NURSING STUDENTS' ACADEMIC PERFORMANCE WITH FLIPPED CLASSROOM PEDAGOGY IN NURSING PHARMACOLOGY

by

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ABSTRACT

Flipped classroom pedagogy, an alternate to lecture instruction, shifts the focus of student learning from passive to active by facilitating a student-centered classroom environment. When coupled with the innovative uses of educational technologies, instructional delivery and design can be enhanced, thereby impacting student academic performance. Active learning encourages students to construct and apply their own knowledge through active participation in the learning process and collaboration with others in the classroom (Mostrom & Blumberg, 2012). Nursing education regulatory agencies stress implementation of active pedagogical practices and student-centered classroom environments to prepare graduates with essential knowledge and professional skills to practice (Everly, 2013). However, in nursing programs, traditional lecture instruction is repeatedly utilized and argued to be an ineffective approach for students to attain high academic achievement. Additionally, there are concerns that graduate nurses are inadequately prepared with the acquisition of fundamental knowledge of pharmacology and application for safe nursing practice (McLaughlin et al., 2014). The purpose of this quantitative, quasi-experimental study was to determine if flipped classroom pedagogy compared to traditional lecture instruction improved academic performance, thus increasing students' depth of knowledge. The experimental sample included 38 students enrolled in two sections of an associate degree nursing pharmacology course during a summer semester, who received flipped classroom instruction for three of the six modules. Also, 42 students, in two sections from the prior summer term, served as the control group and were entirely taught with traditional pedagogical instruction. Multivariate analysis of variance (MANOVA) between factors indicated no significant

difference in academic performance when comparing the six unit exam and final exam grades of both samples. However, analyzing examination scores of the experimental group after flipped instruction was implemented in three of the six modules, utilizing analysis of variance (ANOVA) repeated measures with covariance, revealed a significant difference on exams in which the participants were instructed with flipped instruction. The study findings suggest flipped classroom pedagogy should not be overlooked as an instructional method effective for nursing pharmacology education; however, the dearth of conclusive evidence on this pedagogical practice indicates further research is needed.

DEDICATION

I attribute my journey toward completion of my dissertation to the unconditional love and motivation from my friends and family. I dedicate my doctoral achievement to my husband, Eric Sirota, and my research work to my two daughters, Charlotte Lillian and Nicole Jessica.

First, I appreciate my mom and dad for being constant cheerleaders throughout all my personal and professional endeavors, continually encouraging me to strive for my dreams. I vividly recall the card my mom sent me, along with one of her infamous care packages, during a time when I encountered a huge academic challenge, during my first year in nursing school. The card's message "Yes, you can" was motivational for me to overcome my discouragement and has remained our inspirational motto throughout other academic difficulties I faced. I know my parents are extremely proud of me and all the letters I have accumulated after my name. I am thrilled that "Yes, I did" and "Yes, I'm done"! Thank you both for your unconditional love and support.

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CHAPTER I

INTRODUCTION

The Institute of Medicine (2011) and the National League of Nursing (2003) stressed the importance of transforming nursing education by implementing active learning instructional methods to meet the changing and diverse needs of millennial learners. In addition to preparing nurses to practice in a changing health care delivery system with increasing complexity, pedagogies should include integrating technology in the learning process and incorporating active and collaborative educational strategies into the classroom (Steiner, Floyd, Hewett, Lewis, & Walker, 2010). Nursing curricula recommend including a variety of evidence-based teaching and learning strategies with flexible learning experiences that reflect how students learn best in a variety of learning course design platforms (NLN, 2003). Recognizing active learning as an indicator of student learning potential is important to ensure academic success, according to Williams and Chinn (2009). This is consistent with the efforts demanded by nursing education regulatory agencies, which are to develop best pedagogical practices with quality classroom environments to bridge the gap between learning facts and applying them (Benner, Sutphen, Leonard, & Day, 2010).

Nursing Pedagogical Practices

Pedagogical practices, along with the nature of the classroom environment, are essential components for nursing students to demonstrate high academic performance. Lecture instruction is entrenched in higher education and the prevailing instructional method utilized in programs of nursing (Everly, 2013). However, traditional lecture style is repeatedly disputed to be an

ineffective approach for contemporary students to learn in nursing education and unquestionably not the best for every student, in terms of learning style and flexibility (Love, Hodge, Grandgenett, & Swift, 2013). This can be attributed to the passive nature of learning and limited student involvement in a traditional classroom environment, thus constraining knowledge acquisition of foundational, factual content and conceptual understanding. With that in mind, there is a growing concern that desired learning outcomes, such as critical thinking and clinical judgment, skills essential to nursing professionals, can be difficult to acquire when conventional teaching methods are utilized.

Nursing curricula encourage educational interventions that generate active learning, which can be accomplished with a student-centered learning environment, be implemented and evaluated for effectiveness (NLN, 2003). Active learning encourages students to construct their own knowledge through active involvement in the learning process and collaboration with others in the classroom setting. Best pedagogical practices are guided by Chickering and Gamson's (1987) seven principles of good practice which include the following: (a) encourages contacts between students and faculty, (b) develops reciprocity and cooperation among students, (c) gives prompt feedback, (d) communicates high expectations, (e) respects diverse talents and ways of learning, (f) emphasizes time on tasks, and (g) encourages active learning. This suggests that utilizing traditional instruction does not meet the principles of good undergraduate education. Therefore, traditional instruction would not be a pedagogical method to select in order to encourage innovation, student involvement, cohesiveness, satisfaction, personalization, task orientation, and individualization. Literature emphasized the need for nurse educators to cultivate and utilize instructional methods that engage students with faculty, each other, and the content (IOM, 2011; Skiba & Barton, 2006). In addition, it has been assumed and demonstrated

that active learning increases learners' depth of knowledge, thereby improving student academic performance (Mostrom & Blumberg, 2012).

Facilitating new directions for active pedagogical practices has been possible with advancements in the internet and technology, thus impacting how students can best acquire knowledge and learn information. Prior to the technological explosion, students accessed and received instruction of content by attending classes, listening to the teacher, and transcribing notes (passive learning). However, as a matter of everyday routine, technology is currently utilized to obtain an abundance of factual (as well as non-factual) information through the internet (Miller, McNear, & Metz, 2013). Skiba and Barton (2006) agreed nearly all college students prefer to receive information via internet or mobile technology like smartphone or iPad, at their convenience. Students become increasingly frustrated with listening to a traditional content-rich lecture and find this method of learning a waste of time when technology is available to provide options for acquiring information efficiently (Blouin, Joyner, & Pollack, 2008).

Technological innovations have impacted the design and delivery of instruction with the establishment of electronic learning (e-learning) environments. Gorder (2008) and O'Toole and Absalom (2003) explored how technology facilitates student-centered teaching with different educational modalities such as web enhanced instruction, online, or blended, which have been established to be effective platforms to educate adult learners (Dimitrova, Sadler, Hatzipanagos, & Murphy, 2003; Zsohar & Smith, 2008). Blended learning strategies rely on an online learning platform that uses various technological tools combined with face-to-face class meetings with various interactive online learning activities (O'Toole & Absalom, 2003). This learning modality holds promise to facilitate a classroom environment for students to participate actively

with each other, the instructor, and meaningful learning experiences with the added benefit of incorporating emerging technologies in the online environments (Billings, Connors, & Skiba, 2001).

In addition, blended learning environment research yields positive evidence on quality student learning experiences and academic outcomes (Delialioglu, 2012). This instructional method provides an opportunity to shift the focus of learning from remote recall (passive learning), to emphasis on application of concepts (active learning) (Phillips, 2005). Greer and Mott (2009) emphasized that blended instruction also promotes transfer of learning due to the engaging and accommodating learning environment established for adult learners. Transfer of learning occurs with a student making a connection between existing knowledge and constructing new knowledge (Paily, 2013). Other advantages of this instruction include activating different learning domains and facilitating students to be self-directed, motivated, and accountable for individualized learning (Schlairet, Green, & Benton, 2014). Higher education institutions view this approach to be cost effective and students favor this instructional modality to be flexible, convenient, and engaging **(**Miller et al., 2013; Phillips, 2005). Rethinking how to deliver instruction that is innovative, personalized, involved, task oriented, interactive, and individualized is preferred in higher education and paramount to facilitate knowledge retention and enhance learning.

Flipped Classroom Pedagogy

Flexible, personalized, and engaging educational practices are the primary impetus for the emergence of a pedagogical strategy referred to as the flipped classroom model, interchangeably known as the inverted classroom. The flipped classroom is an educational strategy associated with an extension of a blended learning approach (Berrett, 2012). The

flipped model emulates the strengths of the blended learning model in the following ways. First, the affordances of technology have made it possible to make traditional lecture instruction accessible via the online learning space. Second, offloading lecture instruction to online can reduce content overload in the classroom environment and promote opportunities for active and collaborative learning to occur. The intention is for students to apply previously learned knowledge, acquired from the online platform, in the classroom environment, thus developing a better conceptual understanding of material and potentially improving academic achievement (King & King, 2010; McLaughlin et al., 2014).

The flipped classroom model was initially adopted by educators in fields of math, science, technology, and chemistry for K-12 classrooms and college settings (Bergmann & Sams, 2012), but has increasingly surfaced in disciplines of medicine, pharmacy, and nursing (McLaughlin et al., 2014). In 2007, two chemistry teachers in Colorado operationalized and coined the flipped classroom model. This strategy was intended to shift traditional lecture instruction outside the classroom space, be delivered via online technologies, and utilize scheduled class time to complete materials and activities, which were typically assigned as homework, within an active and collaborative learning environment (Bergmann & Sams, 2012; Strayer, 2007).

The flipped classroom model gained growing interest nationwide as an attractive active instructional approach for 21st century learners in higher education. During the intervening years, through blog posts, online news articles, websites, and informational articles across educational research, a considerable amount of attention has been given to the flipped classroom model as an exciting, unconventional instructional/pedagogical method (Bishop & Verleger, 2013). Evidencing this phenomenon are the 16,000 members connected worldwide through a

professional learning network with the given intent of seeking the best pedagogical practical advice on how to implement the flipped classroom model effectively (Overmyer, 2015).

This pedagogical method emerged as an alternative strategy to traditional classroom instruction to enhance learning. Offering educational experiences to promote active participation in the classroom is argued to be effective in improving academic achievement to a diverse group of students in nursing programs and should be reflective of the knowledge and skills essential for entry-level professional nursing practice roles. When coupled with the innovative use of various educational technologies, the flipped classroom's mission, and perhaps destiny, is simply to enhance instructional delivery, design, and ultimately, learning in the classroom environment.

Statement of the Problem

Nursing is a discipline in which graduates are expected to practice safely, be proficient in informatics and technological advancements, participate in interdisciplinary relationships, and develop effective life-long learning patterns (Benner et al., 2010). Also, professional skills such as self-directed learning, collegial collaboration, and independent problem solving and decision making are crucial for nurses to demonstrate (Benner et al., 2010; Schlairet et al., 2014). In addition, graduates need to keep current with emerging health care-related evidence due to an evolving health care environment, which impacts the manner in which nursing care is provided and how responsibilities such as medication administration are performed. Meanwhile, with the expansion of the nurse practitioner role, which includes medication management, it is imperative that undergraduate educational courses equip students with foundational knowledge and critical thinking skills in pharmacology.

Meechan, Mason, and Catling (2011) expressed concerns with the limited time spent in undergraduate nursing curricula preparing students to understand pharmacology application. As

a result, graduate nurses' preparation and knowledge base of pharmacology may be inadequate for safe nursing practice. Likewise, King (2004) shared that there was an absence of an integrated approach to teach pharmacology across educational programs of nursing, which may encumber the acquisition of fundamental knowledge. So, to prepare contemporary nursing graduates properly to acquire higher cognitive thought processes for nursing practice, there is tremendous demand in nursing academia to challenge traditional teacher-centered conventional pedagogies (Everly, 2013). This demand is not new and begs for serious and continued attention.

The flipped classroom**,** a relatively modern mode of instruction, has potential to respond to nursing curriculum reform demands to implement alternative pedagogies that move students beyond rote memorization of information to application of learning (Everly, 2013; Giddens, Hrabe, Carlson-Sabelli, Fogg, & North, 2012). Given the prodigious amount of factual information to learn in a pharmacology class, it has been hypothesized that students can retain more knowledge if material is learned outside of the class and students are taught how to use information, instead of learning specific facts (Miller et al., 2013). As nurse educators increasingly embrace the flipped classroom model, one may wonder if this pedagogical strategy is, in fact, empirically sound (Schlairet et al., 2014). In addition, as this instructional trend expands, one may also question whether the flipped classroom model is an effective educational approach compared with traditional instructional practices to accommodate the needs of millennial nursing students to achieve the prescribed learning outcomes in nursing pharmacology.

Statement of Purpose

The purpose of this study was to determine the effectiveness of flipped classroom instruction compared with traditional instruction on student academic performance in a nursing pharmacology course. The researcher sought to determine if educational strategies that incorporate emerging technologies with active learning environments can improve knowledge retention and provide optimal learning results in nursing education. The results of this study can contribute to the limited empirical evidence on flipped instruction in nursing curricula and provide information on whether flipped instruction is a sound pedagogical approach to effectively prepare students academically for pharmacological responsibilities in nursing practice.

Significance of the Problem

First, a research study that analyzes whether the flipped classroom model, an alternative educational strategy to traditional pedagogy, may be well-suited to better prepare graduates seeking professional careers such as nursing, with the competence and skills vital to thrive in a complex health care work environment is worthwhile. The National League for Nursing (2003) strongly recommended that the nursing profession promote "the true spirit of innovation and overhaul traditional pedagogies to reform the way the nursing workforce is educated" (p. 626). A global survey indicated that 93% of nursing faculty continue to use traditional teacher-centered methods, driven by lecture instruction, facilitating passive absorption of information (Ferguson & Day, 2005). Perhaps this can be attributed to a content-saturated nursing curriculum, with highly complex and challenging courses such as pharmacology (King & King, 2010; McLaughlin et al., 2014). However, when students are not actively engaged in processing

information, development of critical thinking skills is disregarded, thus students have difficulty applying theoretical knowledge to the practice setting (Institute of Medicine, 2011).

