that you have used.
4. What do you want to learn from this ultrasonic course?

Quadrant One: Activate Prior Knowledge

Participants were asked to introduce themselves and give a brief history of their current practice setting and the number of years of clinical practice. Next the responses to the survey were presented that assisted us in providing facilitation questions during the one-hour session. The information was gathered during the discussion that also directed our presentation to focus on key topics about the current evidence on ultrasonic instrumentation

Quadrant Two: Acquisition of New Knowledge and Concepts

This session discussed the current evidence on using ultrasonic instrumentation. Ms. George and I addressed the various questions posed in Quadrant One and discussed these topics in-depth. This quadrant allowed the participants to discuss and clarify any misconceptions about the technology. In addition, we posed various questions to further engage the participants

throughout the session. As the information was presented, we used typodonts (mouth models) and ultrasonic inserts to assist the participants in making the connection between theory and clinical practice. We also provided opportunities to debrief about the various topics in 15-minute intervals; this allowed participants to ask any further questions prior to continuing to the next topic.

Quadrant Three: Practical Application

The hands-on activity provided the participants the opportunity to bridge the theory with the clinical practice. The dental school's Clinical Simulation and Learning Center was utilized for this session. The simulation center consists of 45 dental operatories with a teaching station located at the front. The teaching station contains a desktop computer, a document camera, a ceiling camera, an annotated monitor screen, and a lavaliere microphone. Each operatory has two monitors. The first monitor displays the demonstrations from the teaching station, while the second is used to gain access to the Internet. Participants were randomly paired and assigned to operatories while Ms. George demonstrated the various ultrasonic scaling techniques using the document camera. I observed the participants' techniques and provided individualized constructive feedback.

The purpose of using the simulation center was to give the participants a safe, learner-centered environment. This setting also provided an educational scaffold to assist them in learning new concepts and to clarify any previous information within the session. During the end of this session, participants were

presented with various clinical cases. Participants were again randomly paired and asked to discuss one clinical case study and provide their clinical recommendation. They formulated a clinical treatment plan utilizing the evidence-based guidelines that were presented in Quadrants Two and Three. Each of us reviewed the clinical case study and provided the correct rationale to the respective questions. The session proved to be the most beneficial for us as instructors. I was able to witness misconceptions they had about the technology. Ms. George and I reinforced their knowledge of what they were taught in the morning session.

Quadrant Four: Synthesis and Extension

In Quadrant Four, the participants synthesized all the information presented throughout the day. We conducted a brief recap on what we had covered and answered any remaining questions about the topic. During this final session, I disseminated an action plan template. This template assisted the participants in drafting an action plan so when they returned back to their respective practices, they could implement the evidence-based ultrasonic theory and practice. The participants were asked to share their action plans with the audience so that the others could learn how to approach their respective employers about implementing what they had learned throughout the course. Issues such as financial barriers and philosophy of practice were addressed in this action plan. Participants shared various strategies of how they would

approach implementing these changes with their employers, with other dental hygienists within their practice, and with their patients.

Sample Selection

Patton (2002) stated that “there are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of the inquiry, what’s at stake, what will be useful, what will have credibility, and what can be done with available time and resources” (p. 244). Purposeful sampling (Patton, 2002) is the most common type of nonprobability sampling used by qualitative researchers. Purposeful sampling occurs when a certain sample is selected because researchers believe that the most information can be gathered by interviewing or observing the particular group.

Purposeful sampling requires researchers to determine specific selection criteria to select a sample of participants. Typically, this is accomplished by creating a list of certain attributes necessary in a sample as determined by the purpose of the study. I used purposeful sampling because this study population provided me the most information about this topic within the field of dental hygiene.

I used two methods to select my sample: the first to generate participants for the continuing education course I designed and the second to select members of that group for follow-up interviews. All participants were informed prior to registering that this CPE course was my dissertation study.

A complimentary one-day, six hour, hands-on clinical dental hygiene continuing education course on ultrasonic instrumentation course was advertised to registered dental hygienists attending a Greater Houston Dental Hygienists' Society (GHDHS) monthly meeting. GHDHS provides continuing education courses to practitioners, in addition to providing professional and legislative updates. A sign-up sheet was circulated at the meeting. Those who signed up were contacted via e-mail to confirm their interest in attending the course at The University of Texas School of Dentistry at Houston. The first 25 dental hygienists to respond were accepted to participate in the course.

