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Role Development of the CRNA Clinical Educator Utilizing an On-Line Resource

Systems Change Project
Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Nursing Practice

St. Catherine University
St. Paul, Minnesota

Ann Bernice Sullivan

March 2013

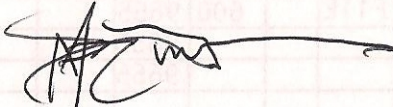
ST. CATHERINE UNIVERSITY
ST. PAUL, MINNESOTA

This is to certify that I have examined this
Doctor of Nursing Practice systems change project
written by

Ann Bernice Sullivan

And have found that it is complete and satisfactory in all respects,
and that any and all revisions required by
the final examining committee have been made.

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A handwritten signature in black ink, appearing to read "Ann Bernice Sullivan", is written over a faint red grid background.

Name of Faculty Project Advisor

5/20/13

Date

DEPARTMENT OF NURSING

Role Development of the CRNA Clinical Educator Utilizing an On-line Resource

Executive Summary

Clinical education is an essential component of nurse anesthesia education. The burden often falls on the staff Certified Registered Nurse Anesthetist (CRNA) who may be ill-prepared for that role. The study, *Role Development of the CRNA CE Utilizing an On-line Resource*, was developed to determine whether an educational program can positively impact the perceived role of the clinical educator (CE), and whether on-line education is an effective mode of educational delivery. An on-line educational program was developed to improve the knowledge and satisfaction of the CRNA Clinical Educator. The educational program was available on-line as short learning modules allowing the CRNA to access them at convenient times through-out their day. A survey tool was used to measure knowledge and satisfaction scores before, immediately after, and two months following completion of the program. A second survey was utilized to measure satisfaction with the mode and content of educational delivery. The results demonstrated that an educational intervention had a positive significant impact on some aspects of the role development of the CRNA CE. The results also demonstrated that on-line education was an acceptable mode of educational delivery for the CRNA group. Supporting the role of the CRNA CE ensures quality clinical education of nurse anesthesia students, and ultimately safe, quality care for patients.

Table of Contents

	<u>Page</u>
Title Page.....	i
Advisor Approval Page.....	ii
Notice of Copyright Page.....	iii
Executive Summary.....	iv
Table of Contents.....	v
Table of Tables.....	vii
Chapter One.....	1
Background.....	1
Clinical Problem.....	2
Clinical Question.....	3
Social Justice and Ethical Considerations.....	4
Chapter Two.....	6
Guiding Theoretical Frameworks.....	6
Literature Review and Synthesis.....	11
Terminology.....	11
Role Development of the Clinical Educator.....	11
On-line Education.....	14
Comparison of Mode of Educational Delivery: On-line Versus Classroom.....	15
Synthesis of the Literature.....	16
Chapter Three.....	18
Methodology.....	18
Design.....	18
System Change Project Intervention: On-line Educational Program.....	19
Survey Tool.....	20
Implementation.....	21
Resources.....	21
Chapter Four.....	23
Data Analysis.....	23
Survey I: Course Content and Feasibility.....	23

Role Development of the CRNA Clinical Educator Utilizing an On-line Resource

Survey II: CRNA Clinical Educator Role.....24
 Pre-course Survey and Immediate Post-course Survey.....25
 Pre-course Survey and Two Month Post-course Survey.....27

Chapter Five.....32
 Discussion.....32
 Limitations.....35
 Future Recommendations.....36
 Conclusion.....37

References.....39

Appendix A.....45

Appendix B.....46

Appendix C.....47

Appendix D.....48

Appendix E.....52

Appendix F.....53

Appendix G.....54

Appendix H.....56

Appendix I.....57

Table of Tables

<u>Table</u>	<u>Title</u>	<u>Page</u>
1	Course Content and Feasibility	23
2	Comparison of Pre-course survey and Immediate Post-course Survey	26
3	Pre-course Survey Merged With Two Month Post-course Survey	29

Chapter One

Certified registered Nurse Anesthetists (CRNAs) are well educated, expertly trained advanced practice nurses who perform over 33 million anesthetics annually (American Association of Nurse Anesthetists [AANA], 2011). Entry into practice education for nurse anesthetists is a rigorous program ranging in length from 27 to 36 months. Clinical education is an essential component of that education. The responsibility of clinical education often falls on staff Certified Registered Nurse Anesthetists (CRNAs) who may be ill-prepared for that role. The primary role responsibility of staff CRNAs is to provide clinical anesthesia services.

Background

Currently, there are 114 accredited programs in the US (AANA Council on Accreditation [COA], 2012). Nurse anesthesia educational programs are associated with both a university and a primary clinical setting. The first six to twelve months of the program are primarily didactic with the remaining portion of the program spent in clinical training. There are variations to that curriculum model, as some programs completely integrate the didactic and clinical aspects throughout the entire program. A number of other programs will continue to integrate a lesser portion of didactics in the latter portion of the program. The Student Registered Nurse Anesthetist (SRNA) administers approximately 850 anesthetics during their training which includes almost 2500 clinical hours (AANA Student Education, 2011). Hospitals associated with these educational programs commit to providing a majority of the students clinical experience and education.

A SRNA is typically paired with a staff CRNA in the clinical setting to provide anesthesia care to patients in the operating room suite. Staff CRNAs are integral to the clinical

education of SRNAs. While the CRNA has been well educated in the administration of anesthesia, there is little or no education as to how to become an effective clinical educator (Hartland, Biddle, Fallacaro, 2003).

Clinical Problem

The primary responsibility for nurse anesthesia clinical education lies with the staff CRNA working in the clinical setting. Despite the importance of clinical education within the framework of nurse anesthesia educational programs, little has been done to support and educate the CRNA clinical educator (CE) (Elisha, 2008). A different skill set is required when teaching others to deliver anesthesia care. The CE role is stressful. There is an increased workload with instruction and evaluation. There is increased responsibility of determining the appropriate balance between allowing the student independence and fostering their educational objectives, and continuing to ensure safe, quality care for the patient. These factors can contribute to stress, and dissatisfaction with the role of the CE. Clinical education of students is an expectation of all staff CRNAs employed at the clinical site. The clinical site for the system change project (SCP) is a primary clinical site for a school of nurse anesthesia education.

The Council on Accreditation of Nurse Anesthesia Educational Programs (COA) has developed national standards required for all schools of nurse anesthesia who wish to be accredited (Standards on Accreditation for Schools of Nurse Anesthesia, 2012). Although these standards address all areas of the nurse anesthesia educational programs there are clear standards relating to clinical education. Clinical faculty support is addressed as well, including standard III, C6., “The educational environment provides opportunities for faculty development” (p. 4).

Prior to the implementation of the SCP there was no program available for support and or education of the CE within the supporting clinical site. Appendix A, depicts the current system

within the organizational structure. The CRNA who performs poorly as a CE is simply no longer assigned in the CE role. Removing poorly performing CRNAs from the role of CE will add the burden of clinical education to the remaining CRNAs which may lead to further staff dissatisfaction. At the time of implementation of this project, there were no programs or educational opportunities in place to support the poorly performing CRNA CE, the CRNA who is dissatisfied working in the role of a CE, or for the CRNA who simply wishes to improve their skills as a CE.

Clinical Question

There were two major components to the SCP that the researcher considered. One was whether an educational component would positively impact the knowledge and satisfaction of the CRNA CE, and the other was whether on-line education was a feasible mode of education delivery for the CRNA group. Traditional methods for delivering clinical educator support and development have been in workshop settings (Myrick, Caplan, Smitten, & Rusk, 2011).

Although these have been shown to be important to the knowledge and satisfaction of the CE, they can vary in length, in content, and in consistency. Dissemination of content to all of the CEs is also difficult to manage. In the healthcare climate today, with a focus on cost management and staffing ratios, it is often difficult for staff to attend workshops as well as for faculty to present at workshops. On-line education can address these issues and can allow for increased access for the learner, increased flexibility for staffing, as well as consistency in the delivery of content (Myrick, et al., 2011). There were two major objectives to this SCP; whether an educational component would increase the knowledge and satisfaction of the CRNA CE, and whether on-line education would be an effective mode of educational delivery for the CRNA group

The research questions for the SCP are:

1. Will the CRNA CE experience an increase in knowledge and satisfaction working in the role of a CE following an on-line educational program?
2. Following completion of an on-line educational program, will the CRNA CE agree that on-line education is a feasible mode of education delivery for the CRNA?

Social Justice and Ethical Considerations

The SCP is upheld within the tenets of Catholic Social Teaching and the AANA Code of Ethics. In the Catholic tradition of St. Catherine University, it is essential for us to create a just and humane world for all people (Sr. Amata Miller, lecture 11/2011). There are seven themes of Catholic Social Teaching (US Conference of Bishops, 2005). One of the key themes is the life and dignity of the human person. It states that the dignity of the person is the foundation of a moral society. Although the SCP described involves education for the CRNA, it is a goal of the project education to promote respect and dignity within the teacher-learner relationship.