Additionally, the flipped classroom model speaks to current nursing pedagogical trends in that it addresses students' diverse learning needs by providing a student-centered classroom environment and integrating technology (Doyle, 2008; Fink, 2003). Millennial students are less interested in taking notes and listening to lectures and are more likely to learn and thrive in learning environments that incorporate active, collaborative, and flexible learning experiences comprised of higher cognitive level learning activities (Roehl, Reddy, & Shannon, 2013). Despite current nursing pedagogical national recommendations and trends, in addition to decades of existing research that support a student-centered classroom environment (Benner et al., 2010), nursing curricula continue to struggle to effectively incorporate pedagogical practices that can promote active learning (Della Ratta, 2015). Hence, research conducted to explore the effectiveness of alternative instructional methods which also leverages advancements in technology, with respect to facilitating students' academic performance, should be of great significance to faculty in higher education.

Next, research has demonstrated clear links between the active learning in the classroom environment and increased student achievement (Hirsh, 2012). Hence, pedagogical practices that promote active learning should be strongly considered to assist students in achieving academic success (Fink, 2003; Prince, 2004). Across academic disciplines at the elementary, secondary, and higher educational levels, the flipped classroom instructional model has primarily been a grassroots phenomenon implemented by an individual teacher who aims to improve higher cognitive level thinking skills (Horsfall, 2012; LaFee, 2013). Institutions of higher education and regulatory agencies of nursing practice continue to call for faculty to implement

evidence-based instructional methods that feature more active learning. Prince (2004) highlighted how introducing active learning exercises in the classroom environment promotes application of course material, thus encouraging students to develop a deep understanding of course material. This underpins to the debate McLaughlin et al. (2014) presented on how traditional pedagogy, which reinforces passive learning, ineffectually facilitates development of critical thinking skills such as analysis, synthesis, and evaluation, each of which is reasonably considered essential to develop depth of knowledge to attain higher academic achievement. Similarly, King and King (2010) and Everly (2013) described how cognitive and social learning outcomes are improved when a learning environment is learner centered with meaningful engagement compared to traditional lecture instruction methods.

Last, Benner et al. (2010) claimed recent nursing studies do not focus as much on evidenced-based teaching methods that increase student achievement in present-day nursing curricula, which move beyond traditional learning environments. The flipped classroom has generated considerable interest to address the diverse learning needs of modern day students and capitalize on flexible learning opportunities that drive student-centered learning (Fulton, 2013; Lumpkin & Achen, 2015). However, there is a dearth of evidence available on flipped classroom pedagogy in nursing curricula, specifically at the Associate's degree level (Betihavas, Bridgman, Kornhaber, & Cross, 2015). Clearly, there is a notable gap in current nursing education literature pertaining to pedagogical practices that expose a well-defined need to generate empirical evidence for implementing active learning with respect to facilitating student achievement.

For all these reasons, this study can inform educators how to apply the flipped classroom model in nursing education. The findings of this study provide further data for decision makers

in the nurse education profession with which to weigh the potential benefits of the flipped classroom model with respect to generating an active classroom environment to facilitate higher academic performance. This study contributes to the literature concerning active learning pedagogies by filling a gap in the literature for evaluation of the efficacy of traditional lecture-based instruction and environment (passive) versus flipped classroom instruction and environment (active) for nursing pharmacology delivered to associate degree nursing students.

Theoretical/ Conceptual Framework

Enthusiasts of the flipped classroom instructional approach share similar pedagogical beliefs as followers of constructivism. Constructivism is an epistemological view of knowledge acquisition emphasizing knowledge construction rather than knowledge transmission. Constructivist epistemology informs constructive pedagogy, which is defined by Richardson (2003), as "the creation of classroom environments, activities, and methods that are grounded in a constructivist theory of learning, with goals that focus on individual students developing deep understanding in subject matter of interest and habits of mind" (p. 37). According to the National Research Council (2005), to construct new understandings, people learn by using what they know by building upon and utilizing prior knowledge and concepts. As adult learners with various backgrounds, a broad base of prior experiences and expectations is brought to the learning experience that significantly impacts how people learn. These learning experiences are best explored through socially shared cognition and instructional activities (O'Donnell, 2012).

Tracing the evolution of learner-centered theories under the auspices of constructivism reveals the social constructivist approach (Jonassen, Marra, & Palmer, 2003), which framed this research. The primary premise of social constructivism is that knowledge is constructed by the learner through social interaction in learning environments that are student-centered (Kuhn,

1996; Vygotsky, 1978). The second premise is that learners create cognitive links from new material to their own prior knowledge by becoming actively engaged individually or together in mindful activity with a scaffolding approach (Paily, 2013).

This notion of scaffolding was originated by Vygotsky (1978). Scaffolding, which plays to Vygotsky's theory, supports a student's ability to construct or develop a deeper understanding to achieve mastery learning, which is facilitated through the exchange of ideas amongst learners by operating within the zone of proximal development (ZPD). Vygotsky defined the ZPD as, "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). Vygotsky believed that instruction is most efficient when the activities occur in a supportive learning environment under adult guidance such as the teacher and when mediated by educational tools such as cognitive strategies, mentors, peers, or printed material.

Vygotsky's (1978) theory also included the use of collaborative learning. Within this approach, learners assume responsibility of utilizing self-direction and small group involvement to facilitate problem-solving skills and reflection, and develop a deeper understanding of information (Ebrahimi, 2013). This is supported under the regulation of the instructor, whom Paily (2013) highlights is responsible for creating a learning environment that gives students time to understand difficult concepts and shows them appropriate resources to find answers. Contrary to accepting information as a given, such as is assumed in a passive learning environment, the teacher becomes a facilitator of knowledge. Bergmann (2014) emphasized the instructor becomes a "guide on the side" and assists students to explore content individually or in a group.

The literature showed progression of Vygotsky's (1978) theory to expand to other learning theories such as cooperative learning, problem-based learning, or peer learning (Bishop & Verleger, 2013). These theories of instruction, though not entirely exclusive of other instructional models, are commonly perceived to fall under the umbrella term or theory of active learning. Active learning, according to Barkley (2010), indicated the mind is actively engaged through participation in learning and constructing new knowledge. This encompasses the concepts of scaffolding, ZPD, and collaboration and supports features of a social constructivist learning environment.

Accordingly, in a social constructivist classroom environment, there is a shift from teacher-centered to student-centered learning, placing individual learners at the heart of the learning experience in the classroom setting (Ebrahimi, 2013). There is no universal definition of a student-centered classroom environment, also referred to in numerous studies as learner-centered classroom environment; however, this paradigm encompasses various instructional methods, practices, and theories that have been well documented from the cognitive perspective in educational psychology literature, including active learning theory (Alexander & Murphy, 1998; Greer & Mott, 2009; McCombs, 1999; McLoughlin & Luca, 2002; Weimer, 2002). A considerable amount of evidence thus far has suggested that student-centered learning instruction provides superior outcomes when juxtaposed with traditional, passive-centered instruction (Ebrahimi, 2013; Lo & Monge, 2013; McCombs, 1999).

Student-centered learning is a conceptual paradigm that is grounded in the social constructivist learning framework. Although there are a variety of possible ways to apply student-centered learning in the classroom environment, the literature agreed upon five central components. The following features of student-centered learning were selected because they

embody the main facets of flipped classroom pedagogy, which is the intervention in this research study.

The first aspect is innovative teaching. Innovative teaching is mainly directed toward promoting students' critical thinking to foster individuals to become independent lifelong learners (Hannafin, Hill, & Land, 1997; Hannafin & Land, 1996; Paily 2013). Implementation of innovative teaching can be executed with multiple methods such as team-based learning, also referred to as cooperative learning and problem-based learning, or self-regulated learning, also known as self-directed learning (Prince, 2004). These forms of innovative teaching are part of active learning, which calls for students to reflect, apply, synthesize, and communicate on course material (Fink, 2003). Innovative teaching can be applied in the classroom environment, however, it is also possible to achieve this in the online environment (Paily, 2013).

The second aspect is active learning, which is simply learning by doing (Hannafin, Hill, & Land, 1997; Hannafin & Land, 1996; Paily 2013). Simple tools like group work or activity based learning enable students to develop and transfer skills and competencies in addition to encouraging self-regulation of learning (Schlairet et al., 2014). The amount of interaction and the higher cognitive level of the student activity used are positively associated with increasing the acquisition of knowledge and development of critical thinking skills (Smith, 2014). The emphasis on development of higher order cognitive skills replaces the notion that learning is related only to transmission of information.

The third aspect is collaboration between teachers and students (Hannafin, Hill, & Land, 1997; Hannafin & Land, 1996; Paily 2013). Collaboration is the notion of the teacher monitoring in which the classroom activities are conducted to offer feedback, requiring full cooperation of the students to make the learning process successful. The instructor does not

teach with the traditional lecture method, but instead acts as a facilitator, who guides, manages activities, and encourages participation in the learning process (Doyle, 2008). The role of the teacher is to facilitate the individual or collaborative assigned activity and provide just-in-time feedback when necessary (LaFee, 2013). The idea of feedback corresponds to the notion of authentic assessment.

The fourth aspect of student-centered learning is authentic assessment (Hannafin & Land, 1996; Hannafin, Hill, & Land, 1997; Paily 2013). Assessment for learning is a process in which the teacher identifies a gap between the students' current knowledge and the learning progression and provides individualized feedback (Angelo & Cross, 1993). Personalized feedback enables teachers to tailor instruction to individual needs and results in improved student achievement (Little, 2015).

The fifth is flexible learning paths, in which students make their own decisions to construct learning in using the resources provided (Hannafin, Hill, & Land, 1997; Hannafin & Land, 1996; Paily 2013). The flexibility is in the ability for students to self-pace their learning and determine when to learn the material and how much time to spend studying, thus encouraging accountability in the learning process. Flexibility in learning can also be demonstrated in the modality of the learning environment (Lumpkin & Achen, 2014). For example, online learning management systems have enabled flexibility for instructors to provide various course materials that meet diverse learning styles (Paily, 2013). Examples would include YouTube videos, handouts, or audio podcast voice-overs. This is congruent with the notion of lifelong learning, building a learning path in a manner that suits the students' interests (Lord, Prince, Stefanou, Stolk, & Chen, 2012).

These five aspects evolved from the social constructivist learning framework and encompass Vygotsky's (1978) premises of active learning (with emphasis on a scaffolding approach and the ZPD) in addition to the idea of collaboration. Also, they are central to the design and delivery of the flipped classroom pedagogical method. Furthermore, these aspects and premises are reflective of the recommendations nursing educational reform efforts' call for contemporary higher education; hence, creating student-centered learning environments that include evidence-based teaching and learning strategies (IOM, 2011). Benner et al. (2010) claimed active learning must occur in the classroom by faculty providing meaningful activities that foster critical thinking and socialization during class time.

Research Questions and Hypotheses

The research questions that guided this study were

1. Does flipped classroom pedagogy improve examination scores for students taught with flipped instruction compared to traditional lecture?
2. Will there be an improvement in students' academic performance measured by examination scores after implementation of flipped instruction in nursing pharmacology?

The null hypotheses were

1. There is no difference in academic performance between students taught with flipped classroom instruction compared with traditional lecture instruction in nursing pharmacology.
2. There is no difference in students' academic performance after implementation of flipped classroom instruction in nursing pharmacology.

Methods

A quasi-experimental study, with a nonequivalent control group, post-test design, in four sections of a nursing pharmacology course (NUR 1141), was utilized for this quantitative

research study. The control group consisted of students from two NUR 1141 Summer 2015 sections that were taught with traditional lecture-based instruction for each unit the entire semester by the same instructor. The experimental group consisted of students enrolled in two sections of NUR 1141 in Summer 2016, who were introduced to flipped classroom instruction for three of the six unit modules. The sections were taught using the same activities and the same instructor. All sections of NUR 1141 used in this study had a total of six unit modules and were taught by the same instructor in the same order. NUR 1141 Summer 2016 term students were instructed with the flipped method for unit modules 2, 4, and 6, whereas modules 1, 3, and 5 were taught using traditional lecture instruction only. The method of instruction, flipped or lecture instruction, was the independent variable and academic performance was the dependent variable.

The first research question was addressed by comparing the academic performance of the students receiving the educational intervention (flipped classroom instruction) with the students in the control group who were taught with lecture instruction. To analyze and compare both groups' module examination scores, a multivariate analysis of variance (MANOVA) was used. Another MANOVA was used to compare the comprehensive final exam student scores between the students in NUR 1141 Summer 2015 and 2016 terms. The second research question used analysis of variance (ANOVA) repeated measures with covariance to analyze the dependent variable (academic performance) after the intervention (flipped instruction) was implemented in three modules. The covariate was the modules taught with traditional instruction.

Assumptions of the Study

The assumptions of this study were

1. Participants had computer access to view and navigate the course learning management system and were familiar with technology and basic computer skills.
2. Participants had the ability needed to complete the active learning activities.
3. Active learning exercises were completed individually or in peer learning groups.
4. The instructor did not utilize lecture instruction in the classroom during modules taught with the flipped classroom model.
5. Students taught with the flipped classroom model came to class prepared after viewing the assigned video lecture and reading assignments.

Limitations

There are several limitations of this study. First, in addressing Research Question 2, the sample size may be too small to detect if there is a level of significance. Thus, prior to conducting the study, a priori power analysis was used to calculate an estimated adequate sample size for reducing the risk of making a Type I or Type II error. This can decrease the occurrence of accepting the null hypothesis when it is false, in other words a Type II error, as a result of a small sample size (Morrison, Adamson, Nibert, & Hsia, 2004). There were students who withdrew from the course; thus, academic achievement could have been impacted and not well assessed. Third, the data collected from this study may not be applicable to different nursing courses that are taught with the flipped classroom approach. Last, the study was conducted in one nursing program at the Associate's degree level; thus limiting generalizability to other nursing programs and levels of degrees.

Operational Definitions of Terms

Academic performance. The amount of understanding a student has related to the course content (Hirsch, 2012). This reflects a student's depth of knowledge gained. Academic

performance is operationally defined by using module examination scores and the final exam score. For this study, a grade of 74.5 or higher was passing and the final letter grade for the course was not included.

*Active learning***.** "Students must connect what is being learned to what is already known" (Barkley, 2010, p. 39). It occurs when the student thinks about the content, resulting in a deep interaction with and knowledge of the information. The student may also use past knowledge to connect with the course content. Prince (2004) highlighted the core aspects of active learning as student activity in the learning process. This is opposed to passively listening to the teacher.