Participants were asked to complete an online survey two days prior to the session. The survey was designed to ask the following: (a) identify demographic information about the course participants and (b) determine their current self-reported ultrasonic instrumentation knowledge and skills. During the course, I recorded field notes on each of the quadrant sessions, observing the multiple interactions among the participants and instructors, as well as among the participants themselves.

At the completion of the course, I asked for volunteers for the interview phase of the study. The 12 participants who were interviewed had 3-25+ years of clinical practice. All 12 participants in this study were female. Participants ranged in ethnicity – one African American, three Hispanics, and eight Caucasians. For those participants who did not have access to an ultrasonic unit that was used in the course, a one-week loaner was provided for them. All 12

interviewees received loaner ultrasonic inserts to use in order for them to practice the new techniques at their respective dental offices.

Data Collection

I conducted a one-hour interview with each of the 12 participants over a two-week period after the conclusion of the CPE session. Merriam (2009) discussed that “in all forms of qualitative research, some and occasionally all of the data are collected through interviews” (p. 87). Interviews are defined as “a process in which a researcher and participant engage in a conversation focused on questions related to a research study” (Merriam, 2009, p. 55). This enabled me to determine how much they had implemented the information they had learned from the course. I used semi-structured open-ended questions for all the interviews. Merriam (2009) stated that the semi-structured interview is used for its flexibility and guided by a list of questions or issues to be explored. The interviews were recorded and transcribed. Several participants were interviewed in the simulation center, while the remaining participants invited me to their homes. The following questions were asked of them:

1. What are your overall impressions of this type of CPE course?
2. What did you like about it this type of learning? What did you dislike? Explain.
3. What made this course different from other CPE courses that you have taken in the past?

4. What activities had the most significant impact in changing your past views of ultrasonic instrumentation? Why?
5. What new information did you come away with?
6. What previous misconceptions were addressed?
7. How have you been able to implement clinical changes in your ultrasonic instrumentation since taking this CPE course?

The interview focused on the process of changing their clinical practice, the barriers encountered, and strategies to implement changes in clinical practice.

Data Analysis

Merriam (2009) stated “the process of data collection and analysis is recursive and dynamic…analysis becomes more intensive as the study progresses and once all the data are in” (p. 169). She recommended that data analysis is done simultaneously with data collection. “The final product is shaped by the data that are collected and the analysis that accompanies the entire process” (Merriam, 2009, p. 171).

I analyzed the data by using the constant comparative method. The constant comparative method involves breaking down the data into discrete ‘incidents’ (Glaser & Strauss, 1967) or ‘units’ (Lincoln & Guba, 1985) and coding them to categories. “The process of constant comparison stimulates thought that leads to both descriptive and explanatory categories” (Lincoln & Guba, 1985, pp. 334-341). I used two strategies for promoting validity and reliability: (a) adequate

engagement in data collection and (b) the researcher's reflexivity. Merriam (2009) explained that adequate engagement means that the data and emerging findings must feel saturated, that is, when additional data do not produce anything new. Interviews were reviewed multiple times until there was redundancy found within the findings. Reflexivity is "the process of reflecting critically on the self as researcher, the 'human as instrument'" (Guba & Lincoln, 2000, p. 183). Being a dental hygienist, I had to reflect on my assumptions and experiences about how I interpreted that data. Maxwell (2005) explained that this provides understanding about how a particular researcher's values and expectations influence conclusions of the study. Member checks were performed during the interview process to ensure for internal validity.

> This is the single most important way of ruling out the possibility if misinterpreting the meaning of what participants say and do and the perspective they have on what is going on, as well as being an important way of identifying your own biases and misunderstanding of what you had observed. (Merriam, as cited in Maxwell, 2005, p. 111)

Limitations

There are three limitations to this research. The first is that it was limited by its scope since it involved a group of participants from the local dental hygiene association in Houston, Texas. Secondly, all the participants were women, since the majority of dental hygienists are female. Thirdly, my experience as a registered dental hygienist and as a dental hygiene educator

created habits of expectation that may have not allowed me to see things that someone who was not a member of the culture might see.