Catholic social teachings challenge us to eliminate discrimination and to protect the vulnerable (Donley, 2010). The SRNA has a vulnerable position within the clinical anesthesia department. Included in the educational content is the need to respect the student and promote fairness and a just culture during their clinical rotations.

There are seven standards contained in the AANA Code of Ethics that help guide CRNAs to fulfill their obligations as professionals (AANA, 2005). Although it is imperative that CRNAs uphold all standards on a continuing basis it is important to remind CRNAs of their professional responsibilities. Three of the standards pertain directly to this SCP:

2.1 The CRNA engages in lifelong, professional educational activities

3.3 The CRNA participates in activities that contribute to the ongoing development of the profession and its body of knowledge.

6.4 The CRNA participates in research activities to improve practice, education, and public policy relative to the health needs of diverse populations, the health workforce, the organization and administration of health systems, and healthcare delivery.

Summary

Through participating in clinical education of student anesthetists, CRNAs are contributing to the ongoing development of the profession. CRNAs have a responsibility to promote competent, safe, quality care. It will be through education of SRNAs that these qualities can be maintained and flourish. CRNAs have a responsibility to engage in research that can improve practice and education. As a professional group, CRNAs have a responsibility to the profession of nurse anesthesia as well as a responsibility to society, to maintain the high standards of quality safe care that has been set before us.

Chapter Two

Guiding Theoretical Frameworks

There are three theoretical frameworks from two professional disciplines guiding this SCP. Patricia Benner's theory, *From Novice to Expert* (1982) is from the discipline of nursing. Malcolm Knowles' Adult Learning Theory, *Andragogy* (1968) and David Kolb's *Theory of Experiential Learning* (1984) are from the discipline of education.

Patricia Benner's theory, *From Novice to Expert*, supports this project from both the perspective of the student as well as the CE. Benner's theory is based upon a model of skill acquisition proposed by Herbert and Stuart Dreyfus in 1980 (Benner, 1982). Dreyfus' model was developed through studying both pilots and chess players and how they acquired the skills necessary for mastery of their craft.

Benner utilized her theory to explain the acquisition of knowledge in nursing. She postulated that knowledge and learning take place not only in the classroom and through textbooks, but that it is embedded in our practice as well (Benner, 1982). It is through our clinical practice and experience that we gain knowledge and become more proficient practitioners. Clinical education in anesthesia occurs in the patient care setting; not in the classroom. The SRNAs enter into the clinical setting following six to twelve months of didactic education. It is the role of the CRNA CE to help bring their knowledge into the practice setting.

Benner described the five stages the learner passes through in their acquisition of knowledge. The stages are, *novice* - no experience with the situation, utilizes set rules and guidelines to practice; *advanced beginner* - has some experience with the situation and yet has limited perception of importance of activities; *competent* - improved organizational and technical skills and improved situational awareness; *proficient* - holistic view of situations; and

finally, *expert* – able to transcend reliance on rules and guidelines, has an ingrained understanding of situations and is able to utilize strong analytical skills as new situations arise (Seibert, 2009). Progress along the continuum is sequential and not every practitioner will reach expert status. The five stages are not differentiated as much by passage of time as by acquisition of the specific characteristics inherent within each stage (Altmann, 2007). The SRNA enters the clinical practice setting a novice. At the time of completion the SRNA is expected to be a competent practitioner.

There are 2 caveats with Benner's theory that have important relevance for the CRNA CE. The first is to recognize that the SRNA enters the clinical setting at the novice level. As the SRNA progresses through their clinical training and they move into the advanced beginner and competent stage, their clinical educational needs will be different (Siebert, 2009). The CRNA CE will need to recognize this transformation and tailor the clinical educational experience to meet the needs of the learner.

The other aspect of Benner's theory that has particular relevance to the anesthesia clinical setting is the SRNA role as the novice practitioner. SRNAs have experience as nurses in critical care areas where they had been perceived as competent practitioners if not proficient and /or expert practitioners. To be considered a novice practitioner again may not always be an easy transformation for the student (Seibert, 2009). Through an understanding of Benner's theory, the CRNA CE can become a more astute educator and can help the SRNA adjust to their new role. The theory may also serve as a model for the CRNA CE to reflect upon their own level of practice and to identify areas for personal clinical growth (Seibert, 2009).

When discussing theoretical frameworks guiding this SCP, an important concept to consider is that nurse anesthesia clinical education is not occurring in a traditional classroom

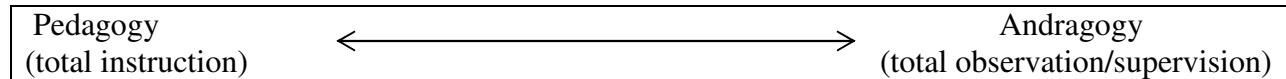
setting. It is occurring in a patient care setting, including hands-on experience, and is ever-changing. Additionally, the SRNA enters the clinical classroom as an adult learner with a variety of experiences.

As the CRNA CE enters into the teacher – learner relationship, it is important to have some understanding of adult learning theory. Pedagogy has been the model for the organization of the educational system in the U.S. and represents a holistic science of education (Hiemstra, & Sisco, 1990). Literally, pedagogy means *to lead the child* (Hartland, 2009)). Adult learning had been studied since the early 1900's and was recognized for having a different construct than educating children. In 1968 Malcolm Knowles introduced the concept of andragogy as a system of ideas, concepts, and approaches specific to adult learning (Hiemstra, & Sisco, 1990). Although Knowles is credited with popularizing the term andragogy, the term had been used in European countries prior to 1968 (Hiemstra, & Sisco, 1990). Additional theorists have contributed to this body of knowledge as well.

Knowles principles of adult learning are based upon four core assumptions (Potts, & Davis, 2009):

1. Adults are self-directed in planning and evaluation their learning
2. Adults learn through experience
3. Adults have problem-solving approach to learning
4. Adults learn best when the material is relevant and useful

Although andragogy is referred to as adult learning theory, there continues to be a place in adult education for pedagogy. Education, especially clinical education, occurs along a continuum dependent upon the learner needs (Hartland, 2009).



It is important for the CRNA CE to recognize that the needs of the learner will be different at different stages of their training (Clapper, 2009). The SRNA in their first weeks of clinical training, and the more senior SRNA orienting to a specialty area may require total instruction versus supervision or observation. The senior student who is near graduation may resent total instruction, instead preferring a supervision and observational model of instruction.

David Kolb's theory of experiential learning melds within the concept of adult learning theory (Cercone, 2008). The basis of Kolb's theory is that learning is a continuous process that is based upon experience (Cercone, 2008). Kolb describes experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). Experiences are grasped either through apprehension (participation in the actual experience) or comprehension (abstract conceptualization outside of the actual experience) (Lisko & O'Dell, 2010). Kolb defines four learning styles and states that learners have a preference for one style over another (Lisko, & O'Dell, 2010; DiBartola, 2006).

1. Accommodators: apprehension and hands-on experimentation
2. Divergers: apprehension, but internalize through reflection
3. Convergers: comprehension; consider the abstract separate from the actual experience
4. Assimilators: comprehension, but internalize the learning

Understanding these learning styles will help the CRNA CE better structure the learning experience in the clinical setting to meet the needs of the individual student, especially as the

SRNA begins their clinical experience (Sewchuk, 2005). Rather than labeling a student who tends to stand back and be less participatory as being tentative, that student may have a more assimilator type learning style. It will be through this type of understanding that the CRNA CE will be better prepared to accommodate and supplement the learning needs of the student. Although learners have a preference of one style over another, they can be encouraged to utilize all learning styles to maximize their learning experiences (McDonough, Loriz, Macha, 2009).

Kolb's learning theory further explains the acquisition of knowledge through the Experiential Learning Cycle of concrete experience, reflection, abstract conceptualization, and active experimentation (Sewchuk, 2005). As the SRNA spends approximately 2 years and over 2200 hours in the clinical area gaining experience, the hands on experiential learning that takes place for these adult learners is powerful. Having a basic understanding of these theories and their impact on the teaching and learning experience in the clinical setting can empower the CRNA to gain an understanding of the process that they are involved with when working in the role of a CE.

Additionally, the intervention for this SCP involves an on-line educational model to educate and support the CRNA in their role as a CE. The researcher needs to prioritize adult learning theory when constructing an on-line course. A concept central to adult learning and to on-line learning is the ability for self-directed learning (Cercone, 2008). It is also important to consider the added demands on the adult life-style, such as family and work obligations (Myrick, et al., 2011). The on-line educational intervention was divided into short (approximately ten minute) modules that the learner was able to access at their convenience to promote flexibility. There were research articles available within each module for additional learning if the CRNA so desired.