Active learning environment. This environment is student-centered and students are taught with a variety of active learning exercises that require student participation actively and attentively in class (Waltz, Jenkins, & Han, 2014). The teacher is the facilitator of knowledge in this environment. (The opposite environment is referred to as a passive learning environment.) Students are not instructed with lecture format. For this study, an active learning environment occurred when the flipped classroom model was implemented. An active learning environment is also analogous with a student-centered learning environment.

Active learning exercise. Prince (2004) defined active learning exercises as "any instructional method that engages students in the learning process" (p. 4). Strategies can include but are not limited to small group work, computer managed instruction, role-playing, games, personal response system technology, case studies, and concept maps (Waltz et al., 2014). Active learning exercises included for this study were group discussion about application questions related to case scenarios.

Classroom environment. Contextually, as applied to educational settings, classroom environment is denoted as the atmosphere, ambiance, tone, or climate that pervades the particular

setting (Dorman, 2014; Fraser, 2012). In this study, the classroom environments that used were active or passive in nature.

Flipped instruction or flipped classroom model. For this study, the flipped classroom model was denoted as an educational strategy that consisted of active learning exercises, completed individually or in a group inside the classroom, and direct, computer-based individual instruction using video lectures outside the classroom via a learning management system (Blackboard) to be viewed prior to scheduled class time. This pedagogical method generates an active learning environment (Bergmann & Sams, 2014; Bishop & Verleger, 2013).

Learning management system. A course management web-based system provided by the institution that a student utilizes to access all course material, discussion board forums, the gradebook, and email communication to the instructor. In this study, Blackboard was used for providing PowerPoint lecture slides, videos, and grades.

Learning outcomes. Learning outcomes are defined as the skills, knowledge, and understanding a student would be likely to obtain as a result of the learning experience (Kuh, Pace, & Vesper, 1997). In this study, learning outcomes related to academic performance of the learner and did not relate to the mode of teaching.

Passive learning environment. This is a teacher-centered learning paradigm in which the student is positioned as an object of instruction **(**Miller et al., 2013). A passive classroom environment encourages students to rely on rote memorization of facts to learn information, hence, hindering a student's ability to expand their depth of knowledge and improve on academic achievement (Berrett, 2012). For this study, students were taught with didactic instruction in this learning environment.

Passive instruction. A traditional pedagogical approach that uses lecture to deliver instruction to students also known as didactic (Bernot & Metzler, 2014). Other forms of passive instruction include watching lecture videos, PowerPoint overheads, and reading assignments (Miller et al., 2013). In this study, passive instruction was the lecture-only method with PowerPoint slide handouts for note taking. With this instruction, active learning exercises were not used.

Student-centered classroom environment. A student-centered classroom environment shares the same definition as an active learning environment.

Traditional pedagogy. A term that combines the description of passive instruction that uses a passive learning environment. In this study, traditional pedagogy was carried out with lecture instruction, also known as didactic, and guided by the theory of instructionism.

Summary

McLaughlin et al. (2014) asserted traditional pedagogy increasingly fails to prepare students to develop, integrate, and transfer knowledge and skills that are expected for professional roles and practices for the 21st century. Herein lies the challenge. To create an effective classroom environment to improve how learning occurs, educators should rethink utilizing traditional instructional methods and consider adopting alternative pedagogical practices that support an active learning environment. Flipped learning is a growing phenomenon in higher education that responds to contemporary pedagogical trends in nursing education to improve learning strategies and environments, with integration of technology and meet the diverse learning needs of students **(**Berrett, 2012). This study explored the effectiveness of the flipped classroom model on students' academic performance and provided empirical evidence to

determine if this instructional method is suitable for teaching and learning pharmacology in nursing education.

Chapter I introduced flipped classroom instruction to be an attractive alternative pedagogical method compared to lecture instruction traditionally utilized in higher education, specifically in nursing curriculum. This study investigated the utilization of classroom environment in a nursing pharmacology course based upon the desire of national education reform efforts to shift to a learner-centered classroom environment in addition to integrating advancements in instructional technology to promote quality learning outcomes such as academic achievement. Chapter II provides a literature background for this study and describes research on pedagogical practices in higher education and nursing curriculum in addition to research on the flipped classroom model compared with lecture instruction used in allied health disciplines. Chapter III presents the design, the research questions, the survey tool, data collection and analysis methods, limitations, and ethical issues. Chapter IV reports a detailed analysis of the data. Chapter V summarizes the research findings, implications for flipped instruction in nursing, and recommendations for future research.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter provides an overview of a review of the literature to lay the foundation for this study. Research was conducted using the following databases: Cumulative Index of Nursing and Allied Health Literature (CINHAL), ProQuest Nursing & Allied Health, Educational Resources Information Center (ERIC), Medline OVID, Pub-Med, EBSCO, ejournals, and dissertation abstracts. Key words that were searched included active learning, active learning methods, traditional lecture instruction, flipped classroom, inverted classroom, blended learning, classroom environments, engagement, and learning environments. Quantitative and qualitative research, peer reviewed, and scientific journals pertaining to nursing education and educational psychology were reviewed and obtained from these databases.

The focus of this literature review was to investigate the selected literature relevant to the purpose of this study. This included research areas of passive and active pedagogical methods, pedagogical influences in 21st century higher education including the contemporary learner type, technological involvement, and modes of instructional delivery, and nursing curricula reform efforts, in addition to flipped learning pedagogy. Relevant research studies were synthesized and incorporated to provide a background for understanding the nature of this study. Chapter II is presented in three general sections: (a) pedagogical practices in higher education, (b) flipped classroom pedagogy, and (c) effectiveness of flipped classroom pedagogy on academic performance.

Pedagogical Practices in Higher Education

Higher education institutions are continually faced with the responsibility of facilitating engaging pedagogical practices to generate quality learning outcomes. In response to this, substantial attention has been given to designing and delivering pedagogy by shifting the emphasis from teaching to learning in the classroom environment (Fink, 2003). Involving students in their own instruction continues to show evidence of improving academic achievement, cultivating independent critical thinking skills, and fostering the capacity for lifelong learning (Astin, 1999; Philips, 2005); thus, future graduates are better prepared for their workplace contexts. In addition, evidence indicates utilizing a variety of active instructional methods with integration of educational technological tools yields to effectively deliver course content and promote improved academic outcomes (Giddens et al., 2012; Greer & Mott, 2009; Mostrom & Blumber, 2012). Encouraging students as partners in the teaching learning process and achieving these institutional intentions, however, has proven difficult to accomplish with the use of traditional pedagogical practices.

Traditional Instructional Methods

Passive instruction. Traditionally, the most predominant method of instruction utilized in higher education introductory courses across academic levels and disciplines includes lecture or also referred to as didactic (Bernot & Metzler, 2014). Didactic learning was first utilized in the 17th century in religious and grammar schools of the Roman Empire during the Renaissance and Reformation periods. In the 19th century, elementary schools in England used lecture instruction, which continued into the 20th century, expanding to secondary modern schools (Sawyer, 2006). During this century, the goal of education was for teachers to know and transmit knowledge into students' heads and success of teaching was measured by testing

students to recall the knowledge they required (Sawyer, 2006). This traditional classroom practice was referred to as instructionism (Tubbs, 2013) and intended to prepare students for the industrialized economy during that timeframe. Instructionism is described as the process in which knowledge is handed down from an all-knowing authoritative figure such as the teacher (Sawyer. 2006). When traditional methods of teaching are utilized, it is usually delivered from the teacher to the student, which Bastable (2008) described as teacher-centered or subject-centered. Tubbs (2013) depicted that "a didactic teacher delivers content, transmits information, instructs pupils, trains pupils, directs and informs them, even commands them" (p. 35). Within a traditional pedagogical paradigm, there are low levels of student participation and the focus of learning is geared toward the next exam.

Passive learning environment. Knowledge transmitted to the student with lecture instruction creates a passive learning environment. This method of teaching places the student in a receptive role in the learning environment and solicits the student to comply with the directions and instruction of the teacher. With this classroom environment, the teacher is perceived as the "sage on the stage," assuming responsibility for making decisions about the course information that needs to be learned (Bergmann & Sams, 2012). Bernot and Metzler (2014) confirmed a sage on the stage relies on lecture alone to impart knowledge to the student. Students only learn what they are told by taking in information from a lecture.

Student activity in the classroom includes memorization, copying, reciting, and listening (Tubbs, 2013), requiring little cognitive effort; thus, limiting the development of higher order cognitive skills such as critical thinking. Fulton (2012) stated students in the passive learner mode are seen as empty vessels that must be filled with the knowledge of a professor when learning information. This instructional method is consistent with the notion of instructionism,

which Sawyer (2006) presented features including “learners memorize facts and carry out procedures without understanding how or why”; “learners treat course material as unrelated to what they already know”; and “learners memorize without reflecting on the purpose or on their own learning strategies” (p. 38). MacLellan and Soden (2004) pointed out this nonparticipatory approach motivates student learning by creating a competition based on grades instead of active participation and cooperation amongst students.

Benefits and disadvantages. Lumpkin and Achen (2015) pointed out one advantage of lecture instruction is to enable students to receive an enormous amount of complex information given to a large number of people at the same time in college or university sectors. Another benefit of lecture instruction Gilboy, Heinerichs, and Pazzaglia (2014) highlighted is it is effective in teaching students in courses where they have little to no prior knowledge or skills in that area. However, these authors also shared that research on traditional instruction demonstrates students’ attention span to listen declines dramatically after the first 10 minutes of class. Likewise, Auster and Wylie (2006) claimed receiving a large amount of information in a short period of time is more than one can comprehend. In addition, little opportunity is provided for critical thinking, application of knowledge, peer involvement, or instructor interactions for feedback as the teacher presents facts and information through face-to-face instruction in the classroom setting (Bligh, 1999).

In addition, a growing body of evidence implies that lecture instruction may be less effective in achieving learning outcomes compared with other available pedagogical approaches used in the classroom setting (Baeten, Kyndt, Struyven, & Dochy, 2010; Barkley, 2010; Billings et al., 2001; Bonwell & Eison, 1991; Fink, 2003). Freeman et al. (2014) reviewed the literature and metaanalyzed 225 published and unpublished studies to support this conjecture by evaluating

student performance on examinations in undergraduate science, math, engineering, and technology classes. Students instructed with traditional, lecture-dominant methods were 1.5 times more likely to fail than were students taught with alternative pedagogical methods. Results from this landmark study reflected similar findings of multiple studies conducted on best teaching practices and student academic performance (Delialioglu, 2012; Everly, 2013; Fulton, 2012; Giddens et al., 2012; Lizzio, Wilson, & Simons, 2002). Likewise, Bernot and Metzler (2014) found traditional instruction inadequate for student learning because it reinforces dependency on the instructor in the classroom environment and limited student involvement.

Therefore, fairly strong evidence suggests that lecture instruction used in the classroom environment ineffectively engages and develops metacognition abilities (Bonwell & Eison, 1991), which Little (2015) indicated are two significant elements in students' personal and academic development. However, currently, there is substantial evidence that lecture-centric instruction continues to be a favored method in many college classrooms (Freeman et al., 2014; Gilby et al., 2014; Lumpkin & Achen, 2015). In fact, lecture was reported to be the teaching method that 45% of faculty at 4-year institutions use in most courses (Barringer, Pohlman, & Robinson, 2010). Despite this, traditional pedagogy has been criticized as alternative pedagogical methods and application different learning theories have emerged within higher education.

Alternative Instructional Method

Emergence of active pedagogical practices. At the beginning of 1970s, traditional modes of instruction were demonstrated to be at odds with cognitive research on how students learn in the fields of psychology, science, education, philosophy, and sociology (Bransford, Brown, & Cocking, 2000). The United States National Research Council reached a consensus

that passive instruction results in a kind of learning that does not transfer to real world settings because of the inability to acquire a deep conceptual understanding of complex concepts or material (Sawyer, 2006). Contrary to the notions of instructionism, students were not perceived to be empty vessels waiting to be filled with knowledge. In fact, assumptions from the cognitive science perspective portrayed learners to be capable of building on existing knowledge, relating new knowledge, and reflecting on their own understanding and learning styles (Sawyer, 2006). This theoretical underpinning of student learning initiated a shift toward an alternative theory of learning called constructivism. In reviewing the literature, constructivism appears not to be a clear learning theory, rather as Sawyer (2006) pointed out, it is a collection of ideas about how learning occurs and how best to promote it.

Constructivism is diametrically antagonistic, in its ethos, to traditional pedagogical philosophical underpinnings, positing the instructional process is grounded in the belief that knowledge can be constructed by learners through active learning experiences (O'Donnell, 2012). Constructivism can be traced back to 18th century educational philosophers and 20th century theorists Piaget, Vygotsky, and Dewey. Piaget shaped cognitive constructivism with research focusing on how information is formed and Vygotsky influenced the notion that individual cognition is developed in social contexts and with interaction between others (Piaget, 1952; Richardson, 2003; Vygotsky, 1978). Both were distinguished cognitive and social exponents of the notion that students do not learn deeply by listening, rather students learn with activity. Similarly, educational philosopher John Dewey postulated that learning occurs through the transfer of information from knowledgeable sources or from one who is more informed to the passive recipient (Richardson, 2003).

Around 1990, many theories and practices derived from the cognitive science realm became central in the domain of learning science, acknowledging that knowledge is constructed best through active involvement. Quntanam, Shin, Norris, and Soloway (2006), as cited in Sawyer (2006), pointed out learning science research has since continued in the direction to support that learning is not a passive process, but it is an active constructive process, instituting a "learning by mindful doing" style (p. 122). Semerci and Batdi (2015) performed a meta-analysis of the constructivist learning method, which included a systematic investigation of studies, both nationally and internationally, published between 2002 and 2015. The results of the study revealed a constructivist approach of active learning was most effective in students' academic success. Correspondingly, Paily (2013) asserted "contemporary educational practices encourage teaching practices grounded in principles of constructivism" (p. 39).