CHAPTER IV

FINDINGS

Three findings emerged from my research. First, designing a CPE program using Kolb's model of experiential learning proved to be highly effective for the participants. Quadrant One was used to establish their baseline knowledge and experiences about ultrasonic instrumentation. This session created a learner-centered activity that provided the faculty a baseline about the audience. During Quadrant Two, participants were exposed to the new knowledge about ultrasonic instrumentation. Here, they learned about the current evidence about the technology and addressed any misconceptions they might have had with using it in the past. Next, Quadrant Three asked them to apply the theory to practice. Participants used the Simulation Center to learn and practice the new techniques. Feedback was provided throughout the session and gave them an opportunity to practice and reinforce the new information. Finally, Quadrant Four culminated in developing an action plan for their use in private practice. They collaborated on developing ways to successfully implement the information into their respective practices. Overall, the format was highly successful from their comments. Having them reflect on their past experiences provided that initial spark to engage them in robust conversations. They enjoyed hearing about the new information and being able to practice it. Finally, thinking of ways of implementing what they learned into practice proved

to be a successful collaborative endeavor as their collective experiences provided feasible solutions to implementing the theory into practice.

The second finding was their experience of being part of a community of practice. The typical dental practice has one dental hygienist as part of the staff. Isolationism is the norm of the dental hygienist since they work on a separate schedule from the dentist. Even with offices that have two or more dental hygienists, their respective busy schedules can be a challenge when finding a time to meet to discuss clinical issues. It was interesting that throughout the day, a large amount of interaction occurred. Dental hygienists from varying contexts engaged in robust conversations about how each of their practices shaped their beliefs and attitudes about ultrasonic instrumentation. Quadrant Three was particularly enlightening as I watched the interaction among dyads; they worked together to achieve their learning objectives.

My third finding was about the various barriers participants faced when they tried implementing the new information. I found that the first barrier encountered was the dentist. Since dental hygienists within the state of Texas must work under the supervision of a dentist, some of the participants expressed a concern in trying to implement change within the practice due to the financial cost of purchasing the equipment and inserts. A second barrier was using ultrasonic instrumentation as the standard of care within periodontal therapy. There are still dental practices today that do not use ultrasonic instrumentation within their daily therapy, even though dental research indicates that ultrasonic

instrumentation can reduce the numbers of destructive oral bacteria causing periodontal disease. The third barrier was working with other dental hygienists who might not be receptive to using the technology due to being educated in using traditional hand instrumentation. Some seasoned dental hygienists feel that hand scaling is the only way and that ultrasonic instrumentation is for the "lazy" clinician versus those that are the true hygiene hand scalers.

Past, Present, and Future Using Kolb's Model of Learning

The title was selected since the session started with the participants reflecting on their experiences, then learning about the present material, and finally devising an action plan for its future implementation. The first session of the CPE program was designed to accomplish the goals of Kolb's Quadrant One, where the objective was to activate prior knowledge. Participants were asked about their experiences using ultrasonic instrumentation by reviewing their responses to an online survey taken two days before the course. This quadrant was designed to engage and analyze their experiences using the technology. The first question was, "How many years have you practiced?" Responses ranged from as little as 3 years to as much as 36 years. I observed robust interaction among the participants who had various years of practice. One respondent said, "Yes, I did like that because it gave me a good feel for what the other levels of the hygienists were—knowing that there were some new graduates, [and] several that had been practicing for years and years and years." Another comment was:

> Back in the days we didn't use power instrumentation, you weren't considered a true dental hygienist if you used ultrasonic instrumentation. We were taught you were a real hygienist if you only scaled teeth exclusively by hand scaling. Ultrasonic instrumentation meant lazy clinicians!

This statement certainly caused laughter among the crowd. This initial debriefing provided a safe haven for all clinicians to speak freely. They knew that they could communicate their past experiences and they learned to develop a level of trust and collegiately among each other.

The second survey question was, "What type of ultrasonic unit do you use?" and 93.3% indicated that they used magnetostrictive, while 6.7% used piezoelectric. This second question was no surprise to most of the participants since this is the predominant technology used in their training. Discussion was robust since there were some who wanted to know more about the particular technique. One commented,

> I think the question was like, what is your impression or something like that about ultrasonics? And then it seemed like people were speaking candidly, because I was kind of afraid to say what I would've said. So since people were speaking candidly so I felt like it kind of set a tone for an honest conversation from the beginning.

As we continued with the discussion, I noticed that various participants were establishing a deeper and personal connection with their experiences within the group.

The third survey question asked them “What type of ultrasonic inserts do you use in your dental hygiene treatment?” Not surprisingly they had only learned the basic universal technique. Reasons that they shared about this were “some of us are still living in the ‘70s, the ‘80s, and ‘90s whenever we went to school. And especially if there’s been huge shifts in that thinking and how things are done.” Our discussions led to the topic of using curved inserts for scaling teeth, called left and right. One comment was

> And so I was never comfortable with the curved tips….I use the curved tips more, now, than I had before, but, you know, I guess I just never fully understood the curved tips and how to use the curved ultrasonic tips.