Literature Review and Synthesis

There were two components central to the design of this SCP. One related to the education of the CE and its impact on both the satisfaction and knowledge of the CE. The other component related to the mode of education delivery; on-line educational format versus traditional lecture or face to face education.

Terminology

The term ‘preceptor’ was used in many studies (Larsen & Zahner, 2011; Parsons, 2007; Riley-Doucet, 2008; Sandau, Cheng, Pan, Gaillard, & Hammer, 2011; Zahner, Tipple, Rather, & Schendzielos, 2009) and it was also used as a key search term in the literature search. Preceptor, as defined by Parsons (2007) is “an experienced nurse who develops a 1-1 limited relationship with a nursing student, providing guidance and supervision to promote his/her clinical competence and skill development” (p.1). Larson & Zahner (2011), Riley-Doucet (2008), and Zahner, et al. (2009) define preceptor similarly. Elisha (2008) described this clinical teaching role as clinical educator. Hartland, Biddle, and Fallacaro (2003) described the CE role as a ‘clinical teacher’. For purposes of this manuscript the terms used will remain consistent with the study authors’ use of the term preceptor, clinical educator, or clinical teacher. The researcher for this SCP uses the term ‘clinical educator’ to describe a staff CRNA who is providing clinical education and support for the SRNA in the clinical setting.

Role Development of the Clinical Educator

There is an abundance of literature supporting the use of and the importance of CEs within various healthcare disciplines. The literature demonstrated that a support system is important for development and support of those roles (Bolderston, Palmer, Feuz, Tan, 2010;

Marfell, 2011; Myrick, Yonge, Billay, 2010, Newman, Sandridge, Lesner, 2011, Culleiton, 2010). Seven articles were reviewed (Elisha, 2008; Larsen, & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Riley-Doucet, 2008; Sandau, et al., 2011; Zahner, et al., 2009) that directly studied the impact of education on the role of the clinical preceptor/educator. Although each of these studies looked at the impact of education on the role of the preceptor, the variables of interest were slightly different between studies. Larsen & Zahner (2011), Parsons (2007), and Zahner, et al., (2009) had similar study designs, similar methods, and measured the same variables; self-efficacy and knowledge. Elisha's (2008) study looked at perceived knowledge and behavior. Sandau et al. (2011) measured confidence and comfort in the role of the preceptor as well as knowledge and satisfaction. Riley-Doucet's (2008) study was aimed at improving both confidence in the preceptor role as well as knowledge about the role. Myrick, et al. (2011) were interested in determining how the education will influence the preceptors approach to teaching and learning.

Six of these seven studies involved sample groups of RNs (Larsen, & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Riley-Doucet, 2008; Sandau, et al., 2011; Zahner, et al., 2009) whereas only one utilized CRNAs (Elisha, 2008). A major difference between the two groups was graduate education within the anesthesia group and undergraduate education within the nursing group. A second major difference was the type of clinical site in which the student and preceptor were engaged. The studies ranged from public/community health nursing (Larsen, & Zahner, 2011; Parsons, 2007) to in-patient, hospital settings (Elisha, 2008; Myrick, et al., 2011; Riley-Doucet, 2008; Sandau, et al. 2011; Zahner, et al. 2009).

The study design for each of these research projects was quasi-experimental. Elisha (2008), Larsen & Zahner (2011), Parsons (2007), Riley-Doucet (2008), and Zahner, et al. (2009)

utilized a one group quasi-experimental design with a pre/posttest format. Polit and Beck (2010) state that the lack of a control group “does not eliminate the possibility of conducting research with integrity” (p. 233), although additional factors may need to be considered when studying the outcome results. A time-series design, where the data is collected over a period of time both before and after the intervention, can help to eliminate or discern some of the other possible causative factors. In addition to the pre/posttest design, Elisha (2008), Larsen & Zahner (2011), Parsons (2007), and Zahner, et al. (2009), also had follow-up testing ranging from two to six months following intervention which helped to increase the validity of their studies. The sample group and survey design remained constant with these studies, which further increased their validity (Melnik & Cole, 2010). All of the studies utilized a questionnaire or survey to measure outcome scores.

Elisha (2008) reported that an eight hour educational workshop significantly improved both perceived knowledge and perceived behavior of the CRNA CE. Larsen & Zahner (2011), Parsons (2007), and Zahner, et al. (2009) reported significant increases in both self-efficacy and knowledge post course. Having three studies so closely related adds to the validity and reliability of the study. Sandau, et al. (2011) reported significant increase in the preceptor education group in confidence and comfort following their workshop. There was no significant difference though, between the group not receiving the education compared to the group who had received the intervention. There were also mixed results regarding satisfaction scores among the two groups. Riley-Doucet (2010) documented strong satisfaction scores with non-traditional education methods but did not have statistically significant data for support. She also was able to document a mastery of the course content.

On-line Education

The previous seven studies, that looked at preceptor education as an intervention, can be further sub-divided into the type or mode of educational delivery offered. Four (Larsen & Zahner, 2011; Parsons, 2007; Riley-Doucet, 2008; Zahner, et al., 2009) of the seven articles looking at preceptor development utilized an on-line format for educational delivery. Traditional educational models of workshops and seminars have drawbacks including cost, staff time, faculty time and availability, and dissemination of information. On-line education has the ability to alleviate these burdens (Myrick, et al., 2011). Additionally, as informatics takes on a more prominent role in health care today, it is imperative for nurses to begin to utilize and take advantage of the resources available.

As previously stated, Larsen & Zahner (2011), Parsons (2007), and Zahner, et al. (2009) had similar studies. Larsen & Zahner (2011), and Parsons (2007) showed a significant increase in both self-efficacy and knowledge following the on-line course. Zahner et al. (2009) demonstrated a significant increase in preceptor knowledge post-course but there was no significant difference in self-efficacy scores. Myrick, et al., (2011) utilized a grounded theory, qualitative design to study the impact of on-line education. Their results reflected the previous studies findings and concluded that, “on-line preceptor support is a feasible, facilitative and an accessible medium by which to provide ongoing professional development for preceptors” (p. 267). These studies demonstrated that an on-line educational format is a viable option for educational content delivery.

DeWolfe, et al., (2010) undertook a systematic review to synthesize and appraise evidence for successful strategies to support and prepare both the preceptor and students. Forty-

seven studies were included, and thirty four of those focused specifically on preceptor support through workshops, individual training and support, or a combination of the two. Again, these studies were related to the RN preceptor role. The authors concluded that all types of educational intervention had a positive impact on the preceptor role. They also found that any length of time, from a one hour class to a three day workshop, had a positive impact. They concluded that through-out the thirty four studies, there was not one specific model that emerged as the best approach to preceptor role development but that on-line education is an area for further development and exploration.

Comparison of Mode of Education Delivery: On-line versus Traditional Classroom

Two additional studies included in this literature review (Chang, Hsiao, Chang, & Lee, 2008; Ray & Berger, 2010) are studies that compared two modes of educational delivery; a traditional classroom type setting compared to on-line learning. Chang, et al., (2008) utilized an experimental design in which RNs were randomly assigned into one of two groups. The groups were exposed to a different mode of education and the outcomes between the two groups were compared utilizing a post-test design. Ray & Berger, (2010) utilized a quasi-experimental design that included a control group.

The specific purpose of the educational intervention in these two studies was to compare the modes of educational delivery. A control group received traditional class-room education while the experimental group received a non-traditional mode of delivery. They each utilized a knowledge or skills mastery test, as had been previously used for outcome measurements, to measure educational outcomes.

Chang, et. al, (2008) noted that there were no statistical differences in satisfaction scores between the two groups. All knowledge scores were passing. Ray & Berger (2010) stated that

there were no significant differences between the groups in their study in relation to knowledge scores, but did not offer data numbers or statistics. They further concluded that there were no significant differences between the satisfaction scores within the two groups but again, they offered no statistics to support their claim.

Synthesis of the Literature

Multiple reviews and search strategies were done in preparation for this literature review. Although multiple disciplines were explored; anesthesia, pharmacology, medicine, physical/occupational therapy, the discipline of nursing provided the greatest body of literature. The literature available in nurse anesthesia, relating to the development of the clinical educator is sparse. In light of the mandated requirement from the Council on Accreditation for Nurse Anesthesia Education, which requires programs of education to provide clinical faculty support, one would expect a greater breadth of research available. The study by Elisha (2008) was a well-designed, quasi-experimental, time - series study which addresses one component of the clinical question. The eight hour work-shop showed significant improvement in both knowledge and satisfaction for the CRNA CE. Since this was one of the few research studies involving the CRNA, and the most recent, it served as a seminal piece of evidence for this SCP. It also underscores the importance of the need for increased evidence to support the development of programs to improve the role satisfaction and knowledge of the CRNA CE.