Active learning instruction. Active learning is typically described as an instructional method that engages students in the learning process (Prince, 2004). A fundamental characteristic of active learning, used to operationalize the concept in this study, is as follows: "students must connect what is being learned to what is already known" (Barkley, 2010, p. 39). It occurs when the student thinks about the content, resulting in a deep interaction with and knowledge of the information. The student may also use past knowledge to connect with the course content. Active learning was one of the seven principles of good educational practice that Chickering and Gamson (1987) incorporated, which emphasized learning while doing. A few years later, in a much cited U.S. government report (Bonwell & Eison, 1991), the following themes were identified in active learning education: (a) students are involved in more than listening, (b) less emphasis is placed on transmitting information, (c) students are involved in higher-order thinking (analysis, synthesis, and evaluation), (d) students are engaged in activities

(reading, discussing, or writing), and (e) greater emphasis is placed on students' exploration of their own attitudes and values. Active learning was further explored by Bonwell and Eison (1991), who similarly described it as activities that involve students in doing things and thinking about the things they are doing. A plethora of research findings in undergraduate education show students are more likely to increase their motivation, attitude toward lifelong learning, and critical thinking skills by being actively engaged in the learning process with classmates, instructors, and course material (Barkley, 2010; Lo & Monge, 2013; McLoughlin & Luca, 2002; Prince, 2004; Schlairet et al., 2014).

Active learning environment. Dormon (2014) pointed out that research on an active learning environment considerably overlaps with student-centered classroom research. To generate an active learning environment, it is key to shift from a teacher-centric learning environment to a student-centered learning environment, which places individual learners at the heart of the learning experience (Ebrahimi, 2013). Fraser (2012) also recognized that classroom environment theories that focus on the learner are affiliated with active learning theory and practice and interconnected to student-centered learning paradigms. The aim for student-centered classrooms is for students to construct knowledge by participating and engaging in the learning process at all times (Doyle, 2008; Hannafin, Hannafin, Land, & Oliver, 1997). In this learning environment, the role of the teacher moves away from transmitting knowledge to supporting and guiding self-regulated student learning (Ebrahimi, 2013). To date there is no universal definition of a student-centered learning environment, also referred to across the literature as a learner-centered classroom environment (McCombs, 2009); however, this paradigm has been substantially researched and built over the past century within the field of

educational pedagogy **(**Alexander & Murphy, 1998; Auster & Wylie, 2006; Baeten et al., 2010; Doyle, 2008; Hannafin, 1996; Lo & Monge, 2013; Paily, 2013).

Additionally, this learning paradigm, which is well documented from the cognitive perspective in educational psychology literature, appears to reflect the nature of a constructivist learning framework (Richardson, 2003). In other words, most studies examining student-centered learning environments and pedagogy uphold the principles of a constructivist approach in that it is primarily associated with active student involvement in the learning process. Educators may use different educational strategies to execute an active learning environment, leading to the Honebein (1996) claim that these variations are the cause of an indistinguishable universal definition of a student-centered classroom environment. Additionally, the construction of a student-centered classroom fluctuates according to the types of students involved in the learning process and the type of discipline in which learning occurs. Nonetheless, what is consistent is that this learning paradigm moves from instruction to producing learning (Paily, 2013). Hence, the literature demonstrated a consensus that the student-centered learning environment is rooted in a constructivist approach because the instructional practices utilized encompass essential attributes including construction of learning, collaborative learning, metacognition, educator student partnerships, authentic assessment (Alexander & Murphy, 1998; Miller et al., 2013; Richardson, 2003; Semerci & Batdi, 2015; Tubbs, 2013; Wilson, 1996).

Hannafin et al. (1997), Wilson (1996), and Paily (2013) offered a description of characteristics of what a constructivist learning environment should encompass. These include learners having (a) experiences in the process of knowledge construction, (b) active seeking of information to analyze and draw conclusions, (c) realistic and relevant contexts to embed learning, (d) ownership and a voice in the learning process, (e) social experiences embedded in

learning, (f) multiple modes of representation used, and (g) self-awareness in the knowledge construction process. These characteristics, by their very nature, reflect a student-centered learning pedagogy as depicted by the literature previously described. Clearly, student responsibilities in this environment are in opposition to roles within traditional pedagogy. Additionally, institutions of contemporary higher education are encouraging pedagogical practices to include active student involvement in the learning environments because of the positive correlation with quality learning outcomes (Everly, 2013; Lord et al., 2012). Moreover, Dorman (2014) asserted no substantial research on college classroom environment has been sustained during the past decade; therefore, research on student-centered environments and pedagogies to determine academic performance continues to hold importance in higher education.

Active learning exercises. Numerous empirical studies conducted and validated on active learning pedagogy indicated various instructional methods can be employed to drive student-centered learning (Bonwell & Eison, 1991; Prince, 2004). Stage et al. (1998) as cited by Lumpkin and Achen (2014) asserted, "the constructivist umbrella encompasses a myriad of instructional practices because different theorists focus on the construction of learning in different ways" (p. 80). Prince (2004) highlighted the core aspects of active learning as student activity with exercises in the learning process.

A review of the literature shows compelling educational strategies are ones that encompass active learning strategies to include collaborative learning, peer learning, and problem-based learning, each needing student participation in the classroom (Prince, 2004; Waltz et al., 2014). Research showed collaborative learning positively supports knowledge retention and mastery, development of problem solving and critical thinking, and improved

communication skills (Lo & Monge, 2013). The key component in collaborative learning is on student interactions rather than learning as a solitary activity, whereas in cooperative learning, which closely resembles collaborative learning, students are involved in group work, but assessment is personalized (Johnson & Johnson, 1994; Prince, 2004).

Peer learning is another approach readily aligned with collaborative learning, which was spearheaded by Harvard professor Eric Mazer, in which learning occurred through active engagement among peers in learning tasks (Fagan, Crouch, & Mazur, 2002; Rao & DiCarlo, 2000). Problem-based learning, which incorporates notions of collaborative and cooperative learning, is a teaching method that was developed in the mid-1950s, rooted in Bruner's theory of discovery learning, and has since been extensively applied in medical education (Savery & Duffy, 1996). This strategy encourages students to participate actively in a learning task revolved around a patient problem as a context for students to learn through problem solving with clinical reasoning. A meta-analysis from 1972-1992 conducted on the effects of problem-based learning suggested graduates taught with this method rather than lecture instruction performed well on exams (Albanese & Mitchell, 1993). These methods differ in application, despite sharing identical benefits such as personalized learning, increased student autonomy, development of independent lifelong learning skills, and enhanced teamwork and communication skills.

Overall, meta-analyses of active-learning research consistently showed that active-learning techniques result in greater student performance than traditional lecture-based courses (Prince, 2004). Likewise, research on how people learn (Bransford et al., 2000) concluded faculty using active learning exercises, in contrast to the lecture method, improved academic performance in subjects such as science, technology, engineering, and math (STEM). Similarly, Barkley (2010); Fink (2003); Freeman et al. (2014); Carini, Kuh, and Klein (2006); Lugan

(2006); Philips (2005); Semerci and Batdi (2015); and Smith (2014) have all concluded that active learning pedagogical practices are strongly linked to increasing student academic achievement as a result of the multiple advantages, which will be described next.

Advantages of active learning. One advantage of implementing active learning strategies in the class is to target all types of learning styles such as auditory, visual, and tactile (Lujan & DiCarlo, 2006). Also, students active in the classroom environment exhibit increasing motivation and satisfaction to learn and perform better academically (McLaughlin et al., 2014). Additionally, Lord et al. (2012) determined active learning environments encourage student autonomy and improved communication with the instructor. Their research utilized eight focus groups with 50 students in higher education to learn about students' experiences in a small business school. Furthermore, students benefit socially by developing teamwork skills through peer collaboration. Active learning improves problem solving and clinical decision-making skills (Freemen, 2014). Everly (2013) underscored improved exam results due to increased interaction and retention with the course material. For example, Prince (2004) cited studies that scores on exams that measure conceptual understanding were two times as high in classes that engaged students compared to traditionally taught classes.

Another significant benefit of active learning that was publicized in a plethora of scholarly studies across disciplines in higher education asserts student involvement in the learning process promotes student engagement, which is an important determinant of quality in higher education (Astin, 1999; Fredricks, Blumenfeld, & Paris, 2004; Pascarella & Terenzini, 1998; Tinto, 1993). Reviewing early studies, engagement has been described in terms of behavior, such as participation and time on task, and also includes an affective aspect such as feelings of belonging, interest, and enjoyment (Appleton, Christenson, Kim, & Reschly, 2006;

Carini et al., 2006). According to Fredricks et al. (2004), behavioral engagement draws on the notion of participation involving academic tasks and social activity and behaviors such as effort, persistence, attention, and asking questions are evident. Appleton et al. (2006) further defined behavioral engagement to include attendance and voluntary classroom participation, which are actions that are tangible to observe compared with the other engagement components such as emotional engagement in the classroom, which includes behaviors such as interest, boredom, anxiety, happiness, or enthusiasm. These behaviors have been linked to the concept of motivation, which is another essential element, in addition to active learning, that Barkley (2010) asserted was necessary for student engagement. Due to the multiple constructs of student engagement, it can be a challenging to distinguish if it is the engagement variables or if it is the activities that contribute to positive student learning outcomes, which is the reason engagement was not measured in the present research study.

However, pointing out the available evidence that demonstrates the interconnectedness engagement has with active learning is pertinent. For example, Astin's (1993) findings concluded engagement is the most important predictor of success in colleges. Auster and Wylie (2006) shared similar findings with the substantial body of literature supporting how active learning is associated with improved attitudes toward learning, academic achievement, and critical thinking due to greater engagement in the classroom. For example, research findings by Carini et al. (2006) concluded from a sample size of 1,058 students at 14 colleges and universities that lower achieving students benefitted from active learning strategies by determining a strong link between student engagement and academic performance. Likewise, Lo and Monge (2013) contributed to this evidence by illustrating active learning contributes to increased engagement; thus, positively supporting knowledge retention and mastery,

development of problem solving and critical thinking, and improvement of communication skills. Ritchhart, Church, and Morrison (2011) determined "in order for a lecture to be an effective method of instruction, it must promote enthusiasm about the subject and provide students with an avenue so that their interaction is intrinsic to the activity rather than additive" (p. 72). Thus, a plethora of research findings in undergraduate education show students are more likely to increase their motivation, attitude toward lifelong learning, and critical thinking skills by being engaged in learning activities with classmates, instructors, and course material (Barkley, 2010; Lo & Monge, 2013; McLoughlin & Luca, 2002; Prince, 2004; Schlairet et al., 2014). Highlighted by Dormon (2014), student engagement research considerably overlaps with active learning; therefore, it is easy to assume student learning outcomes will generate similar results. However, not all active learning classrooms will enable learners to be engaged and achieve higher cognitive level thinking to attain successful learning outcomes.

Student learning outcomes. There is substantial evidence that demonstrates active learning for the most part produces quality learning outcomes as a result of the educational benefits demonstrated in active learning literature described above (Modell, 1996). Results from a review of the literature on the effectiveness of active learning conducted by Prince (2004) revealed credible evidence that challenging traditional pedagogy by incorporating a variety of forms of active learning promotes higher academic performance and positive student attitudes toward learning. These results were consistent with Bonwell and Eison's (1991) conclusion that active learning surpasses traditional lectures by developing thinking skills and promoting knowledge retention. Prince (2004) highlighted the importance of introducing activities in the classroom setting to be intended to promote learning outcomes; thus, encouraging students to develop a deep understanding of course material. Similarly, King and King (2010) and Everly

(2013) described how learning outcomes, such as academic achievement, are improved when student cohesiveness and active participation occur in the classroom setting as compared to traditional lecture instruction methods. This led to the debate McLaughlin et al. (2014) presented on how traditional pedagogy, which reinforces passive learning, ineffectually facilitates development of critical thinking skills such as analysis, synthesis, and evaluation, each of which is reasonably considered essential to develop depth of knowledge to attain higher academic achievement. Overall, findings thus far suggested that pedagogical practices and classroom environments incorporating active learning provide superior student outcomes when juxtaposed with traditional pedagogical practices (Ebrahimi, 2013; Lo & Monge, 2013; Miller et al., 2013; Prince, 2004).

21st Century Learner Considerations

Considering contemporary learner characteristics, advancements with technology and developments of innovative modes to deliver instruction are vital in today's higher education institutions. One type of learner in academia is the nontraditional student. The National Center for Education Statistics (2002) described this nontraditional student body to work part- or full-time, be financially independent, have responsibilities for dependents, no high school qualifications, and did not enter college immediately after high school. There is an influx of nontraditional students representing diversity in gender, age, and socioeconomic status (Jeffries, 2005). Schuetze and Slowey (2002) pointed out that nontraditional students in the higher education system are typically the minority, but recently have shifted to become the majority in certain types of institutions and programs. Due to a variety of modern day learner characteristics, higher education institutions are confronted with how to tailor learning

environments to support nontraditional students' need for flexibility and cost-effectiveness, without compromising quality learning outcomes.

Another generation of students in academia is referred to as millennials; those individuals born from 1981 to 2000 (Jeffries, 2005). These students gravitate toward collaborative activity, are technologically savvy, creative, innovative, prefer real-time communication, and get bored easily (Hansen & Erdley, 2009). Roehl et al. (2013) explained that millennial learners have a decreased tolerance for lecture instruction because they prefer 24/7 information connectedness with active participation, environments that support group activity, and have appreciation for social aspects of learning. This was consistent with Montenery et al.'s (2013) depiction of millennial learners as high achieving, team oriented, multitaskers, who prefer immediate feedback and positive reinforcement. Montenery et al. (2013), in harmony with research conducted by O'Reilly (2009), Prensky (2005), and Reilly (2012), concluded that use of emerging instructional technology and creative educational methods will positively engage millennial learners, developing critical-thinking skills.

Modern day students enter college and university environments with technological sophistication, hence will be ineffectively educated in traditional classroom environments with passive instruction. As a result, there is pressure for educational institutions to adapt in ways to address the pedagogical needs of contemporary students and offer dynamic opportunities for student learning (Barringer et al., 2010). For instance, Philips (2005) highlighted that the higher education sector needs to be viewed at the cutting edge of technological and educational innovation to enhance learning. The better the blend of pedagogy and technology to deliver instruction with current and emerging educational technologies, the more optimally it results in serving students' educational needs (O'Toole & Absalom, 2003; Skiba & Barton, 2006).

As technology has become increasingly embedded in education, interest has grown in online learning as a means of either supporting or replacing traditional lecture pedagogy (Philips, 2005; Williams & Chinn, 2009). Bajt (2011) highlighted how the rising use of the internet created opportunities for web based learning, also called e-learning. Anderson (2008) defined online learning as "the use of the internet to access learning materials; to interact with the content, instructors, and other learners" (p. 4596). Dimitrova et al.'s (2003) findings showed online learning environments are viewed by students as convenient, accessible, and promote self-directed learning. As the link between pedagogy and technology continues to be established, Skiba and Barton (2006) explained how the gap between traditional face-to-face instruction and alternative learning environments will be filled with transforming the design and delivery of education by leveraging technological tools.