After this statement, I observed the room exploded into a separate groups talking about how their former faculty never truly embraced using the curved inserts. They felt that it never contributed to the overall scaling technique.

> Interviewer: And what previous misconceptions were addressed?
>
> Interviewee: I thought the universal was universal and it would go in every spot and didn’t realize – I mean, yes, I know tooth anatomy, and I know that there’s, you know, curves and bumps and – things like that, and – but I just figured that the

> universal would get everything, and – I just – I'm sure I learned that in school, but I don't remember.

So this was a very enlightening moment since everyone shared the same sentiments that she had. They knew the curved inserts existed but through this debriefing, they learned that their training did not place an emphasis on using them.

After discussing their experiences with using the ultrasonics, we moved to Kolb's Quadrant Two, which was the acquisition of new knowledge and concepts. In this session, the learners moved from reflection to concrete experiences to thinking through the use of the current literature and analyzing case studies. Here, I found a robust conversation between the experienced clinicians and the instructors. One commented that,

> I think several things were impactful. Seeing so much research about it – even though she kept saying there was not a lot of research done – but seeing so much research about it and her showing those slides. Showing like how the water, like, this was without water, this was with water – and being able to visually see that made a big impact on me. And then her talking about that there was some cementum removed or how much cementum was removed with hand instrumentation versus this – and the research that had been done about it – that made an impact on me. Then definitely seeing – like holding the inserts and seeing how the rights and lefts – 'cause I had just totally dismissed rights and lefts after school.

Another participant stated that the current research made an impact on her practice providing therapy to pediatric patients. She stated that:

> Well, I guess when I heard some of the other hygienists talking about that they used ultrasonic on kids because I always used them on adults. I just never felt that it was – "appropriate" is not the right word – but I just never felt that you should use ultrasonics on kids. But that, to me, was a misconception, because obviously a lot of other hygienists are using them on kids, and very effectively, too, from what they were saying.

Additionally, another participant responded how she appreciated how the format provided the fundamental background in ultrasonics.

> I was really impressed with the research that was presented and also, to be able to hear what my co-workers and peers were doing with ultrasonics. So I think coming away from that it was kind of like a shot in the arm to go, "Oh. Yeah. Okay. I didn't know that. Now that I do, now that I know better, I can do better for my patients because now I'm armed with this information."

Quadrant Two provided a pathway that enriched and expanded the learner's knowledge by addressing their past concerns with the current theory and practice. It was the bridge that connected their past to their present experiences.

Quadrant Three shifts the learner from thinking to doing. The session creates an opportunity for them to experiment with their new knowledge while providing a safe learning environment. One responded, "the actual going to the

lab and actually doing them, and then getting a critique right at that point so you know. You know what, if I just turn it this way or, or tweak it this way. You make the connection from theory to the practical application every day."

The venue for this activity was conducted in the Simulation Center. The center has a teaching station where the instructor uses a camera that can demonstrate the various techniques while the participants can watch the technique at their respective operatory monitors. They had the ability to follow along while they receiving one-on-one feedback. One responded,

> Because of the way it was structured – and the computer monitor – I mean if you had a question, you could see it right here on the monitor; so you could make corrections. And then if you still didn't get it, she would actually come to you personally and say, "Hey, you know, do this or turn your hand this way." And it just sunk in for me, so I thought that was great; where I did not get that before.

Another commented that for her the most helpful aspect was

> actively seeing what's being displayed at the teaching station. I'm a hands-on person. You can give me stuff to read, or you can sit there and tell me how to do it, but if I don't watch somebody do it or even try it myself, then it's not going to stick.

This was a prevailing sentiment throughout this session. As an observer, I noticed the back and forth questioning. I had several participants walk up from

their operatories to reinforce techniques and asked for clarifications to any misconceptions. One responded,

> The format was fantastic, because everything sunk in. Immediately after I had a question, I got an answer, and it was what I had just learned, and I was applying it. So, it was really a good way for me to learn.

Another participant said that,

> it was especially helpful to have someone who really knows what they're doing watch what you're doing and go, "No, try this. This is better," you know. So, you know, we're – I'm 20-something years removed from hygiene school, and that's the last time I've had actual physical instruction. Where someone's actually watching me and telling me, "Well, no, this will be easier, try this. Do it this way." So that was kind of, you know, a nice refresher.

The session that was designed according to Kolb's Quadrant Three made the learner aware of the possibilities and actively engaged the learner through the use of simulation. It provided an opportunity for them to practice and experiment with new concepts.