Multiple sources of evidence support both parts of the clinical question; that education of some design, improves the role satisfaction and knowledge of the clinical educator (DeWolfe, et. al, 2010; Elisha, 2008; Larsen, & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Riley-Doucet, 2008; Sandau, et. al, 2011; Zahner, et. al, 2009), and that on-line education is a viable

mode of educational delivery (Chang, et. al, 2008; Larsen & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Ray & Berger, 2010; Riley-Doucet, 2008; Zahner, et al., 2009).

On-line education was an important component of this SCP. The more recent literature (Larsen, & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Riley-Doucet, 2008; Zahner, et. al, 2009) is beginning to show that on-line education for the preceptor is a viable mode of delivery. There is no evidence from the nurse anesthesia literature regarding on-line education for the CRNA CE. Technology is used daily in the clinical practice arena, both in caring for patients as well as the electronic health record (EHR) navigated. It is essential for clinicians to begin to use this technology to its' full capabilities, and for the betterment of clinical practice and patient care.

The clinical question addressed through this SCP was an educational program to improve the satisfaction and knowledge of the CRNA CE, and to be able to deliver that education in an on-line format. The systematic review from DeWolfe, et al., (2010), underscored one of the difficulties with the clinical educator or preceptor role development. There was no one program or one strategy that stood out as a 'best practice' model for the educational content or mode of delivery.

Summary

It is clear from the evidence that clinical faculty development needs to be provided for clinical educators. Regardless of the type of education and regardless of the mode of educational delivery, there is a consensus from this body of literature that the knowledge and satisfaction of the preceptor is positively impacted. There is also a consensus that on-line education is an effective mode of delivery. It was the intent of this SCP to add to this body of knowledge and to further advance the use of technology for the betterment of our profession.

Chapter Three

Methodology

The SCP had two goals; to determine whether an educational intervention would increase the knowledge and satisfaction of the CRNA CE, and whether an on-line format was an acceptable mode of educational delivery. The clinical site for implementation of the SCP is a large teaching institution that supports a school of nurse anesthesia. The SCP was implemented within the anesthesia department of the clinical site. There are approximately 250 staff CRNAs employed within the anesthesia department. Prior to implementation, IRB approval was obtained from St. Catherine University (12-N-39) as well as the participating clinical site (12-007-011). Participation in the project was voluntary and participants were able to withdraw at any time without repercussions.

Design

The SCP was a quasi-experimental, time-series design with convenience sampling. All staff CRNAs (approximately 250) were invited to participate via e-mail invitation (Appendix B). One follow-up e-mail invitation was sent in an attempt to increase the sample size. The resultant number of CRNAs agreeing to participate was 40. The intervention for the SCP was an on-line educational program developed by the researcher. Two survey tools were utilized as measurement tools for data gathering. One survey measured knowledge and satisfaction of the CRNA CE. The second survey measured feasibility of on-line education as well as relevance and structure of the course content. Prior to implementation, an e-mail was sent to each CRNA explaining the format of the educational program, the surveys requested, as well as a link to the pre-course survey. Participants were informed that completion of the survey constituted implied consent (Appendix C).

System Change Project Intervention: On-line Educational Program

The intervention for the SCP was an on-line educational program to increase the knowledge and satisfaction of the CRNA CE. The educational program was developed by the researcher. Multiple resources and experts in the field of CE were utilized in course development.

There is a gap within the anesthesia literature regarding clinical education. Elisha (2008) provides a seminal piece of evidence for this project. The educational content for this SCP was based upon results from that study. Those recommendations included, “adult-learning principles, establishing positive teacher-learner relationships, providing positive feedback, and conducting student evaluations” (p. 290). Additionally, experts within the field of clinical education in physical therapy were consulted as were faculty within the school of nurse anesthesia. Prior to final completion of the course content, the director of a nationally renowned school of nurse anesthesia reviewed and approved course content with the researcher.

The resultant educational program for the SCP was divided into six content areas which are; Introduction to Clinical Education, Knowledge and Learning, Ethical Being, Critical Thinking, The Exceptional Student, Student Evaluations, and a short conclusion module. Each content area consisted of a recorded power point lecture utilizing Camtasia software for audio input. Learning objectives as well as a current research article relevant to the topic were included in each content area. The audio lectures were eight to eleven minutes in length. A goal of dividing the program into short segments was to allow CRNAs to access them during their available time or at a time that was most convenient to each individual.

The program was accessible via Blackboard Educational Technology, version 9.1. The supporting clinical site avails Blackboard Educational Technology to all employees at no cost.

There is a strong technological infrastructure to support online activity at the supporting clinical site. Participants were able to access the program from any private or public computer inside or outside of the participating institution.

Survey Tool

Each participant was asked to complete a pre-course survey, an immediate post-course survey, and a two month post-course survey. The survey was developed by the researcher within REDCap (Research Electronic Data Capture). It was developed to measure both knowledge and satisfaction of the CRNA CE (Appendix D). The survey questions were adapted from survey questions used in a previous study with permission of the author (Elisha, 2008). The questions were sent to nurse anesthesia faculty members for feedback as well as the researcher's advisor. Finally, the researcher met with a consultant within the survey research department for final feedback and clarification.

The pre-course and two month post-course surveys were administered through REDCap. Participants were given ID numbers through a REDCap survey administrator. The data collected were anonymous to the researcher. The immediate post-course survey was embedded in the course and although the results were anonymous to the researcher, they were also anonymous to the REDCap survey administrator. Therefore, the REDCap survey administrator was unable to match the responses to the ID numbers previously provided to the respondents. The researcher was unable to match pre-course survey results to the immediate post-course survey results.

An additional survey was utilized at the conclusion of the educational program relating to feasibility of online education as well as course content (Appendix E). The survey used was adapted from an online survey template used at the supporting clinical site for ongoing education. The survey was administered through REDCap and the results were anonymous.

Implementation

The SCP was implemented in September, 2012. Participating CRNAs were enrolled in the course via Blackboard Technology and were provided instructions and support for log on information. The program was made available to the participants for a six week time interval. There were no limits to the number of times they accessed the course.

Thirty-seven participants completed the pre-course survey. Thirty participants completed the educational program and completed the course-content survey. Of those participants completing the course, twenty-eight completed the post-course survey.

An e-mail was sent to all project participants in January of 2013 via the REDCap survey center (Appendix F). Each participant was asked to complete the two month post-course survey. Two additional e-mail reminders were sent with a total of twenty participants completing the two month post-course survey. There were no identifying factors with the data collected and individual responses were anonymous to the researcher.

Resources

Resources needed for the SCP development, implementation, and evaluation are shown in Appendix G. The clinical site supporting this SCP, utilizes three shields representing practice, education, and research as its emblem. Integrating these three shields into daily practice is an organizational value and a part of the organizational culture. As noted on the finance budget, the monetary cost to the researcher for development, implementation, and evaluation is \$0.00. No direct monetary benefits will come from this SCP. Appendix H describes the cost/benefit analysis of this project if it were implemented through-out the entire CRNA practice at the supporting institution. The resultant return on investment (ROI) is 2.84% (Appendix I).

Summary

A quasi-experimental, time series design project was developed to determine if an educational program might impact the knowledge and satisfaction of the CRNA CE. Survey tools were developed utilizing evidence from the literature as well as expert consultation to test whether the intervention of the educational program had an impact. The project was implemented within a large anesthesia department that supported a school of nurse anesthesia.

Chapter Four

Data Analysis

The researcher gathered data surrounding two subject matters. One was whether on-line education was an acceptable mode of delivery and whether the course content was relevant to practice. The other was the impact the educational program had on the knowledge and satisfaction of the CRNA when working in the role of a CE.