Reform Efforts in Nursing Curricula

First, the Institute of Medicine (2011) and the National League for Nursing (2003) stressed the importance of transforming nursing education by changing instructional methods to meet the changing and diverse needs of millennial learners. These include integrating the use of technology in the learning process and incorporating active and cohesive classroom environments into the curriculum. Lemley and Burnham (2009) investigated the use of technology in nursing school and findings revealed an increase from 53% to 58% of nursing schools intended to incorporate Web 2.0 technology, specifically podcasts, into their curriculum in the following year. Nursing curricula should encourage flexible learning experiences by including a variety of evidence-based active pedagogical practices that consider how students learn best and use learning course design platforms with various instructional technologies.

Second, a recent literature review conducted by Waltz et al. (2014) on the use and effectiveness of active instructional methods in nursing education revealed the imperative need to continue to build upon a body of evidence depicting a more solid argument for implementing an active classroom environment. Additionally, Popkess and McDaniel (2011) determined nursing students do not perceive themselves to be engaged in learner-centered and interactive pedagogies in the classroom environment. A sample of 22 studies in medicine and pharmacy between 2000 and 2012 were reviewed and it was determined the number of well-designed studies on active pedagogies in nursing remains limited in addition to an existing concern of the quality of the studies performed (Waltz et al., 2014). It is important to note the scarce amount of research conducted on Associate degree nursing students, whereas the majority of active learning studies utilize baccalaureate or graduate level student populations.

Third, professional nursing skills such as critical thinking, communication, teamwork, and independent, self-regulated learning are all essential for nurses to deliver safe and efficient nursing care (King & King, 2010). Accredited programs of nursing are pressured to have students meet specific learning outcomes and acquire the above mentioned professional skills, which are difficult to cultivate and assess with the traditional lecture format (NLN, 2003; Waltz et al., 2014). A substantial body of evidence illustrates desired learning outcomes in education occur when students become independent, active and collaborative participants in the learning process through problem solving and constructing meaningful knowledge (Lujan & DiCarlo,2006; Sawyer, 2006; Skiba & Barton, 2006). Despite the numerous available studies on alternate instructional methods to enhance student learning outcomes in nursing education, existing literature shows continued debate about the overall effectiveness of active learning

instructional methods and environments compared to traditional pedagogies (Waltz et al., 2014) in higher education.

Lastly, nursing education reform efforts encourage educators to transition from a passive classroom environment to a learning environment that fosters individual or collaborative student involvement in class discussions or activities (Institute of Medicine, 2011; NLN, 2003). In addition, other recommendations included pedagogies to be personalized, task oriented, satisfying, and innovative (Everly, 2013). Another significant national nursing initiative is for nurses to "engage effectively in a process of lifelong learning aimed squarely at improving patient care and population health" (IOM, 2011, p. 202). Swiderski (2011) agreed "students should be more capable of retaining, accessing, and using their knowledge in various contexts, from formal academic environments to real-world situations, which should allow them to take full advantage of what they know in everything they do" (p. 243). Therefore, exploring best instructional methods and the optimal classroom environment for nursing education is pertinent for the conjecture Benner et al. (2009) provided, which is the gap between nursing education and transfer to practice can perhaps be minimized with utilization of active learning pedagogical practices.

Summary

Nursing curricula are packed with a plethora of information to be taught to meet program objectives; thus, students spend time memorizing or recalling knowledge instead of acquiring a deep understanding (Lujan & DiCarlo, 2006). Additionally, educators are encouraged to inspire students to develop lifelong skills, as indicated by National League for Nursing (2003) and Institute of Medicine (2011), which included lifelong learning, critical thinking, and socialization

into the profession, skills that can be achieved with student-centered learning pedagogical practices.

A notable gap in current nursing education literature unveiled a well-defined need to generate empirical evidence for implementation of active learning pedagogies in nursing curricula. The flipped classroom model, grounded within the principles of social constructivism, is an instructional method that provides opportunities to address identified deficiencies of traditional pedagogy. While some educators supported the flipped classroom model's potential to shift the student to the center of the learning experience, others expressed concern that this approach does not actually increase active involvement and question the efficacy on academic achievement. This is supported by Popkess and McDaniel's (2011) argument that students who participate in activities in the classroom environment do not necessarily have to be actively involved in the learning process. Despite these uncertainties, the flipped classroom model, if effectively implemented, befits a compelling pedagogical method to enrich the teaching and learning process for nursing students (Betihavas et al., 2015), thus examining and contributing to the evidence on flipped classroom pedagogical practices is worthwhile and will be described next.

Flipped Classroom Pedagogy

Flipped classroom pedagogy, an evolving alternative approach to didactic, lies at the intersection of integrating various instructional technologies and accommodating an active learning environment. A flipped classroom model has potential to offer a sound way to modify classroom instruction by shifting the paradigm of teaching and learning, presenting a student-centered classroom environment. Flipped pedagogy is an innovative, growing strategy, but as

the research indicated, there is no clear consensus of a definition (Berrett, 2012; Bishop & Verleger, 2013; LaFee, 2013; Lumpkin & Achen, 2015; Schlairet et al., 2014).

Without one established definition of a flipped classroom, this pedagogical approach is typically labeled based on the structure of this model. Bergmann and Sams (2012), two pioneers in the field, operationalized this approach as learning that shifts out of classroom space and into the individual learning space with the assistance of various technologies. Hence, students become the agents of their own learning instead of the object of instruction (Bergmann & Sams, 2012). Lage, Platt, and Treglia (2000) described this model as the inverted classroom, which will "enable students to view lectures either in computer labs or at home, whereas homework assignments can be done in class, in groups" (p. 32).

The flipped classroom model has also been depicted as "a reordering of activities already part of the course pedagogy" (Sankoff & Forcese, 2014, p. 2) or more critically a reconceptualization of higher education pedagogy. Sankoff and Forcese (2014) advocated the "flip is the means, not the method" (p. 3). In other words, what was previously assigned as homework now occurs inside the classroom with the teacher present and in the form of discussion or active learning exercises. Out of class assignments consist typically of lecture-based instruction that is provided through recorded and downloadable lectures to deliver course concepts. Essentially, the enormous time consumed providing lecture instruction within the traditional classroom can now be outsourced, allowing instructors to use substantial class time to nurture active learning by means of activities. More importantly, the flipped classroom should not solely rely on instructional video lectures for teaching and learning as Sankoff and Forcese (2014) pointed out, rather, it is the incorporation of activities in the classroom component that is the chief strategic factor for success of this instructional method.

Sankoff and Forcese (2014) highlighted that the misuse of the flipped model will occur if instructors continue to deliver lectures during class time, reverting to a teacher-centered, passive classroom environment. Likewise, Roehl et al. (2013) indicated inverting or flipping the classroom should not sacrifice the amount of content for students to learn, rather the structure of this approach should create an active learning environment to facilitate student involvement with peers, faculty, and more importantly the material. This approach is to maximize time students and faculty have face-to-face in an intentional manner to actively learn the material. Student involvement has a tremendous role in promoting engagement with purpose of fostering depth of knowledge and meaningful learning (Astin, 1999). Therefore, regulating the classroom component with activities promoting active learning is the key ingredient of flipped instruction and embodies the underlying theoretical framework of student-centered learning and student involvement theories.

Without a consistent universal definition and implementation of the flipped classroom, Sankoff and Forcese (2014) point out that this can consequently lead to considerable misinterpretation of how to apply this model effectively. Therefore, exploring the different misunderstandings of how the flipped classroom model is constructed will be described first to aid in determining a working definition of this instructional method. This is necessary to do prior to expounding upon designing and delivering a flipped classroom course, its benefits and criticisms, and the effectiveness of this pedagogy on academic performance in health care programs in higher education as conveyed in the literature.

Misconceptions of Flipped Classroom Pedagogy

The educational movement with the blended classroom model continues to be one of the few misconceptions of flipped classroom pedagogy. Blended learning has been referred to as

hybrid, web-enhanced instruction, or technology enhanced learning (Delialioglu, 2012). Garrison and Kanukah (2004) defined blended learning as "the thoughtful infusion of face-to-face and online learning experiences" (p. 96). Berrett (2012) noted how the definition and construction of the flipped classroom has been commonly associated with an extension of a blended learning approach, but there are notable differences. To avoid the misperception of the flipped classroom model as analogous to the blended classroom model, distinctions between the two instructional modalities are outlined in Table 1 below.

Table 1

Distinctions Between Flipped and Blended Instructional Modalities

	Flipped Classroom	**Blended or Hybrid Course**
Definition	A pedagogical model in which the typical lecture and homework elements of a course are reversed.	A portion of classroom time is replaced by online activities. Classroom time is reduced, but not eliminated.
Teaching and Learning Goals	Both combine the best features of face-to-face teaching and online learning to promote active, independent student learning.	
Course Activity	Video lectures viewed by students at home before the class with in-class time devoted to exercises, projects, or discussions.	Online learning activities may involve chat, discussion boards, quizzes and exercises, and/or group collaborations
Face-to-Face Time	Time in the classroom is repurposed rather than reduced. Face-to-face time remains the same as in a traditional course.	Because classroom time is reduced, reduces face-to-face time and provides faculty and students flexible scheduling options for use of their time.

(http://online.teaching.ucla.edu/Terminology)

In addition, Delialioglu (2011) pointed out how "the blend occurs not in the learning but in the teaching" (p. 311). This rejects Berrett's (2012) perspective that the flipped classroom instructional method was simply an extension of the blended learning model. Even with the distinctions between the two which are detected in face-to-face time and the definition as outlined above, existing evidence demonstrated both of these approaches serve as a mode to improve student learning and academic success levels. Perhaps, this can be attributed to parallel teaching and learning goals of each method which is identified in Table 1.

For instance, Delialioglu (2011) examined student achievement and engagement outcomes with blended learning environments by comparing lecture instruction to active learning instructional approaches using collaborative activities in a 3rd-year computer networking course. "Student engagement was measured with three constructs of the survey; Active and Collaborative Learning, Student-Faculty interaction, and Level of Academic Challenge" (Delialioglu, 2011, p. 316). Irrespective of students' individual factors analyzed such as sex, parental education, motivation, GPA, and technical skills, the study concluded that academic engagement was increased with meaningful activities in the blended learning environment. This was consistent with findings throughout educational research that confirm that blended learning environments enhance students' learning experience and outcomes (Ololube, 2015; O'Toole & Absalom, 2003; Zsohar & Smith, 2008).

Additionally, favorable academic outcomes resulted with active instruction in the blended learning environment (Ololube, 2015). There are countless existing studies that intend to compare active and traditional instruction to determine student learning outcomes using blended learning environments in the course design. However, even though the majority of blended

learning research did demonstrate comparable benefits to flipped learning research, the literature review will not focus or address studies on blended learning.

In addition to analyzing the depiction of the blended learning model, another barrier to establishing a universal definition of flipped pedagogy includes the misinterpretation between the labels of flipped classroom and flipped learning, which merits further clarification. Experienced educators on the governing board of the flipped learning network, with support of Pearson and researchers at George Mason University, declared there is a clear distinction and these terms are not interchangeable (FLN, 2014). Flipped learning is defined as

> a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter. (www.flippedlearning.org/definition)

In other words, educators facilitate the classroom environment to be engaging with the intention to promote active learning.

Also, there are four pillars that educators must include to move from a flipped classroom to flipped learning, resulting in active learning. For flipped learning to be effective, a flexible environment is needed to allow for diverse learning modes and support independent or group work. Second, a learner-centered instructional approach is applied in the classroom environment for students to actively construct knowledge, which is contrary to the traditional teacher-centered model. Third, instructors maximize class time with active learning exercises that foster conceptual development of intentional content, depending on grade level and course material. Fourth, professional educators are visible during class time to conduct ongoing formative assessments and provide feedback in real time (www.flippedlearning.org/definition). Experts

claimed that a flipped classroom may not necessarily lead to flipped learning if improperly implemented, which is where the distinction lies.

Definition of Flipped Classroom Pedagogy

Despite the different labels dubbed to the flipped classroom pedagogy, establishing a working definition of the flipped classroom model for this research study was imperative. The flipped classroom model was operationally defined as an alternative educational strategy to traditional pedagogy consisting of student involvement utilizing active learning exercises, completed individually or in a group, inside the classroom, and direct computer-based lecture instruction using video lectures to be viewed individually outside the classroom. See Figure 1 for an illustration of the flipped classroom model compared to a traditional classroom,

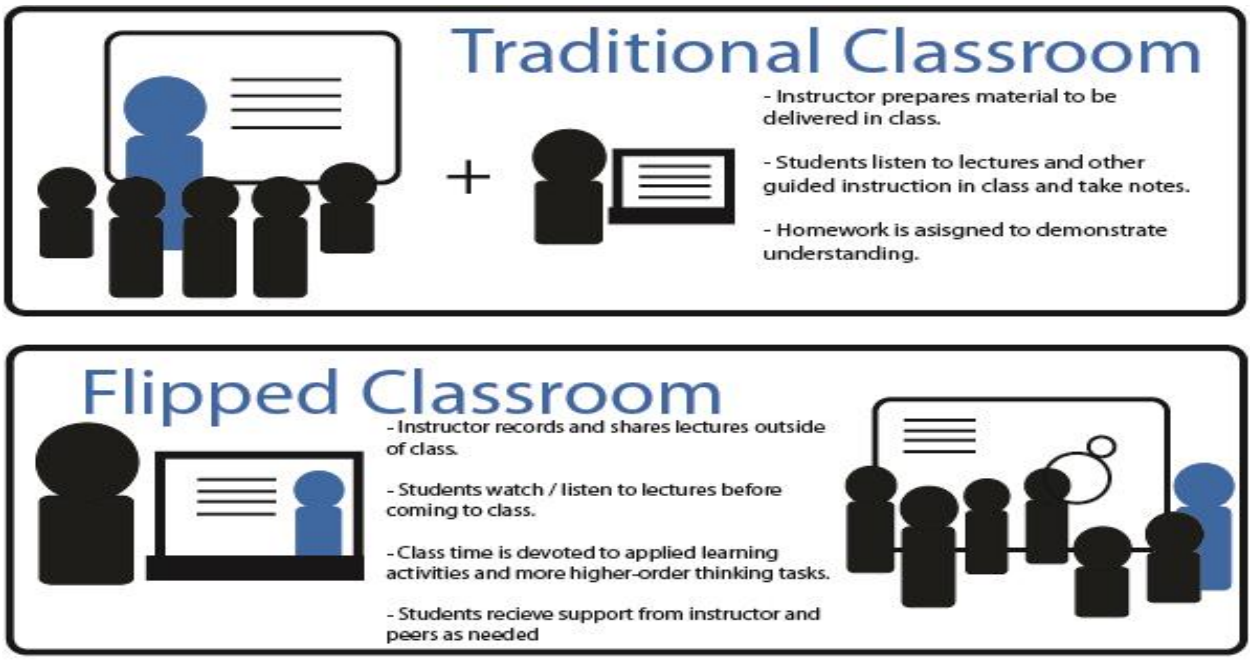

Figure 1. Illustration of differences between flipped classrooms and traditional classrooms (http://www.slu.edu/cttl/resources/teaching-tips-and-resources/flipped-classroom-resources).