Quadrant Four was the final process where the learner is committed to putting the new behavior into practice. In this final session, a written action plan was created that assisted the learner in implementing the change. During this session, participants were asked how to initiate change within their respective practices. The major comment that I heard was that this was the first time they

had to think about creating and implementing an action plan. One said, “This is the first CE course that I’ve been to that the wheels have been put into motion.” A second comment was “Right, I definitely think the two main things are to see it and to do it – the hands-on – and then the plan of implementing it at the end. I think those are two crucial steps. I’ve never had that in a CE course before.” This was a new way of thinking since most of them had never had anyone ask them how they were actually going to make this happen. As one responded,

> How are we going to incorporate this into our practice? What information are we going to take back and what are the steps we’re going to do to incorporate the information back in the office? So, it was actually nice to just find that out at the very end, to kind of tie everything at the end. It wasn’t just like someone speaking to me the whole time.

Reflection on practice and reflection in practice was the predominant message in Quadrant Four. It was “How am I going to make this work?” and “How will I convince my employer that this will beneficial to the practice and the patients?” As one participant said, “And this is the first CE course that literally the next business day that we went to work, my colleague and I were trying to figure out, ‘Okay, well, when can we order what? What patients are we going to use it on?’” It is in this quadrant that the learning of the participants truly moves into the future. In essence, the participants come full circle. We had started with their past experiences then moved them into the present with the current information and then finally had them mapping out their future plans for implementation.

Communities of Practice

The participants in this study had the experience of being part of a community of practice during this CPE program. A community of practice is a group where members have a common interest in a particular domain or area, or it can be created specifically with the goal of gaining knowledge related to their field. It is through the process of sharing information and experiences with the group that the members learn from each other (Lave & Wenger, 1991). Isolation is the norm for dental hygienists as clinicians. In a small practice, there may be only one hygienist; in larger practices there are two or more, but they work independently and rarely have the opportunity to consult with one another.

It was interesting to see how they learned from each other from the various sections. Quadrant One provided them a venue to discuss their experiences. As one respondent said, “I thought it was good, you know, just so that we could kind of get in a small group and just talk about our experiences.” While another participant commented that “listening to other questions that were asked answered whatever questions I might’ve not realized that I had until I heard their questions.” During this interaction, I could see how they shared a common interest. Their interactions facilitated and strengthened their community of practice.

In Quadrant Two, I observed how the different years of experiences lend themselves to the learning process. One commented that an important aspect was “the ability to talk to someone else while you’re doing it, because I think you

learn from each other." Other participants echoed this thought during this session. They reminisced about the various dental practices they worked in and discussed what they had encountered in using the technology. There were different philosophies of practice when it came to using ultrasonics, and through this discussion, they learned to compare and contrast the information. One respondent said, "And so it was nice to be able to discuss that with other people, 'How am I going to use this? What am I going to do now?'" A second commented: "I was really impressed with the research that was presented and also, to be able to hear what my co-workers and peers were doing with ultrasonics."

Quadrant Three gave each of the participants an opportunity to apply the theory to practice. The prevailing sentiment was that they enjoyed working collaboratively in small groups. One comment was:

> Then we moved into the hands-on portion. I think the group of people was small enough that everybody got a chance to visit because I knew several of the people. So it was interesting to just visit with them and talk about what they're doing in their practice.

A second comment was:

> I went through a couple of the steps and at least talked to the other hygienist and my other colleagues about what I learned about the course. I just thought that the simulation was really interesting because that was my first experience.

The simulation center provided a rich activity of informational exchange. I would observe them moving from one operatory to another. They would ask us to repeat the various techniques on the overhead camera so they would make sure that they understood the technique. As we concluded the simulation session, I noticed how engaged they were with the hands-on portion; we finally had to remind them we had move on since we still had the final session to cover in the remaining time.

In Quadrant Four, where they had to develop an action plan; most of the participants enjoyed reflecting upon the past with the other participants. One commented, “So another thing I thought was good was how we got together in groups at the end to talk about like how we were going to apply it or what steps we were going to take to make this happen.” Overall, I noticed that each of them visited with other clinicians throughout the workshop. Everyone had the opportunity to learn from each other and found that experience quite rewarding.