Survey I: Course Content and Feasibility

Forty CRNAs agreed to participate in the SCP. Thirty CRNAs completed all six modules of the program and completed the course content survey at the end of the program (N = 30). The survey and the results are summarized below:

Table 1. Course Content and Feasibility

Question	Results	
1. This course was appropriate for on-line learning?	Strongly disagree:	4 (13%)
	Disagree:	0 (0%)
	Agree:	10 (33%)
	Strongly agree:	16 (53%)
2. How much time did it take to complete this course?	45 minutes	1 (3%)
	60 minutes	6 (20%)
	1 hour, 15 minutes	8 (26%)
	1 hour, 30 minutes	8 (26%)
	1 hour, 45 minutes	7 (23%)
3. The time it took to complete this course was:	Too short	0 (0%)
	Just right	25 (83%)
	Too long	5 (16%)
4. The teaching strategies (i.e. power point, audio input, etc.) used were appropriate for the course.	Strongly disagree	2 (7%)
	Disagree	1 (3%)
	Agree	16 (53%)
	Strongly agree	11 (37%)

5. The content was applicable to my practice/job responsibilities.	Strongly disagree	2 (7%)
	Disagree	0 (0%)
	Agree	10 (33%)
	Strongly agree	18 (60%)
6. How much of the content/information was new to you?	0 – 19%	5 (17%)
	20 – 39%	9 (30%)
	40 – 59%	10 (33%)
	60 – 79%	4 (13%)
	80 – 100 %	2 (7%)
7. How much of the information was worthwhile review?	0 – 19%	0 (0%)
	20 – 39%	2 (7%)
	40 – 59%	5 (17%)
	60 – 79%	4 (13%)
	80 – 100 %	19 (63%)
8. Your overall rating of this course?	Poor	0 (0%)
	Fair	2 (7%)
	Good	8 (27%)
	Excellent	20 (67%)

The overall response to the course was positive. Twenty-six (87%) CRNAs agreed or strongly agreed that the on-line format was an acceptable mode of delivery. Twenty-eight (94%) CRNAs gave an overall rating of good to excellent for the program. There was variability with respect to time needed for completion of the course from forty-five minutes (one CRNA) to one hour, forty-five minutes (seven CRNAs). The majority of CRNAs (16 or 54 %) spent one hour, fifteen minutes to one hour, 30 minutes to complete the program.

There was greater variation regarding course content and new knowledge (question #6). Five CRNAs (17%) thought that only 0 – 19% of the content was new knowledge while two CRNAs (7%) thought that 80 – 100% of the course content was new knowledge. The majority of the participants, 19 CRNAs (63%), thought that 20 – 59% of the course content was new

knowledge. Subsequently, 19 CRNAs (63%) found that 80 – 100% of the course content was worthwhile review.

Survey II: CRNA Clinical Educator Role

A major purpose of the educational intervention was to increase the knowledge and satisfaction of the CRNA working in the CE role. Participants were asked to complete a pre-course survey, an immediate post-course survey, and a two month follow up survey. All three surveys were identical. There were six possible responses to each survey question, ranging from completely disagree (1) to completely agree (6). The final four questions were related to demographic data collection. The data collected was analyzed utilizing descriptive statistics through JMP 9.0 software.

Pre-Course Survey and Immediate Post-Course Survey

All staff CRNAs were invited to participate. Forty CRNAs volunteered to participate in the SCP which represented an approximate positive response rate of 16%. Thirty seven CRNAs completed the pre-course survey. Although thirty CRNAs completed the on-line course (73% of participants), only twenty-eight CRNAs completed the immediate post-course survey. The pre-course survey was administered via the REDCap survey center. A survey center administrator provided each participant with an ID number that was blinded to the researcher. The immediate post-course survey was embedded in the conclusion module of the on-line educational program. The survey administrator was unable to match ID numbers to those survey results. Subsequently, the researcher was unable to match the pre-course survey responses to the immediate post-course survey responses. The table below compares the means and the standard deviation between the sum of the two groups; pre-course survey and immediate post-course survey.

Table 2: Comparison of pre-course survey means and immediate post-course survey means

Question:	Pre-Course Survey; N = 37		Immediate Post-Course Survey; N = 28	
	Mean	± SD	Mean	± SD
1. I maintain student privacy and confidentiality.	5.29	0.845	5.25	0.887
2. I form an opinion of the SRNA and their performance based on my own perceptions and interactions with that individual.	5.00	0.881	5.00	0.881
3. I maintain patient safety and quality of care related to institutional policies and procedures, while working with the SRNA.	5.64	0.949	5.678	0.475
4. My teaching style reflects the individual needs of the SRNA that I instruct.	4.72	0.804	4.75	0.927
5. I adapt my role depending on the experience level of the SRNA.	5.48	0.606	5.10	0.875
6. I facilitate the SRNA to develop an anesthetic plan and problem solve independently within his/her scope of experience and practice.	5.10	0.606	5.07	0.857

7. I provide constructive feedback.	5.00	0.881	4.96	0.838
8. I provide daily feedback through both written and verbal evaluations.	5.00	1.105	5.21	0.786
9. I complete each item and provide constructive comments on the daily evaluation form.	4.78	1.181	4.92	0.813
10. I have knowledge and expertise to offer to the SRNA.	5.35	0.715	5.32	0.722
11. I am a resource for the SRNA.	5.54	0.605	5.50	0.745
12. I promote and model reflective practice and critical thinking skills.	5.24	0.683	5.28	0.712
13. I interact respectfully with the SRNA.	5.54	0.605	5.57	0.634
14. I enjoy working in the role of a Clinical Educator (CE).	5.16	0.897	5.14	0.848
15. I feel that I positively impact the SRNAs that I teach.	5.00	0.745	5.14	0.755
16. I improve my professional practice when I work as a Clinical Educator.	5.18	0.844	5.28	0.854

*scale from 1 - 6
1=completely disagree
2=strongly disagree
3=disagree
4=agree
5=strongly agree
6=completely agree

Comparing means between the pre-course survey and the immediate post-course survey, there is no significant difference between the means. It is expected that there would not be a considerable change between the pre-course and immediate post-course survey since the CRNA had not had an opportunity to incorporate the information from the educational modules into their practice. There also needs to be consideration given to the fact that not all of the CRNAs who completed the pre-course survey (N = 37), took the course (N = 30) and completed the immediate post-course survey (N = 28). It is difficult to draw significant evidence based conclusions from this data.

Pre-Course Survey and Two Month Post-Course Survey

The pre-course survey and the two month post course survey were administered through the REDCap survey center. Each participant was given an identification number that maintained anonymity for each participant. Although there were twenty responses to the two month post-course survey, only eighteen of those participants had completed the course, and the pre-course survey (45% of participants). Therefore the number of participants and their respective survey responses that the researcher compared was eighteen (N = 18).

As with the previous survey, the data was analyzed using JMP 9.0 software. The researcher used the Wilcoxon matched pair signed rank test to analyze the data. The Wilcoxon signed rank test is a non-parametric test which is considered a counterpart to the paired *t* test when outcomes are being measured on an ordinal scale (Polit, 2010). The test is useful with small sample sizes and with non-normally distributed populations. Utilizing matched pair analysis will compensate for respondent bias. It is appropriate to use when there are two paired groups or when subjects serve as their own control, such as a pre-post survey design. Rather

than looking at the actual value, the Wilcoxon signed rank test will provide information regarding the differences between the magnitudes and signs of paired observations. It tests the hypothesis that there is a difference between the means of matched pairs. There are two possibilities with this test. First, the null hypothesis, that the intervention had no effect on the knowledge and satisfaction of the CRNA CE following the educational intervention. Second, that a change has occurred as a result of the educational intervention and the magnitude of that change. Table 3 shows the results of the Wilcoxon signed rank test following merging of the pre-course survey data with the 2 month post-course survey data.

Table 3: Pre-Course Survey merged with Two Month Post-Course Survey (N=18)

Question	Pre-Course Survey	2 Month Post-Course Survey	Change between Surveys	One-Tailed Signed Rank p value	Significant (p ≤ .05)
	Mean: ± SD	Mean: ± SD	Mean: ± SD		
1. I maintain student privacy and confidentiality.	5 ± 0.970	5.55 ± 0.511	0.555 ± 0.98	0.0078	Yes
2. I form an opinion of the SRNA and their performance based on my own perceptions and interactions with that individual.	4.66 ± 0.916	5.166 ± 0.785	0.555 ± 1.03	0.0176	Yes
3. I maintain patient safety and quality of care related to institutional policies and procedures, while working with the SRNA.	5.388 ± 1.243	5.833 ± 0.383	0.444 ± 1.196	0.062	No

4. My teaching style reflects the individual needs of the SRNA that I instruct.	4.722 ± 0.826	4.944 ± 0.802	0.222 ± 0.729	0.179	No
5. I adapt my role depending on the experience level of the SRNA.	5.333 ± 0.685	5.444 ± 0.615	0.111 ± 0.581	0.343	No
6. I facilitate the SRNA to develop an anesthetic plan and problem solve independently within his/her scope of experience and practice.	5.055 ± 0.802	5.222 ± 0.548	0.166 ± 0.704	0.265	No
7. I provide constructive feedback.	4.833 ± 0.923	5.055 ± 0.802	0.222 ± 0.729	0.171	No
8. I provide daily feedback through both written and verbal evaluations.	4.888 ± 0.900	5.388 ± 0.777	0.500 ± 1.094	0.046	Yes
9. I complete each item and provide constructive comments on the daily evaluation form.	4.444 ± 1.293	5.166 ± 0.923	0.722 ± 1.124	0.011	Yes
10. I have knowledge and expertise to offer to the SRNA.	5.222 ± 0.646	5.333 ± 0.685	0.111 ± 0.674	0.363	No
11. I am a resource for the SRNA.	5.333 ± 0.685	5.388 ± 0.697	0.055 ± 0.538	0.500	No
12. I promote and model reflective practice and critical thinking skills.	5.055 ± 0.725	5.222 ± 0.732	0.166 ± 0.615	0.226	No
13. I interact respectfully with the SRNA.	5.388 ± 0.607	5.500 ± 0.618	0.111 ± 0.471	0.312	No
14. I enjoy working in the role of a Clinical Educator (CE).	5.000 ± 1.028	5.000 ± 1.028	0.000 ± 0.594	0.500	No