Application of flipped classroom pedagogy at the college level has received little research attention compared with the adoption of this model in primary and secondary education

(McCallum, Schultz, Sellke, & Spartz, 2015). However, a survey of the literature finds one consistent impetus to implement the flipped classroom method, irrespective to the identified benefits and criticisms, is to create a student-centered classroom with intention to foster student learning achievement (Lo & Monge, 2013; McLoughlin et al., 2014; Overmyer, 2015; Roehl et al., 2013). FLN (2014) completed a comprehensive review of theoretical and empirical evidence on the flipped learning model to determine the impact on student outcomes. It was concluded further research is needed to evaluate the role of technology and contexts in which this teaching strategy works best to optimize student learning. Therefore, under what conditions the flipped learning model can be implemented effectively is of utmost importance for educators to consider prior to initiating this instructional approach. Essentially, investigating the literature on the design and delivery of the flipped classroom model used in higher educational institutions is vital.

Course Design and Delivery of the Flipped Classroom Model

Though no two flipped classrooms are designed or delivered the same, they all share the following composition which is a shift from a teacher-centered classroom to a student-centered learning environment (Love et al., 2014). As articulated by Bergmann and Sams (2012), in the flipped classroom model, students receive first exposure to instruction of foundational concepts and material outside the classroom environment. This is accomplished through an online learning platform and various educational technologies to deliver content and materials to students (Fulton, 2012). Consequently, face-to-face class time becomes freely available for students to participate in individual or group active learning exercises to apply prior learned course related material (Bergmann & Sams, 2012). Lage et al. (2000) asserted the hallmark of a flipped classroom involves student engagement within the classroom environment to facilitate

knowledge acquisition, which is parallel to McCalum et al.'s (2015) portrayal of the flipped classroom model. In addition to the classroom environment, other uniform features of the flipped classroom model include the integration of technology and the role of the teacher and student.

Classroom environment component. The flipped classroom model by its very construction leads to a student-centered classroom environment. National recommendations and decades of existing research supported that student-centered classroom environments are effective with the incorporation of active instructional methods to promote transfer of learning (Auster & Wylie, 2006; Bonwell & Eison, 1991; Chickering & Gamson, 1987; Fink, 2003; Fraser, 2012; Lord et al., 2012; NLN, 2003; O'Donnell, 2012; Prince, 2004; Weimer, 2002). With the flipped classroom model, face-to-face class time is intended to be spent encouraging students to participate in activities, either individually or in a group, that activate prior knowledge and integrate new information (Bergmann & Sams, 2012). The classroom becomes the space for students to work through homework problems, clarify difficult concepts, and engage in collaborate learning activities (Herreid & Schiller, 2013). Active learning classrooms encourage students to utilize higher cognitive thinking skills such as analysis (Bonwell & Eison, 1991), but it is crucial that the instructional activities are designed with a focus on student activity that requires thoughtful participation on the part of the student (Prince, 2004).

Sifting through the literature revealed a variety of active learning activities that are implemented in a flipped classroom learning environment to foster student engagement and are very similar in nature across disciplines. For example, Schlairet et al. (2014) wrote about their experiences with classroom activities used in a flipped fundamental concept of nursing course in an undergraduate baccalaureate program. These activities included peer instruction, small group

work, short class discussion, small group presentations, knowledge readiness quizzes, and case studies. Similarly, Miller et al. (2013) fostered an active learning environment in a large Dental Physiology course with the use of small group interactivity and engaging lectures as defined by "short periods of lecture followed by 'breaks' that may consist of 1 minute papers, problem sets, brainstorming sessions, or open discussions" (p. 347). Correspondingly Mason, Shuman, and Cook (2013) and Tune, Sturek, and Basile (2013) required active student involvement during class time using peer learning and problem-solving activities to engage students in learning, without sacrificing course coverage of content, in courses taught with a flipped classroom model. Likewise, another study on active learning strategies in a Physician Assistant flipped classroom addressed the use of case studies and problem solving discussion in groups, peer explanation and self-explanation, short writing breaks during class time, role playing, and problem-based learning (Smith, 2014).

All of these authors, in addition to Barkley (2010), FLN (2015), Gilboy et al. (2015), Herreid and Schiller (2013), Lumpkin and Achen (2015), and Pierce and Fox (2012), unanimously claimed active learning exercises in the classroom environment with the flipped instructional method benefit students in a variety of ways by providing a more holistic approach to instruction. Benefits included increased student engagement, improved critical thinking skills, more opportunities for real-time feedback, and a greater sense of social interaction (Prensky, 2010). This can be attributed to students becoming active participants in the classroom environment, which opposes the notion that learning is related only to transmission of knowledge (Modell, 1996; Prince 2004). Moreover, when learning is centered on the student in the classroom, a constructivist learning situation is generated. Jonassen et al. (2004), Jonassen (2006), and Savery and Duffy (1996) advocated that constructivist classroom environments

engage and support learners to construct knowledge through collaboration and conversation with others in the pursuit of achieving learning goals with learning activities and experiences that are embedded in a meaningful context.

Without the active learning activities and a student-centered learning environment, Smith (2014) postulated that the flipped classroom technique is no different than traditional lecturing. Weinstein and Meyer's (1991) view was that a student-centered classroom will result in "more productive learners who will function effectively and independently in the uncertainties of the future" (p. 26). The flipped classroom model speaks to the main attributes that a constructivist classroom environment offers, but it does represent one constituent of this instructional method. For complete effectiveness, the instructional content needs to be provided to students prior to attending a scheduled class; thus, the utilization of instructional web technologies is paramount.

Technological component. Technology has a tremendous and significant role in successfully designing and delivering a course with the flipped classroom model. Technology enables the conventional lecture to be made available by means of prerecorded recording and video technologies, referred to as lecture capture (LC) (LaFee, 2013). Smith (2014) described how screen casting programs, such as Camtasia Studio, Captivate, and Tegrity capture the delivery of the instructors' presentation with whatever is on the computer screen. This software enables the ability to include review questions while students view the presentation for a more active learning experience. In addition to providing fundamental course concepts with e-lectures or LC, other web-based educational tools and resources such as online quizzes or videos provided by the instructor can be utilized to deliver course information.

Web-based platforms with technology enhanced materials offer flexible possibilities to supplement student learning experiences and transmission of content beyond traditional

pedagogical instruction (Greer & Mott, 2009; Hanson, 2015). Gordor (2008), Hannafin and Land (1997), Jeffries (2005), Mancuso-Murphy (2007), and Ololube (2015) all agreed that acquiring foundational course information through technology enables learning to become self-paced and self-guided as well as relies heavily on student motivation to learn and prepare for the in-class learning activity. Strayer (2012) stressed the flipped classroom course design is to not replace traditional lecture with technology, but what makes this method effective is the "regular and systematic use of interactive technologies in the learning process" (p. 172). This is key to those who will argue classrooms have been flipped for decades as evidence by eras of utilization of computer-assisted instruction for learning. Bergmann (2014), Overmyer (2015), and Bishop and Verleger (2013) claim flipped classroom pedagogy is not a synonym for online videos or a replacement of teachers with videos.

It is well documented that designing and delivering the flipped classroom model with the integration of educational technological advancements presents numerous advantages to enhance quality learning (Betihavas et al., 2016; Gilboy et al., 2015; Little, 2015; Tune et al., 2013). First, students can independently and frequently access and view the lecture at an individual pace (Bergmann & Sams, 2012). Anecdotal findings from Frydenberg's (2013) study on implementation of the flipped classroom through the use of screencasts in an Information Technology course revealed students who watched the instructional videos at their own pace prior to class were more involved in the learning process in class and engaged than when listening to an in-class lecture.

Second, diverse student learning styles can be met. Lage et al. (2000) described the flipped classroom as a method of teaching that appeals to all types of learners by leveraging learning microeconomics with various multimedia technologies, such as videos or PowerPoints,

which in turn increased responsibility placed on the student to access and learn the material in a way that best matched their preferred learning style. Their research findings demonstrated the benefits of using technology in teaching are consistent with the intention of creating a more inclusive classroom environment to allow students who do not learn best from the traditional lecture method to learn in an alternative way.

Last, students who have grown up in an Internet accessible, highly digital world, become more engaged in the learning process (Paily, 2013; Pardue & Morgan, 2008; Pierce & Fox, 2012; Reilly, 2012; Skiba & Barton, 2006). Roehl et al. (2013) also recognized the need for educational institutions to integrate existing and new technologies into pedagogical practices and advocated for the flipped classroom model to be adopted to engage millennial learners and promote more accountability for the individual learning experience. Additionally, these authors advocated this method will capture the attention of contemporary students, who are distinguished by their access to technology and desire for an environment of variety, and as Giddens et al. (2012) and Prensky (2002) pointed out, the ability to think and process information differently than prior generations of students.

It is undeniable that technology has been a vehicle to bring innovation and flexibility to instructional delivery systems; thus transforming teaching and learning (Dimitrova et al., 2003). Paily (2013) highlighted applying the emerging technologies in educational processes can be effective in facilitating learner self-directedness and autonomy in the learning process, which has pedagogical underpinnings in constructivism. Self-directed learning has long been recognized as the most appropriate learning style for adults and can be maximized with advancements in technology (Akkoyunlu & Soylu, 2008; Bristol, 2012). Although it is the widespread use of the internet that has enabled improvements to traditional pedagogical practices by impacting how

students can best acquire knowledge and learn information, it is the pedagogical design that contributes significantly to the success of teaching and learning practices (Schlairet et al., 2014). Furthermore, McCallum et al. (2015) emphasized how the roles of the teacher and student are another critical element to nurturing student learning, development, and success.

Role of teacher and student. Moving away from a traditional teacher-centered pedagogy shifts the traditional role of the instructor and student. As previously noted, with traditional instruction such learning has been said to perpetuate passive learning. The flipped classroom model is designed to place the student at the center of the learning experience (Critz & Knight, 2013). This is best accomplished when the role of the instructor changes from a provider of knowledge, "sage on the stage," to facilitator of the learning experience, the "guide on the side" (Herreid & Schiller, 2013), organizing independent or group active learning exercises in the classroom setting. An illustration of the role of teacher and student can be seen in Figure 2.

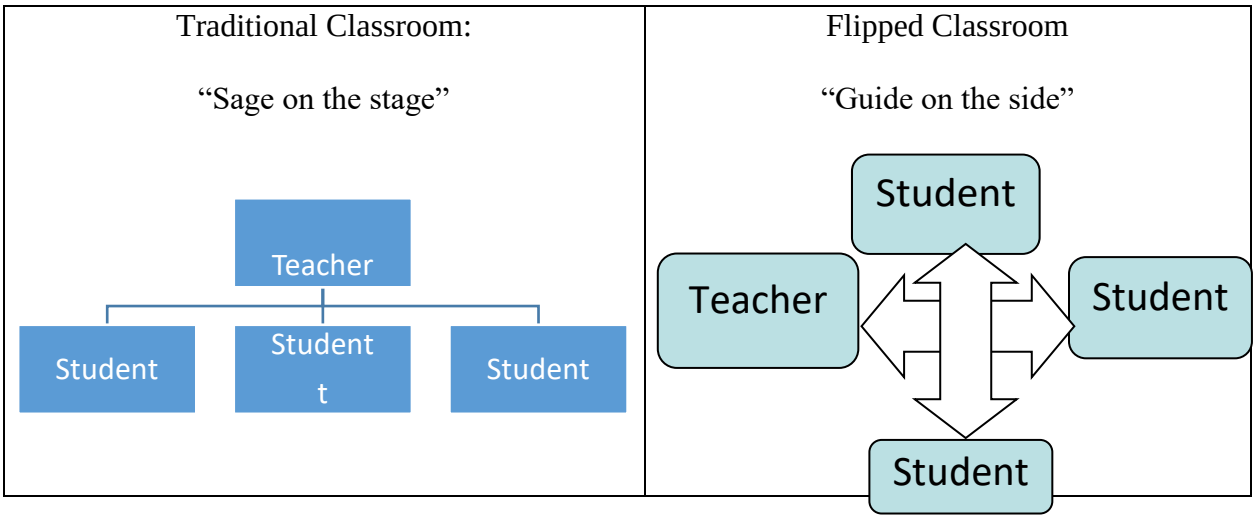

Figure 2. Role of teacher and student in flipped vs. traditional classroom environment.

A "sage on the stage" imparts knowledge to the student through lecture alone, which has been criticized as an ineffective approach to assist students in acquiring the necessary knowledge and skills (Gilboy et al., 2014). Schlairet et al. (2014) claimed this teaching style hinders

students' ability to assume personal responsibility for knowledge acquisition. As students are recipients of information, there is little or no engagement with course material or collaboration with peers to master learning. As a result, institutions have strongly emphasized the need to encourage faculty to move away from this approach and become more of a facilitator of knowledge, also known as "guide on the side" (Gilboy et al., 2014). This method aligns with the constructivist theory of learning in that knowledge must be constructed by making sense of the information as opposed to having knowledge transmitted to one another.

As a result of this shift in teacher and student traditional roles, the flipped classroom instruction renders to be a unique instructional solution that highlights the purpose of teaching expressed as student learning (Schlairet et al., 2013). Also, by relinquishing accountability of learning to the student, the instructor is afforded more time to assess a student's conceptual understanding of the pertinent information, clarify material, offer personalized feedback, and cultivate higher cognitive level thinking skills such as analysis and application (Bergmann & Sams, 2014). Thus, with active learning environments, peer collaboration and self-directed learning skills, which are also tenets of constructivism, are refined (Auster & Wylie, 2006; Della Ratta, 2015; Fagen, 2002; Honebein, 1996; Lage et al., 2000).