Barriers to Implementation

The primary goal of CPE is to change professional practice. Dental hygiene is one of the few professions that are regulated by another practice. In this study, the major barrier to implementation was identified as structural. Dental hygienists can work in a variety of settings such as public health and academia; however, most are employed within private dental practices. Generally, the practice of dental hygiene is under the direction and supervision of a dentist. The exception is in Colorado where dental hygiene independent

practice is legal. Most dental hygienists do not have direct control over resources; only the dentist they work for does. While the participants of the CPE program may want to use new equipment in their clinical practice, to do so they must first persuade the dentist to invest resources to procure the new equipment. One respondent commented,

> Well, one of the ways that I presented it to him was, he wouldn't drill with a round bur all the time. I think the hardest part was coming up with an action plan because I think that was the hardest thing to do anyway when you're trying to talk a doctor into buying you a product because if they don't see the value of it, there's no value to them. Do you know what I mean? We have to make it – we have to sell it to them showing them why it's going to a make them more productive and stuff like that. But, in that respect, it was good, because you got other people's opinions and how they approached it, so that was really good. For me it was hard to come up with a plan.

Another participant commented:

> It's going to get me to go to my boss and go, "Yeah, I know its $160, but it's really gonna help." I didn't get new instruments due to the cost. The dentist said, "Well, yours are in better shape than mine are." I wanted the inserts, but instead he purchased a hand piece that we really didn't need. But he's kind of a gadget junky.

Unless the dentist agrees to make this investment, dental hygienists cannot implement the new technique in their own practice. One of the participants reflected on this situation:

Interviewer: How about at the end where we're doing an action plan – how was that?

Interviewee: That was tough, and I always have problems.

Interviewer: Because of your employer, because you think about that…?

Interviewee: Well, that and just, you know, my whole mindset trying to come up with –

Interviewer: How to get on there?

Interviewee: I don't know that I'm a big thinker.

Interviewer: Okay.

Interviewee: I'm kind of an in-the-moment person and then I like to think of myself as a big picture person. But coming up with plans like that….I guess in that I'm a little intimidated by the fact that he's....I don't know why I'm wasting the time, because he's going to give me a hard time about this.

A second barrier that was discovered was resistance to the adoption of the new technology. Even though ultrasonic instrumentation was developed in the 1960s, its acceptance into mainstream dental hygiene treatment just started in the mid-1990s when emerging research demonstrated its effectiveness in improving periodontal outcomes. For the most part, dentists and dental

hygienists still scaled teeth using traditional hand instruments. Ultrasonic instrumentation was only used for the extremely challenging periodontal cases. It took some time for the dental community to consider ultrasonic instrumentation as the standard of care. This CPE course was able to show the evidence about how effective its use is, but more importantly it made the argument that hygienists need to engage their dentists in a discussion about changing their clinical practice to incorporate using ultrasonic instrumentation on a more routine basis. One comment was “my training was, you know, more pro-ultrasonic, and then once I got into private practice, I encountered several dentists who were hesitant to use ultrasonics on older patients.” So the challenge most of the participants faced was convincing dentists who were educated in the past to adopt this technology into practice.

One field observation was that there was a recurring sentiment among the participants that it would be difficult to convince their dentist to make the purchase. The dentist would argue that there are more pressing equipment needs in the office and that their needs are low on the totem pole.

A third barrier that was discussed was how the participants were going to convince their dental hygiene colleagues back in their respective dental offices to adopt this technology. The participants commented that those dental hygienists who believed in hand scaling would not be receptive to this type of technology because they were not a true dental hygienist unless you scaled teeth by hand. One comment was,

> The stereotypes of those who use ultrasonics and those who don't was brought up, and I just thought that was great, because you don't – I mean the question was answered, you know. Some people say, "Oh, they use ultrasonics too much because they're lazy," but that's not the reason for them using ultrasonics. It's not. It's because it is beneficial and more therapeutic for the patient.

The CPE course forced the participants to find solutions on how to implement change in the face of these barriers. One respondent said,

> Had I not had the CE, I don't know where I would have gotten this information had I not thought, "Hmmmm…I think I'll go on the Internet and see what's new in ultrasonics." You know, I've never had a company rep come in and say, "Hey, let me tell you this. Have you seen this study?" The CE was a really good way to get the information out.

There are clinicians who still practice as they were taught in school, and it is important that CPE designers introduce new technologies and show their efficacy. This is an important step in advocating for evidence-based practice.

Conclusion

Designing a CPE course using Kolb's model of learning proved to be effective because participants reflected upon their past practice, then were introduced to new information, and then were asked to develop an action plan for the future.

Communities of practice developed in this CPE course and were a natural outcome of Kolb's active learning model. These provide a connection among the participants that facilitates their learning, and this was especially apparent when the participants collaborated on the development of an action plan.