15. I feel that I positively impact the SRNAs that I teach.	4.777 ± 0.732	5.000 ± 0.766	0.222 ± 0.547	0.109	No
16. I improve my professional practice when I work as a Clinical Educator.	5.055 ± 0.872	5.111 ± 0.676	0.055 ± 0.636	0.500	No

*scale from 1 - 6
 1=completely disagree
 2=strongly disagree
 3=disagree
 4=agree
 5=strongly agree
 6=completely agree

Four of the survey questions (#’s 1, 2, 8, and 9) showed a significant increase between the pre-course and the two month post-course survey data. Although all of the other means (except questions # 14, which didn’t change) increased from pre to two month post-survey, it was not to a significant level. The four questions that showed a significant increase in mean scores related to knowledge in the role of the Clinical Educator. None of the questions related to satisfaction in the role of the CRNA CE (questions 13 – 16) showed a significant increase following the intervention. The data analysis demonstrated that the educational intervention had a significant, positive effect on some aspects of the knowledge of the CRNA working in the role as a CE.

Summary

The results from the SCP demonstrated that there is a place for on-line education within the CRNA practice environment in the supporting institution. Not all questions on the role development survey demonstrated a significant change between pre-course implementation and two-month post course implementation. There is evidence to support some aspects of knowledge development in the role of a CRNA CE had been impacted, both positively and significantly.

Chapter Five

Clinical education, provided by staff CRNAs, is a fundamental component to nurse anesthesia education. Even though the Council on Accreditation for schools of nurse anesthesia require programs to offer clinical faculty development and support, there remains a gap in the literature regarding best practice to support CRNA clinical faculty. There were two goals of the SCP. First, whether an educational component could increase the knowledge and satisfaction of the CRNA CE while working in the role of a CE. Second, whether that education could be effectively delivered in an on-line format. Surveys were utilized as measurement tools to determine if these goals were met.

Discussion

A study, central to the development of the SCP, was conducted by Elisha in 2008 as a model to support the CRNA CE. Utilizing an eight hour workshop, Elisha was able to demonstrate a significant increase in both perceived knowledge and behaviors in the role of the CRNA CE. From these findings, he developed four topic areas that had the most significant impact on the CRNA CE. Those topic areas included, adult learning principles, developing positive teacher-learner relationships, providing positive feedback, and conducting student evaluations. These topic areas were utilized in the development of this SCP. There were four items from this SCP that showed significant increases from pre-course survey scores to the two month post-survey scores. These items related to the development of positive teacher-learner relationships, and conducting student evaluations. A striking difference between Elisha's study and this SCP was the time allotted for education delivery and the format of the education. Elisha utilized an eight hour traditional face to face workshop setting while this SCP utilized six short modules delivered in an on-line format which the student was able to access at their convenience.

Elisha utilized a time series designed survey as a measurement tool comparing pre, post, and two month post course results. The time series design survey tool used for this SCP was based on the survey developed by Elisha and used in his study.

There is a body of literature within the discipline of nursing surrounding the role development and support of the preceptor or clinical educator utilizing an educational intervention (Larsen, & Zahner, 2011; Myrick, et.al, 2011; Parsons, 2007; Riley-Doucet, 2008; Sandau, et.al, 2011; Zahner, et.al, 2009). The educational interventions from these studies varied from on-line education modules (Larsen, & Zahner, 2011; Myrick, et.al, 2011; Parsons, 2007; Riley-Doucet, 2008; Zahner, et.al, 2009) to a more traditional workshop setting (Sandau, et. al, 2011). Each of these studies demonstrated an increase in knowledge from pre-course scores to post test scores which is consistent with the results from the SCP. Sandau et al., (2011) measured both knowledge and satisfaction in the preceptor role following a traditional workshop intervention. They were able to demonstrate an increase in knowledge but their satisfaction scores were inconclusive. The SCP is consistent with the literature in that an educational intervention did significantly impact perceived knowledge of the CRNA CE but it was not able to demonstrate an increase in satisfaction of the CRNA working in the role of a CE.

It is important to assess the satisfaction data with awareness of the mean, pre-survey scores. Out of sixteen questions, ten of the mean scores were five (strongly agree) or greater on a scale of 1 – 6. Only one was less than 4.5 (question 9: I complete each item and provide constructive comments on the daily evaluation form.), which was 4.44. Especially meaningful to the researcher, was the mean response to question 14, “I enjoy working in the role of the clinical educator”, which was 5 (strongly agree). It indicated that the participating group of CRNAs (N=18) was a group which already had a strong sense of satisfaction in the role. The possibility

exists, that those who volunteered to participate in and followed through on completion of the SCP are a group of CRNAs who enjoy working in the role of a clinical educator. Therefore, with this sample group of CRNAs, the SCP was unable to significantly increase their already strongly perceived satisfaction in the role of a clinical educator.

The systematic review by DeWolfe, et. al (2010) looked at support and development of the RN preceptor role. They concluded that all types of educational interventions, from a one hour class to a three day workshop, had a positive impact on the role of the preceptor. Following an educational intervention, from traditional workshop settings (Elisha, 2008; Sandau, et. al, 2011) to on-line learning modules (Larsen, & Zahner, 2011; Myrick, et.al, 2011; Parsons, 2007; Riley-Doucet, 2008; Zahner, et.al, 2009) the literature demonstrated an increase in perceived knowledge in the role of the clinical educator or preceptor.

The second goal of this SCP was to determine if an on-line educational format was an acceptable mode of educational delivery. Traditional educational models of workshops and seminars have drawbacks including cost, staff time, faculty time and availability, and dissemination of information. On-line education has the ability to alleviate these burdens (Myrick, et al., 2011) As informatics takes on a more prominent role in health care today, it is imperative for nurses to begin to utilize and take advantage of the digital educational resources available. Chang, et al., (2008) developed an experimental design that compared two modes of educational delivery; a traditional classroom setting verses on-line learning. They noted that there were no statistically significant differences in satisfaction scores between the two groups. Additionally, effective on-line education utilized for support and development of the preceptor has been supported in the literature (Larsen & Zahner, 2011; Myrick, et al., 2011; Parsons, 2007; Riley-Doucet, 2008; Zahner, et.al, 2009). Each of these studies concluded that web-delivered

education was an effective mode of delivery. Utilizing on-line education also allowed increased access to educational programs for nurses (Parsons, 2007). The SCP reflected these findings with 87% of participants indicating that they agreed or strongly agreed that the course was appropriate for on-line learning. A majority of participants (90%) agreed or strongly agreed that the teaching strategies were effective.

Limitations

Invitations to participate had been sent to all staff CRNAs at the participating institution which was approximately 250 CRNAs. Forty CRNAs, or approximately 16%, volunteered to participate. Larger sample sizes are more representative of the population and provide more accurate data. With small sample sizes there is a risk that data will not support the hypothesis, even though the hypothesis may be correct (Polit and Beck, 2006). The final number of participants, who completed the pre-course survey, the educational component, and the two month post-course survey was 18 (N=18). In context of all invited participants (250 CRNAs), this represented approximately 7% of all practicing CRNAs in the participating institution. In context of the forty CRNAs who volunteered to participate, the 18 CRNAs represented a completion rate of approximately 45%. With the small response rate it is important to understand the possibility of volunteer bias (Polit and Beck, 2006). Those CRNAs willing to participate may be different from the general population of CRNAs. According to Heiman (2002), those who volunteer to participate may find the topic more interesting than those who didn't volunteer. It is important to recognize that the data gathered from this SCP may not be representative of the entire group.

The immediate post educational course survey was embedded within the educational course. The REDCap survey administrator was therefore unable to match pre-course survey

scores with the immediate post-course survey scores. Therefore there were limitations as to the information that data could provide. Although mean survey scores were compared (table 2), the significance of the comparison is minimal.

Four of the sixteen survey questions produced significant results. Even though all of the other questions demonstrated an increase between pre and two month post-course survey (except question 14 which remained unchanged), it was not at a significant level to draw conclusions. It would be the work of future researchers to determine whether a larger sample size would demonstrate similar results.