Benefits

The flipped classroom model has demonstrated the following benefits. Primarily, this instructional approach has much potential to address the deficiencies of traditional pedagogical practices by fostering a classroom environment for millennial students to effectively engage in the learning process (Roehl et al., 2013). Fulton (2012) highlighted advantageous characteristics of the flipped classroom to include (a) students move at their own pace, (b) doing homework in class gives teachers better insight into student difficulties and learning styles, (c) teachers can

more easily customize and update the curriculum and provide it to students 24/7, (d) classroom time can be used more effectively and creatively, (e) teachers using the method report seeing increased levels of student achievement and interest, (f) learning theory supports the new approaches, and (g) the use of technology is flexible and appropriate for 21st century learning. These features correspond to Chickering and Gamson's (1991) "Seven Principles for Good Practice in Undergraduate Education," including encouraging contact between students and faculty, developing reciprocity and cooperation among students, encouraging active learning, giving prompt feedback, emphasizing time on task, communicating high expectations, respecting diversity and ways of learning.

At its best, flipped classroom instruction will assist students in becoming more independent, active participants in the learning process through constructing meaningful knowledge (Berrett, 2012; Fink, 2003). Supported by decades of research, there is a strong link between an active classroom environment and academic performance, sanctioning classroom engagement as a valuable predictor for attaining student learning outcomes (Carini et al., 2006; Freeman et al., 2014; Kuh, 1997; Prince, 2004). For example, Prince (2004) cited studies that scores on exams that measure conceptual understanding were two times as high in classes that engaged students compared to traditionally taught classes. Miller et al. (2013) emphasized that learning driven by lectures may be an ineffective approach to promote application and synthesis of knowledge. Additionally, Ritchhart et al. (2011) determined "in order for a lecture to be an effective method of instruction, it must promote enthusiasm about the subject and provide students with an avenue so that their interaction is intrinsic to the activity rather than additive" (p. 72). Thus, a plethora of research findings in undergraduate education showed students are more likely to increase their motivation, attitude toward lifelong learning, and critical thinking

skills by being engaged in learning activities with classmates, instructors, and course material (Barkley, 2010; Lo & Monge, 2013; McLoughlin & Luca, 2002; Prince, 2004; Schlairet et al., 2014; Swiderski, 2011).

Criticisms

Despite the wide support in educational literature to foster active learning classroom environments, flipped classroom pedagogy does receive skeptical criticism which should be considered (www.educause.com, 2012). First, for the instructor to transfer the traditional lecture to an alternative media and online video lectures, much effort and time to create and periodically make adjustments to content as needed is required in addition to compiling appropriate group learning activities reflecting course objectives (Findlay-Thompson & Mombourquette, 2014). A critic of flipped instruction expressed concern that video lectures will not be customized for the various learning needs of the individual student and can be viewed as a replacement of the role of teachers (Bergmann & Sams, 2012). The Khan Academy would be an example illustrating the misconception of the role of the teacher diminishing with the use of video instruction. To the contrary, student participation and accountability are necessary in a flipped classroom course and teacher and student interaction in the classroom increases. However, there are indeed students who prefer to work alone, are uncomfortable in group learning activities, and unable to make necessary connections to course content (Roehl et al., 2013). Also, Findlay-Thompson and Mombourquette (2014) pointed out that students will need to overcome their reliance on traditional classroom methods and accept accountability for self-learning that is necessary with the flipped method. Another downside to the flipped classroom approach is the accessibility or knowledge a student or instructor may have regarding online instruction and navigating online course management platforms can be inadequate.

Summary

Bearing in mind some benefits and adversities to the flipped classroom, McLoughlin and Luca (2002), Roehl et al. (2013), and Everly (2013) revealed that active learning pedagogies are relevant in today's education because of the diversity in learning needs and the technological upbringing of the millennial generation of students. Yielding a student-centered classroom environment with active learning activities, integrating technology, and promoting student involvement is closely linked to facilitating quality learning outcomes (Astin, 1999; Baeten, 2010; Barkley, 2010). Additionally, critical thinking and peer collaboration are skills strengthened with flipped classroom instruction, which aligns with recommendations of higher education and nursing curricula reform efforts previously described (FLN, 2014; Giddens & Brady, 2007; Greer & Mott, 2009; Horsfall, Cleary, & Hunt, 2012; Ironside, 2004; Love, 2014).

Furthermore, recent literature has emerged examining whether differences do exist in student academic achievement in high school and college settings utilizing the flipped classroom compared to the traditional classroom and the findings have been conflicting (Bergmann & Sams, 2012; Fulton, 2012; LaFee, 2013; Lage et al, 2000; Massey, Kim, & Mitchell, 2011.) Thus, changing the delivery and location of instruction with the flipped classroom model in higher education has yet to be definitively determined to create an effective classroom environment supporting students' attainment of high academic performance (O'Flaherty & Philips, 2015).

Effectiveness of Flipped Classroom Pedagogy on Academic Performance

It is vital to corroborate a body of evidence of flipped classroom pedagogy effectiveness since this instructional method is growing in popularity among various scholastic areas in efforts to address the recent calls for higher educational reform in colleges and universities. Flipped

classroom pedagogy offers possibilities to promote critical thinking and teamwork, essential workforce skills, to better equip graduates with skills (Critz & Knight, 2013). The majority of existing studies on flipped classrooms that evaluated students' academic performance illustrated mixed findings (Betihavas et al, 2016; Findlay-Thompson & Mombourquette, 2014; LaFee, 2013; Little, 2015, McCalum et al., 2015). However, it is clear that this strategy has sparked interest as a potential instructional mode to engage nursing students for the complexities of modern health care (McLaughlin et al., 2014).

Tune et al. (2013) evaluated the effectiveness of traditional lecture methods compared with a flipped classroom graduate physiology course at the Indiana University School of Medicine by measuring student performance on examinations in cardiovascular, respiratory, and renal topics. Students in the flipped course scored significantly higher ($p < 0.05$) on weighted cumulative sections by an average of more than 12 percentage points, thus, indicating this method to be effective. Della Ratta (2015) used team-based learning in an undergraduate nursing course within a flipped classroom setting to facilitate student learning and improve performance on examinations. Team-based learning is an active learning method, commonly used in health care professional education, to focus on knowledge application and foster student accountability for learning (Fagen, 2002; Rao & DiCarlo, 2000). The findings, in fact, did include significantly higher examination scores and students reported valuing teamwork and collaboration as an outcome with this approach, thus, Della Ratta (2015) recommended flipped pedagogy as a promising strategy to facilitate active learning and prepare nursing graduates. Another study by Harrington, Bosch, Schoofs, Beel-Bates, and Anderson (2015) compared learning outcomes of baccalaureate nursing students in a medical surgical second semester course taught with flipped and traditional pedagogical methods and noted no statistical

differences as measured quantitatively through examination exams. However, similarly to Della Ratta (2015), this study concluded the flipped model to be effective for students to demonstrate mastery learning and is reflective of the cognitivist constructivist theory.

Whereas some of the limited available studies concluded flipped classroom pedagogy to be effective in improving academic performance, other relevant research indicated the contrary. In sifting through the literature at large on flipped classroom use, findings revealed inconsistencies in academic performance outcomes in non-healthcare related higher education courses, which echoed the empirical evidence reported from the various studies conducted in health care professional fields like medicine, pharmacology, and nursing. For this reason, the literature review will explore and convey the research on flipped pedagogy utilized in pharmacy and nursing, including nursing pharmacology, disciplines that pertain more directly to this study.

Pharmacy Education

The Accreditation Council for Pharmacy Education expected educators to incorporate educational technologies and methods to promote student learning and equip students with contemporary knowledge and skills to practice (See & Conry, 2014). Likewise, Blouin et al., (2008) advocated transforming the method in which classroom instruction is managed and utilizing technology as a medium in student learning of pharmacy education, in an evidenced-based manner, as crucial to graduate expert learners in pharmacy. In addition, these authors were in favor of migrating away from traditional pedagogy and increasing teacher-student contact in the classroom with the use of higher cognitive order learning activities. Pharmacology is a course that lends itself to self-study commitments and can benefit from rich learning experiences, too (Falcione et al, 2011; King & King, 2010).

For these reasons, the flipped classroom method has been gaining attention in Colleges of Pharmacy with favorable learning outcomes. In reviewing the literature of studies pertaining to the flipped classroom, Hessler (2016) asserted the most profound quantitative analysis of the flipped model was conducted by McLaughlin and colleagues on 1st year pharmacology students at the University of North Carolina. These researchers compared student performance, engagement, and perceptions of instruction in a flipped pharmacology course delivered to two satellite classrooms for 2 consecutive years using the traditional followed by the flipped instructional method. The flipped model increased attendance ($p = 0.03$) and revealed considerably higher grades than the traditional lecture format ($p = 0.001$). Ninety-three percent of students taught with the flipped method reported that the flipped method promoted their ability to apply important concepts and improve understanding because of increased engagement with the teacher and material. The qualitative research conducted in this same study showed students favored learning important material prior to class and engagement and learning were enhanced with the active learning exercises completed during class time.

Comparable to the purpose of the study McLaughlin et al. (2013) conducted, Wong, Ip, Lopes, and Rajagopalan (2014) assessed the effectiveness of the flipped classroom on academic performance by comparing examination scores of pharmacy students taught cardiac arrhythmias with traditional and flipped instructional methods. Students in the flipped class viewed prerecorded lectures posted online along with other reading materials prior to attending a scheduled class period. During class time, quizzes, discussions, and various active learning activities were used. The demographic characteristics of both groups did not differ gender or in mean age, or undergraduate grade point average. Mean examination scores in the intervention group ($n = 103$), showed students taught with flipped instruction during a pharmacology class

period scored significantly higher than the class that was taught with traditional methods for the topic of cardiology. Their findings supported flipped classrooms as a method to improve academic performance.

A growing body of research in pharmacy education studies demonstrated an increasing implementation of the flipped classroom (Ferreri & O'Conner, 2013; McLaughlin et al., 2014; Pierce & Fox, 2012). Research studies demonstrated similar evidence as the above described studies in that the underlying principles and design of flipped pedagogy foster learning and prepare pharmacists for success in the workforce. Therefore, rethinking the traditional lecture-based classroom and engaging students in active learning classrooms have been gaining increasing attention in pharmacy education and have equally sparked the interest in nursing schools.

Nursing Education

A recent systematic review of the flipped classroom in nursing education conducted by Betihavas, Bridgman, Kornhaber, and Cross (2015) indicated there is evidence lacking on this pedagogical practice in nursing education compared to other health-related disciplines. The authors did claim the number of educators that used this method has increased and they recommended additional research to evaluate the implementation process and effects on students' performance. Their conclusions, after reviewing the literature between 2013 and 2015, encompassed five studies, two with quantitative methodologies, which met their determined inclusion criteria. The studies compared academic outcomes of students taught with a flipped classroom versus traditional approach and revealed varied findings of effectiveness of this method from improved to no difference. Three of the studies recommended the flipped classroom model and potential for this instruction to transform nursing education; however, all

concurred there was a dearth of existing literature in nursing (Betihavas et al., 2015). Table 2 shows the available studies in nursing literature pertaining to flipped classroom.

Table 2

Flipped Learning Strategies Utilized Pre-class and Within-class and Exam Scores

Author/s & year	Course/Program	Learning Strategies utilized pre-class	Learning Strategies utilized with-in class	Examination scores for the flipped classroom compared to traditional
Critz and Knight (2013)	Post graduate pediatric course	Minimum 10 h pre-class study; 11 pre-class modules including pre-reordered lectures (20–40 min); peer text books.	10-item weekly quiz. Case studies. Role playing. Group problem solvingSimulation10 min student and faculty lectures	Not measured
Geist, Larimore, Rawiszer, & Al Sager (2015)	Undergraduate pharmacology course	Viewing online lectures	Applied active learning strategies such as case studies and nursing intervention strategies; and Immediate feedback on skill development	Increase in interval scores. No significant difference in final exam
Harrington et al. (2015)	Undergraduate medical–surgical nursing course	Not reported	Weekly quizzes. Other strategies not reported	No significant difference in final exam
Missildine, Fountain, Summers, & Gosselin (2013)	Undergraduate adult health course	Pre-recorded lecture made available to students online	A range of small group activities. Simulations, case study, games.	Not measured
Simpson and Richards (2015)	Undergraduate public health science and population health courses	Voice over PowerPoints Teaching videos Interactive online modules Directed readings	Small group work. Case studies. Web quests. Videos with response time. Group developed presentations	Significant increase in exam scores

(Betihavas et al., 2015)

Tables 2 illustrates the active learning exercises utilized in addition to outcomes of students' academic performance. The implications disclose a low number of graduate and undergraduate courses that implemented flipped instruction and fairly recently, within the past 3 years. Also, there was a variety of strategies used for class preparation and during class time that revealed mixed results in regard to determining differences between exam scores. This review also conveyed the dearth of research conducted on flipped pedagogy in nursing curriculum, despite the increasing use of this instruction in higher education. Bernard (2015) confirmed there are gaps in nursing literature on the flipped classroom approach and the existing few studies lack rigorous design, randomized sampling, or control of extraneous variables such as active learning methods used. However, this author, similarly to Towle and Breda (2013), suggested that flipped classroom instruction is relevant to nursing education by transferring the education paradigm to a student-centered pedagogy.

Nursing pharmacology. In establishing there is lacking research evidence on flipped pedagogy in nursing curricula, there are even fewer studies conducted using nursing pharmacology courses. In sifting through the literature on nursing pharmacology education and flipped classrooms, two articles surfaced. The first was a study that used a quantitative pretest-posttest nonequivalent control quasi-experimental design to determine significant differences in content acquisition in a baccalaureate nursing course that was delivered with flipped vs. traditional instructional methods at a state university in Tennessee (Geist et al., 2015). Three unit tests and a comprehensive final exam were used to measure the difference in academic achievement in a population of 40 nursing students. The findings showed there was no statistical significance on the final exam, but the variance in performance across the course was highly associated with the flipped teaching method. This implied the flipped classroom can improve

knowledge acquisition and provided evidence this method can be effective for teaching nursing pharmacology. However, these authors suggested supporting these findings with additional well-designed research studies on a larger scale with students in an associate degree program (Geist et al., 2015).