Finally, participants in this study valued the fact that barriers to implementation of the new technology in their practice were addressed. Consideration of these barriers in the CPE course enabled them to develop strategies to deal with them so that the new learning could be implemented in their practice.

CHAPTER V

SUMMARY, IMPLICATIONS, AND CONCLUSIONS

In an ever-changing healthcare environment, it is important that dental hygiene practitioners are up-to-date with the latest information in order to provide the best care to their patients. CPE courses must be designed to actively engage the learner, with the goal of creating a change in their practice behavior. In my study, I designed a CPE program for dental hygienists using Kolb's (1984) model of experiential learning. With a colleague, I presented this program to a group of 25 dental hygienists and followed that up with interviews with 12 of the participants. I found that this format fully engaged the participants, stimulated active learning, and helped them make plans for implementing what they had learned into their practice.

Discussion of Findings

Three findings emerged from my study. First, designing an interactive CPE format by taking the participants through their past, present, and future proved to be an excellent teaching method. Second, communities of practice played a crucial role in solidifying their learning. And third, there are barriers encountered when trying to implement what is learned from CPE programs when dentistry governs the practice of dental hygiene.

Past, Present, and Future Using Kolb's Model of Experiential Learning

Overall, the participants had very positive comments about the format of the program. They wished that more CPE designers used an experiential learning approach. Kolb's (1984) emphasis on experience as central to the learning process shaped the design of this program. In this study, the participants were assimilating and then applying what they learned to practice. This format engaged the learner more effectively than the traditional lecture format of CPE.

The practice of dental hygiene is a highly skilled-based profession that requires practitioners to constantly hone their critical-thinking and psychomotor skills. Prior to graduation, dental hygiene students spend numerous classroom and clinical hours to become competent clinicians. It is through these hands-on activities in various phases of the dental hygiene curriculum that students learn how to be skilled dental hygienists. It makes sense that the use of experiential learning would be highly effective in practicing hygienists' professional development. Over the years, dental hygienists develop from being a novice to an expert. As Merriam (2009) indicated, "experience is central to learning….It is how learners attach meaning to or make sense of their experiences that matters" (Merriam, 2009, p. 153).

Designing CPE courses with an experiential format requires time and planning. Davis et al. (1999) argued that the traditional CPE lecture format is much easier to give and is a revenue generator due to the large number of

attendees. However, if CPE courses are to be a vehicle for clinical competence, then we as curriculum designers must think about the types and duration of the learning activities within these courses (Davis et al., 1999). Cervero (2000) agreed that the traditional lecture CPE format has been "largely ineffective in improving the performance of the professional" (p. 3). Mazmanian and Davis (2002) and Armstrong and Parsa-Parsi (2005) discussed and demonstrated that implementing active and self-directed learning strategies promote a desired change in clinical practice behavior.

Communities of Practice

Participants were highly engaged in their discussions throughout the session and shows the importance of communities of practice in learning within the CPE context. I observed this especially with the simulation center where they were highly engaged with the demonstrations, and I also observed discussion between dyads of participants. Lave and Wenger (1991) identified three characteristics of communities of practice: (a) the formal and informal interaction between novices and experts, (b) the emphasis on learning and sharing knowledge, and (c) a sense of belonging among members. Fox and Bennett (1998) advocated that curriculum designers take into account the learning that occurs within the groups and include various experiential learning activities.

An additional feature of this study was the discussion among the participants more generally. During several of the sessions, I noticed interaction among the clinicians with various years of practice and found that some of them

questioned what they had learned in school compared to what they were learning from this presentation and what they had learned from their own practice. Tavris and Aronson (2008) discussed the concept of cognitive dissonance that refers to the discomfort a person feels when he or she is confronted with information that challenges a belief, opinion, or knowledge claim. This format gave participants the opportunity to discuss their own beliefs about an experience with ultrasonic instrumentation, thereby, expanding their learning. Designers of CPE programs would do well to build in opportunities for communities of practice to develop among participants.

Barriers to Implementation

Dental hygiene is one of the few professions that is governed by another profession, in this case dentistry. The dentist has a significant impact on the practice of dental hygiene. The participants agreed that without the dentist's support, the information learned from CPE courses could not be implemented within their practice. This raises the issue of self-regulation within the field of dental hygiene; if hygienists were able to make their own decisions about their practice, change could be implemented much more easily.