The survey tool used for both the CRNA CE Role and the On-line Education Course and Content were strictly quantitative tools. Although the results were straightforward and seemingly simple to analyze, there were no opportunities for participant comments. Allowing the participants the ability to comment on the course might offer insight as to some of the variability between responses. An area of interest included the variability of time it took to complete all of the modules. Another important area of interest to consider was, why did 13% of participants strongly disagree that this was appropriate for on-line learning? Was it due to different learning styles or was it simply the subject matter? Would all on-line learning be inappropriate or was it just this subject matter? Also, and arguably most importantly, participants would have been able to provide constructive ideas for future development of the course.

Future Recommendations

Moving forward, this SCP needs to be utilized as a base for new knowledge. It is a beginning requirement for providing support for the CRNA CE; not an entity unto itself. According to Reed and Lawrence (2011), a component central to a profession is “that its practice

is accompanied by a dynamic system of knowledge development” (p. 134). There are significant relationships between nursing knowledge, theory, practice, and research. These relationships are neither linear nor hierarchical. They are intertwined with each other and are messy and mangled and dynamic and ongoing (Velasquez, McArthur & Johnson, 2011). It is precisely this messiness and this dynamic structure that leads to the richness of nursing knowledge and theory innovation today. As we move into the twenty-first century we need to continue to develop new paradigms for knowledge generation. With the influx of DNP educated nurses we are positioned to develop and generate nursing knowledge and theory within and around our practice settings.

There are multiple avenues for continued development utilizing the knowledge gained from this SCP. One can attempt to better develop or engage a group of CRNAs to participate in the education in an effort to increase the sample size. A needs assessment can be done utilizing focus groups or surveys in an attempt to better meet the needs of the CRNA group. Each module within the existing SCP can be further developed; especially those knowledge areas that demonstrated a significant change. Simulation is beginning to emerge as a component to preceptor development (Chorpenning, & Krautscheid, 2010); a simulation component can be added to the educational intervention to determine effectiveness. Finally, on-line education can be further developed to include a variety of topics of interest to the CRNA.

Conclusion

The results from this SCP demonstrated that an educational intervention had a significant improvement on some aspects of the role development of the CRNA CE. Four of the twelve knowledge questions demonstrated a significant increase following the educational intervention. Although the researcher was disappointed that there weren't significant increases with other questions, particularly with satisfaction in the role, it seems prudent to not completely dismiss

the results of this study. With most of the pre-course survey scores being 5 (strongly agree) and above, there is a possibility of volunteer bias. Coupled with the small sample size, the researcher believes there is merit in pursuing further research in this direction.

It was also demonstrated that on-line education was feasible and was an acceptable mode of educational delivery for the CRNA group. Moving forward, it would be prudent to continue to explore other topics of interest for on-line education. It will also be important to address the topic areas that seemed to be of greatest benefit to the CRNAs. Through DNP education, it is imperative that system change projects are utilized to continually develop and improve knowledge and processes within nursing practice settings. It is precisely this process that will add to the richness and uniqueness and longevity of our profession.

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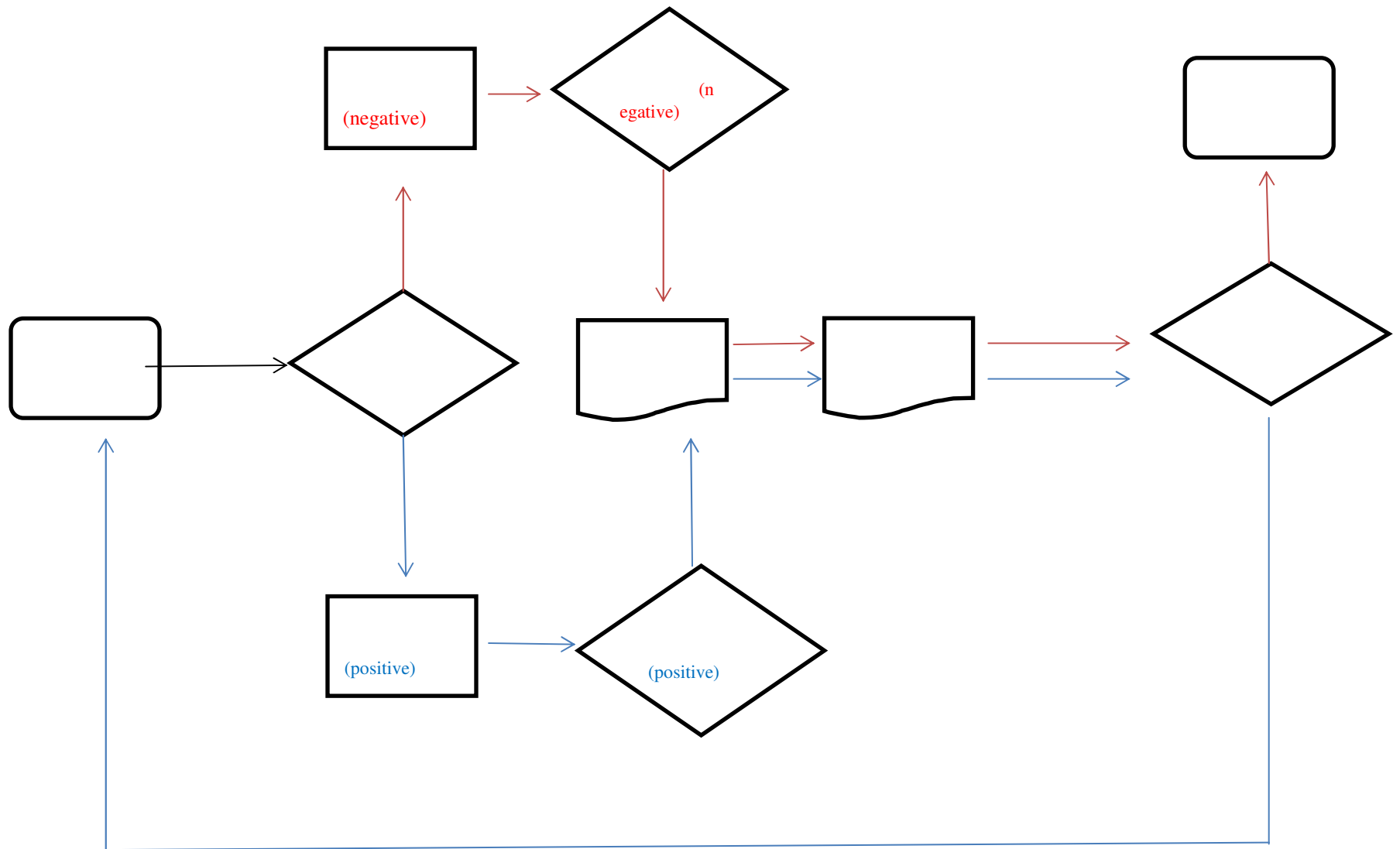
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Appendix A

System prior to implementation of System Change Project



Appendix B

Greetings,

As a part of my DNP course work, I am piloting an on-line educational module to support the CRNA working in the clinical educator role. You are all invited to participate. Participation is voluntary. The total time commitment will be approximately 60 – 75 minutes. The module is split into six segments that take 9 -15 minutes to view, so that the entire educational component does not need to be completed at one sitting. The course will be available on-line for six weeks. You will be able to complete the course at your own pace. There will be a short (20 question) survey before you start the course as well as when you complete the course and at two and six months following the course. There will also be an 8 question survey regarding the course content and format following the course. The class will be available on-line through a program called 'Blackboard'. Blackboard is available for our use via the intranet, is easy to navigate, and there is technical and personnel support if needed. If you are willing to participate, please contact me either by e-mail (Sullivan.ann27@mayo.edu) or phone (3-4895) by Friday, September 19.

Thank-you for your consideration,

Ann Sullivan

Appendix C

Good Morning,

You have all agreed to be a part of a study project titled "Role Development of the CRNA Clinical Educator Utilizing an On-Line Resource". The study is being conducted as a part of my DNP course completion work through St. Catherine University. Your participation in this project is voluntary and you are free to withdraw at any time.

You are being asked to complete this survey prior to commencement of the on-line course. The survey is twenty questions in length and should take less than 10 minutes to complete. You will be asked to complete this same survey when you finish the course, and at two and six months intervals following the course.

The survey has been approved by the Institutional Review Boards of St. Catherine University as well as the Mayo Clinic. There are no risks associated with participating in this study. The survey collects no identifying information of any respondent. All of the responses in the survey will be recorded anonymously. By completing and submitting this survey, you are indicating your consent for the use of the collected data for research purposes.

You will be able to open the survey by clicking on the link.
Thank-you again for your willingness to participate.

Ann Sullivan

Appendix D

CRNA Clinical Educator Role

Please complete the survey below.

Thank you!

1) I maintain student privacy and confidentiality.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

2) I form an opinion of the SRNA and their performance based on my own perceptions and interactions with that individual.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

3) I maintain patient safety and quality of care related to institutional policies and procedures, while working with the SRNA.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

4) My teaching style reflects the individual needs of the SRNA that I instruct.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

5) I adapt my role depending on the experience level of the SRNA.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

6) I facilitate the SRNA to develop an anesthetic plan and problem solve independently within his/her scope of experience and practice.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

7) I provide constructive feedback.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

8) I provide daily feedback through both written and verbal evaluations.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

9) I complete each item and provide constructive comments on the daily evaluation form.