Gillis and Praker (1996) discussed the constraints to the professionalization of the field of dental hygiene and how they impede the growth and confine the delivery of dental hygiene services to traditional and supervised settings. Besides being controlled by the dental profession, dental hygienists are underutilized as members of the health care team, especially

since interdisciplinary care is where today's healthcare system is moving (Gillis & Praker, 1996). Turner, Ross, and Ibbetson (2011) and Edgington, Pimlott, and Cobban (2009) advocated that dental hygienists must be able to work autonomously in the areas of treatment decision-making and treatment planning. Given the autonomy, dental hygienists can provide oral health services that in turn can reduce the population's oral health disparities (Edgington et al., 2009).

> Society has a right to dental hygiene care provided by professionals who possess a substantial theoretical foundation for exercising judgment and improving oral health care. A profession's research efforts are closely linked with its service role, responsibility and accountability to the public, therefore, practice can be only as good as the research and theory base that supports it. (Cobban, as cited in Darby, 1990, p. 3)

The participants expressed their frustrations with CPE courses they had taken in the past and how they were unable to make the changes they had learned about due to the dentist having the final say for philosophical or financial reasons. This came to light in the final session when the participants were asked to develop a plan for implementation of what they had learned. CPE programs could benefit from adding sessions on how participants could persuade dentists to adopt specific changes in dental hygiene practice.

Industry can also play a significant role by offering dental hygienists financial incentive payment plans and trial loaner units so that they can evaluate these units. These marketing strategies would make it possible for dental

hygienists to consider adopting these technologies without relying on the dentist. In addition, both dentists and dental hygienists would have the opportunity to evaluate the technology to see if it would be a good fit with their philosophies of practice.

Implications for Practice

Dental hygiene CPE planners need to change their thinking when designing CPE courses. Too many times dental hygienists take CPE course only for their completion code and nothing more. So they sit and listen; but when they return back to their practice, they fall into the same routines, as if they had never attended a course. There is no clinical behavioral change, and that is what CPE courses must do to move the profession forward.

One suggestion would be that CPE program designers have opportunities to learn about experiential learning theory. Not all designers have a background in adult education; they need continuing professional education themselves and would benefit greatly from knowledge of basic adult learning principles and even more from an understanding of how experiential learning is facilitated. The eventual goal of any healthcare CPE course is to improve practice, and that requires using a teaching method that fully engages learners and enables them to implement what is learned in their practice, leading to better patient outcomes.

A second suggestion is based on what is currently happening in California – the use of professional portfolios for licensure. If dental hygienists could document the clinical outcomes from a CPE course, they could assist the

National Dental Practice-Based Research Network (PBRN, 2014) in finding solutions to oral conditions. A National Dental PBRN is defined as “a group of outpatient dental care practices that, although primarily devoted to providing dental care services, has affiliated as a group – and typically with an academic health center – to investigate research questions and to share experiences and expertise” (para. 3). Having hygienists be part of the National Dental PBRN would enable them to make significant contributions to dental practices nationally.

Future Research

It would be beneficial to conduct this study in other regional areas of the United States. Since each state has its individual practice act for the profession of dental hygiene, there are varying levels of CPE requirements for licensure. It would be valuable to know if different licensure requirements have an impact on the design of CPE programs.

Colorado is the only state that allows independent dental hygiene practice. This means that registered dental hygienists can open their own practice separate from a dentist; however, there must be a dentist to whom they refer patients with intermediate or advanced restorative or surgical needs. A research study involving these particular dental hygienists could prove significant since they make the purchase decisions for their own practices. It would be helpful to know how these dental hygienists implement what they learn from their CPE courses.

This study has shown the benefits of one experiential learning theory, the model developed by Kolb, in creating an effective CPE course for dental hygienists. It would be valuable to design and study a CPE program using another experiential learning theory, such as situated learning, in order to determine what specific benefits could be derived from different theoretical approaches.

Finally, research is needed on the gendered dynamics inherent in the practice of dental hygiene. Dentistry remains largely a male field, and it is the dentist who owns the practice and hires and supervises dental hygienists, a profession which is overwhelmingly female. We need a better understanding of how gender shapes the daily practice of dental hygiene.

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APPENDIX A

DENTAL ULTRASONIC UNIT

This dental ultrasonic unit converts electrical energy into mechanical energy. The mechanical energy is used to remove dental biofilm and dental calculus from the tooth and root surfaces.

APPENDIX B

ULTRASONIC INSERTS

The dental ultrasonic inserts are inserted into the unit's handpiece. As electricity passes through the handpiece, it is converted to mechanical energy. The inserts are used in various areas of mouth.