- Completely disagree; occurs in 0 out of 5 teaching experiences
- Strongly disagree; occurs in 1 out of every 5 teaching experiences
- Disagree; occurs in 2 out of every 5 teaching experiences
- Agree; occurs in 3 out of every 5 teaching experiences
- Strongly agree; occurs in 4 out of every 5 teaching experiences
- Completely agree; occurs in 5 out of every 5 teaching experience

10) I have knowledge and expertise to offer to the SRNA.

- Completely disagree
- Strongly disagree
- Disagree
- Agree
- Strongly agree
- Completely agree

11) I am a resource for the SRNA.

- Completely disagree
- Strongly disagree
- Disagree
- Agree
- Strongly agree
- Completely agree

12) I promote and model reflective practice and critical thinking skills.

- Completely disagree
- Strongly disagree
- Disagree
- Agree
- Strongly agree
- Completely agree

13) I interact respectfully with the SRNA.

- Completely disagree
- Strongly disagree
- Disagree
- Agree
- Strongly agree
- Completely agree

- 14) I enjoy working in the role of a Clinical Educator.
- Completely disagree
 - Strongly disagree
 - Disagree
 - Agree
 - Strongly agree
 - Completely agree
- 15) I feel that I positively impact the SRNAs that I teach.
- Completely disagree
 - Strongly disagree
 - Disagree
 - Agree
 - Strongly agree
 - Completely agree
- 16) I improve my professional practice when I work as a Clinical Educator.
- Completely disagree
 - Strongly disagree
 - Disagree
 - Agree
 - Strongly agree
 - Completely agree
- 17) Gender
- Male
 - Female
- 18) Age in years.
- 25 - 30
 - 30 - 35
 - 35 - 40
 - 40 - 45
 - 45 - 50
 - > 50
- 19) Years of experience as a CRNA.
- 0 - 2 years
 - 2 - 5 years
 - 5 - 8 years
 - 8 - 12 years
 - > 12 years
- 20) Highest level of education completed.
- Associate Degree
 - Diploma
 - Bachelor Degree
 - Master Degree
 - Doctoral Degree

Appendix E

On-line Course Evaluation

This course was appropriate for on-line learning.	Strongly disagree Disagree Agree Strongly agree
How much time did it take to complete this course?	45 minutes 60 minutes 1 hour, 15 minutes 1 hour, 30 minutes
The time it took to complete this course was:	Too short Just right Too long
The teaching strategies used were appropriate for the course.	Strongly disagree Disagree Agree Strongly agree
The content was applicable to my practice/job responsibilities.	Strongly disagree Disagree Agree Strongly agree
How much of the content/information was new to you?	0-19% 20-39% 40-59% 60-79% 80-100%
How much of the information was worthwhile review?	0-19% 20-39% 40-59% 60-79% 80-100%
Your overall rating of this course:	Poor Fair Good Excellent

Appendix F

Greetings and Happy New Year to all,

Last September you volunteered to participate in a study project titled "Role Development of the CRNA Clinical Educator Utilizing an On-Line Resource". The study is being conducted as a part of my DNP course completion work through St. Catherine University. Your participation in this project is voluntary and you are free to withdraw at any time.

You are being asked to complete this survey two months after the completion of the on-line course. The survey is twenty questions in length and should take less than 10 minutes to complete. It is identical to the survey taken prior to and immediately following completion of the on-line course.

The survey has been approved by the Institutional Review Boards of St. Catherine University as well as the Mayo Clinic. There are no risks associated with participating in this study. The survey collects no identifying information of any respondent. All of the responses in the survey will be recorded anonymously. By completing and submitting this survey, you are indicating your consent for the use of the collected data for research purposes.

You will be able to open the survey by clicking on the link.

Thank-you again for your willingness to participate.

Ann Sullivan

Appendix G

Resources and Financial Budget

Needed Resources	Estimated Cost	Actual Cost
Program Development; DNP student; Performed on own time	120 hours x \$50.00/hour* = \$6,000.	(developed by DNP student not during work time) \$0.00
Educational Classes for learning Blackboard Technology (for developer)	12 hours at \$100/hour (cost of the educator and the student 12 x \$100 = \$1200.	(Internal education is encouraged by the clinical site) \$0.00
Nurse Anesthesia School Faculty (advise re: course content)	4 faculty members for 1.5 hours: 4 x 1.5 hours x \$50/hour = \$300.	(offered their services to DNP student without charge) \$0.00
Blackboard Technology for each CRNA user	Clinical Site has contract for 15 – 20,000 users without additional costs; unable to obtain actual cost for contract; utilized \$25/user** 30 participants; 30 x \$25 = \$750.	\$0.00
REDCap (Research Electronic Data Capture) Survey Center Advisor	3 one hour sessions spent with REDCap personnel 3 x \$50 = \$150.	Clinical Site is a member of the REDCap consortium; employees are encouraged to use software and support. \$0.00
Statistician	To date: 4 hours at \$50/hour: 4 x \$50 = \$200.	Clinical site has statistician available one afternoon per week for consults for employees engaged in research; statistical program is available for employees \$0.00
Survey Center Consultant	One hour at \$50.00/hour = \$50.00.	A one hour meeting with a survey consultant is covered by the clinical site. \$0.00
Camtasia Software	\$200.	Clinical site has the software available for employee use \$0.00
Media Specialist	6 hours at \$50.00/hour 6 x \$50 = \$300.	Media Specialists are available for use for projects that may improve practice \$0.00

<p>Computers for education participation</p>	<p>Multiple computers available for employee use at clinical site Utilized kilowatt/hour for energy costs Program length 1.5 hour 30 participants Average energy costs = \$.12/hr *** 30 x 1.5 x .12 = \$9.00</p>	<p>\$0.00</p>
<p>Total Costs</p>	<p>\$9,159</p>	<p>\$0.00</p>

* = salary and benefits assumed for all employees = \$50.00/hour.

***=The University of Texas Health Science Center, San Antonio charged a fee of \$25 per student for a one hour class (http://ims.uthscsa.edu/student_support/bb_instr_qa.aspx#prep_2).

*** = Average cost in the United States is \$.12/hour (<http://www.eia.gov/electricity/data.cfm#traderel>).

Appendix H

Costs and Benefits of System Change Implementation

Measurable Costs	<i>SCP pilot program with 40 participants</i>	<i>Implementation to entire CRNA staff of 250</i>	Measurable Benefits	<i>Implementation to entire CRNA staff of 250</i>
Program development time	120 hours x \$50/hour = \$6000	120 hours x \$50/hour = \$6000	Costs avoided (if on-line education is feasible): Not needing to attend one hour lecture during working hours	Total # of CRNAs = 250 Salary/benefits = \$50/hr 250 x \$50 = \$12,500
Blackboard Technology* (use/student)	\$25./student 40 students x \$25 = \$1,000	\$25/student 250 CRNAs x \$25 = \$6,250	Costs avoided: Rental and facilities fee	Assumed: \$250
Computer Costs: Average kilowatt costs/hour**; multiple computers available for employees use at participating clinical site.	\$.12/hour 1.5 hours/user \$.12 x 1.5 x 40 users= \$7.20	\$.12/hour 1.5 hours/user \$.12 x 1.5 x 250 users= \$45.	Costs avoided: Transportation costs since CRNAs will not need to travel to the clinical site on day off from work to attend a lecture; with online format can access at any time	Estimate: 125 of CRNAs not working on day of lecture; need to travel to site. Mileage cost = \$.55/mi x 16 mi (average mileage and commuting distance in the US [US Census Bureau]) 125x\$.55x16 = \$1100
Camtasia Software***	\$200	\$200	Intangible benefits: Increased satisfaction for the CRNA when working in the CE role.	Unable to place a dollar amount value.
Total Measurable Costs	\$10,207 (with only 40 participants)	\$12,495	Total Measurable Benefits	\$13,850

Note. * = The University of Texas Health Science Center, San Antonio charged a fee of \$25 per student for a one hour class (http://ims.uthscsa.edu/student_support/bb_instr_qa.aspx#prep_2).

** = Average cost in the United States is \$.12/hour (<http://www.eia.gov/electricity/data.cfm#traderel>).

*** = Cost of purchasing Camtasia online for personal use (www.SoftWareCasa.com/Camtasia)

Appendix I**Return on Investment (ROI)**

ROI =	$(\text{total benefits} - \text{total costs}) / \text{total costs} \times 100$
ROI =	$(\$13,850 - \$12,495) / \$12,495 \times 100$
ROI =	2.84%