Hanson (2016) contributed to the evidence on flipped instruction by evaluating undergraduate baccalaureate nursing students' experiences in a pharmacology course that used e-lectures, peer discussion, quizzes, and case studies in comparison to traditional instruction. Compared to the Geist et al. (2015) study, sampling was purposeful and included 51 students enrolled in subsequent years, but the response rate to the questionnaire administered with a weblink to access via email was low (13%). Additionally, demographic data were not collected, therefore, this study had a few limitations to consider. Regardless, the findings revealed students preferred the flexible delivery of choosing course activities to participate in and reported an increased understanding as a result of the ability to pause and replay the e-lectures. Another significant outcome of this study was that students reported better comprehension of complex information related to this subject by being introduced to the material prior to class (14%) and linking concepts within their course with the assigned activities (29%). Whereas some positive findings were uncovered, the study found 13% of the students preferred traditional instruction, which was attributed to the comfort of this teaching method. This author did conclude the study furthers evidence that flipped instruction does equip students for 21st century health care, but she recommended further evaluation of the aspects of this pedagogy that facilitate critical thinking and active learning prior, during, and beyond the classroom.

Over the past 2 decades, Meechan et al. (2011) highlighted nursing curricula may not be sufficiently preparing undergraduate nurses to achieve their medication administration

responsibilities with pharmacology education. King and King (2010) asserted that there is a lack of attention given to consistent undergraduate preparation of nursing pharmacology, thus hindering the acquisition of fundamental knowledge. Similarly, Lim and Honey (2006) supported this assertion in that nurses have a difficult time comprehending important pharmacological content such as pharmacodynamics, pharmacokinetics, therapeutic and toxic effects, and understanding food and drug interactions. To address these concerns, King (2004) ascertained graduate nursing students need to be prepared in pharmacology education to become academically competent professionals with the knowledge and skills to make safe decisions about medication administration, particularly in the older population with polypharmacy and multiple complex health care needs.

Summary

Constructively aligning a pharmacology course in nursing curriculum that can bridge the theory-practice gap by enhancing students' ability to think critically while undertaking essential responsibilities such as medication management is key to improving safe patient outcomes. Pedagogies that are designed to encourage student-centered classrooms to promote active learning and social interaction are recommended in nursing education, and are supported by higher education institutions. Flipped classroom instruction is consistent with current nursing reform efforts that stress the need to incorporate evidenced-based teaching practices that promote innovation, student and teacher involvement, critical thinking, collaboration, self-directed learning, and effective communication skills within the classroom environment as a place to cultivate students who can engage independently in lifelong learning (Bernard, 2015; NLN, 2007; O'Flaherty & Phillips, 2008; Philips, 2015; Popkess & McDonald, 2011; Ritchart, 2011;

Roehl et al., 2013). When designed and implemented in the appropriate academic setting, flipped classrooms have the possibility to be a viable instructional approach.

In reviewing nursing pharmacology literature related to learning outcomes with flipped instruction, there are even fewer studies published and the existing literature is particularly quantitative in nature. Schlairet et al. (2014) confirmed the scarce amount of research on use of the flipped classroom model in nursing education as a major challenge for programs of nursing to implement this instructional approach. Additionally, these authors, along with Everly (2013) and McLaughin et al. (2014), encouraged further research on how the flipped classroom model restructures traditional pedagogy to facilitate application of knowledge and a quality classroom environment in curricula for health care professionals.

Therefore, it may be reasonably argued that there is a noticeable gap in nursing literature which in itself points to a need to discover if preliscensure nursing students can learn pharmacology and attain higher academic achievement with a flipped classroom instructional model. Moreover, literature in disciplines of pharmacy and nursing show baccalaureate students as the target population, which further substantiates the need to conduct research with Associate degree nursing student populations (Critz & Knight, 2013; Harrington et al., 2015; McLaughlin, Dean, Mumper, Blouin, & Roth, 2013; Meechan et al., 2011; Strayer, 2012). Clearly, on a grander scale there is a need to determine if a flipped classroom model can prove to be an effective alternative to the traditional instructional model as assessed by objective examination.

CHAPTER III

METHODS

National attention on evidence-based pedagogical practices that cultivate a student-centered learning environment continues to be a critical initiative in nursing education (Benner et al., 2010; Fink, 2003; Hessler, 2016; McLaughlin et al., 2014; NLN, 2003; Popkess & McDaniel, 2011; Steiner et al., 2010). The flipped classroom model is an instructional method that is increasingly being implemented in higher education and utilized by nursing faculty (Hessler, 2016; Schlairet et. al., 2014). To that end, conducting research on flipped classroom pedagogy compared with traditional instructional methods on academic performance in nursing curricula is relevant and can yield further data on active learning pedagogies.

This study intended to examine the effectiveness of flipped classroom instruction compared with traditional instruction on students' academic performance in nursing pharmacology. Additionally, this study served to investigate and extend prior research on active learning pedagogies and the effect on learning outcomes using flipped classroom instruction. This chapter describes the methodology in detail by providing the research questions, research design, setting, participants, and instrumentation utilized to examine the research questions proposed for this study. A detailed explanation of the procedure used to collect and analyze the data to address the research questions follows.

Research Questions and Hypotheses

This research study addressed the following research questions:

1. Does flipped classroom pedagogy improve examination scores for students taught with flipped instruction compared to traditional lecture?

2. Will there be an improvement in students' academic performance measured by examination scores after implementation of flipped instruction in nursing pharmacology?

The null hypotheses were

1. There is no difference in academic performance between students taught with flipped classroom instruction compared with traditional lecture instruction in nursing pharmacology.

2. There is no difference in students' academic performance after implementation of flipped classroom instruction in nursing pharmacology.

Setting of the Study

The setting for this research study was a public state college in the Southeastern region of the state of Florida. This educational institution upholds a vision of "a College of diverse, active learners engaged in intellectual, social, and personal growth that enriches and transforms our community" with a mission to "create and sustain a dynamic teaching and learning environment" (Palm Beach State College, 2016a). This college has become the largest institution of higher education in the county and the 7th largest of the 28 colleges in the Florida College System. In 2010, this college offered baccalaureate degrees in programs of informational technology and nursing; hence, becoming a state college. During the 2014-2015 academic year, a report revealed the college served a total of 47,741 students in credit and noncredit classes (Palm Beach State College, 2016a). The average age of a student is 26 years old, with 56% who are female. Students attending this college are racially and ethnically diverse, with more than half representing members of minority groups including Black non-Hispanic, Hispanic, Asian, and Native American.

The study was conducted within the Associate's Degree Nursing Program that is accredited by the National League for Nursing Accrediting Commission (NLNAC) and is approved by the Florida State Board of Nursing. The nursing program is responsible for graduating the highest number of registered nurses in its local county. Although students can take nursing courses on two of the four campuses connected with this college, it is the central campus location that was used for this study. Students are admitted to this program using a point system, including criteria such as prior college education, completed nursing program general education requirements, a grade point average of 2.5, and a minimum score of 850 or above on a preadmission assessment test called HESI A2. Students are admitted in the fall and spring terms to the nursing program. Participants were recruited from an Introduction to Nursing Pharmacotherapeutics course (NUR 1141).

Course Context

The context of NUR 1141 along with the course description, learning outcomes, grading, evaluation method, and methods of instruction are described. Introduction to Nursing Pharmacotherapeutics (NUR 1141) is a 2 credit hour course that was utilized for implementation of the flipped classroom instructional strategy during Summer 2016 term. The NUR 1141 Summer 2015 course was taught as a traditional course and was used as a control group. The class time duration for each summer section was 2.5 hours, scheduled once a week on the main central campus and not taught by the researcher. Students were required to enroll in this course prior to or as a co-requisite with the first semester nursing course, Introduction to Nursing Concept I theory, clinical, and skills lab.

Course Description

The course description of NUR 1141 stated that the beginning level student will be introduced to the concepts of pharmacotherapeutics in nursing. Topics included pharmacokinetics, pharmacodynamics, nursing process, medication errors, and administration through the lifespan in addition to body systems of autonomic and central nervous, gastrintestional, respiratory, cardiovascular, anti-inflammatory, neoplastic, anti-infective, endocrine, male and female reproductive, bone, skin, eye, and ear. At the completion of this course, the student will have an understanding of the major drug classifications as they relate to the nursing process.

Students utilized Blackboard as the course management system to obtain course material, announcements, email access to instructor and classmates, grades, the syllabus, and the lecture schedule. The lessons are organized into unit modules, which correspond to the lecture schedule. Each unit module includes learning objectives, lectures material, handouts, and homework assignments. The lesson unit modules for this course are presented below:

Module 1: Professionalism (includes 10 chapters)

Module 2. The Nervous system (includes 7 chapters)

Module 3: Cardiovascular includes (includes 7 chapters)

Module 4: The Immune System (includes 5 chapters)

Module 5: Allergies, Asthma, Peptic ulcers, and Bowel disorder (includes 6 chapters)

Module 6: Endocrine, Male and Female Reproductive, Bone, Integumentary, Ear/Eye (includes 3 chapters).

Course Learning Outcomes

Each learning outcome is met with a range of 4-8 lesson objectives for each chapter. The course learning outcomes, located in the course syllabus and course catalog, are as follows:

> As a result of taking this course, the student will be able to:
> 1. Explain significant historical events contributing to the development of pharmacology.
> 2. Identify the roles of the professional nurse in relation to medication administration, in varied settings as it relates to evidence based practice.
> 3. Discuss effects of medication on the body during all phases of drug activity (pharmacokinetics and pharmacodynamics).
> 4. Identify the potential for drug-drug interactions and drug-food interactions, including over-the counter (OTC) and complementary/alternative agents (CAMs).
> 5. Describe special considerations for dosage related side effects when discussing "at risk" populations such as the fetus, infants, children, pregnant women, and the frail elderly.
> 6. Develop a knowledge base that includes the nursing process as it relates to medication administration.
> 7. Identify the correct measures to ensure the prevention of medication errors.
> 8. Define the ethical and legal aspects of medication administration.
> 9. Describe the usage of drugs when administering medication to culturally diverse populations.
> 10. Identify major classifications of pharmacotherapeutic agents.
> 11. Identify essential knowledge required to enhance client's understanding of the effects of medication on their health and well- being.
> (Palm Beach State College, 2016b)

Grading

The grading criteria for this nursing program are explained according to the Nursing Student handbook. The course grade is determined by exam scores and a passing grade is dependent upon achievement of a 75% or higher on all exams including the final exam. Additional assignments, projects, and papers will be added to the course grade only if the 75% has been met (Palm Beach State College, 2016).

Over 12 weeks, during a summer term, students had five module exams, each worth 12%, in addition to a comprehensive final exam that was worth 20% of the course grade. A student who does not achieve a passing grade does have the opportunity to repeat the class in the

subsequent semester. According to the grading policy, all students must achieve an average grade of 75% on all tests prior to adding class participation and assignment points to the final grade ("Institution Web Site"). Grades are provided to students through the course management system called Blackboard. The overall course letter grade in this nursing program can be viewed in the Table 3.

Table 3

NUR 1141 Grading Rubric

Letter grade	Points
A	90-100
B	83-89
C	75-82
D	N/A
F	Below 75

Course Evaluation Method

Module unit exams are assembled by the course instructor and reviewed by a testing committee to ensure accuracy of information and the unit learning objectives are being evaluated. Students take a computerized exam (not including a make-up) in the nursing testing center and are provided a private cubicle with a computer. Two proctors are present to minimize academic dishonesty. Students log on to the computer to access the unit exam with their student ID and password. Module unit exams are comprised of 50 questions, with a 100-question final. While the questions used on the exam are the same for each student, the order of question distribution and item options are randomized to maintain academic integrity. Students have 1

hour to take each exam, with exams typically scheduled every other week throughout the semester. Two hours are provided for students to complete the final exam. All students in the current study had the same amount of time to take all exams. There were no cases when a student required additional time or accommodation for testing per the Disability Student Center guidelines.

All exams in NUR 1141, with the exception of make-ups, are delivered by an online testing software called Test Generator. Test Generator enables teachers to create and administer exams to students. NUR 1141 exams have been developed by the course instructor and have established content validity over time. Morrison et al. (2004) described content validity as the effectiveness of the test items in measuring the basic nursing knowledge of students. After each exam, the instructor determined the overall exam reliability by analyzing the item difficulty and item discrimination, also known as point-biserial index. This is a correlation between score of an item and score on the exam, with the general rules as follows: below 0.2 indicating a poor item, 0.2-.029 indicating fair, .03-0.39 indicating good, and lastly 0.4-0.7 indicating very good (McGahee, & Ball, 2009). The instructor reported the items varied in score in the good and very good range. During the analysis of individual exam item performance, the instructor determined not to discard any exam questions on the unit exams and final.

Course Instructor

The course instructor was not the researcher for this study. The course instructor taught two sections of NUR 1141 during Summer 2015 and two sections of NUR 1141 during Summer 2016. The instructor has taught NUR 1141 for the last 3 years at this institution in fall, spring, and summer terms. The instructor also taught during the past 3 years at this college, theory and clinical in Nursing Concepts II (NUR 1223), which is a second semester course. The instructor

used the flipped classroom instructional method for the past 2 academic years in NUR 1223. The instructor informed the researcher that she attended workshops and webinars on flipped classrooms and active learning in the classroom. The instructor has 19 years' experience as a registered nurse with clinical specialties in Emergency Room and intensive care units. In addition, the instructor has 15 years as an educator amongst different educational institutions. The instructor's highest degree is a Master's of Science in Nursing; however, she is currently a nursing doctoral candidate.

Participants

A nonrandomized population of Associate Degree Nursing students at a state college in Florida enrolled in two sections of an Introduction to Nursing Pharmacotherapeutics (NUR 1141) course during Summer 2016 were utilized as a convenience sample for this study. These students were part of the experimental group, receiving the educational intervention of flipped instruction. The control group was students who were enrolled in two sections of NUR 1141 during Summer 2015 taught with traditional lecture instruction for the entire semester. The instructor who taught the two sections during Summer 2015 also taught the two sections in Summer 2016. Additionally, students enrolled in both summer terms of NUR 1141 during any of the terms adhere to the same nursing admission criteria and policies of the program, lecture topic schedule and unit module order, course management system, assignments, and examinations.

The sample population studied contained a mix of students by gender, ethnicity, and age. Participants were predominantly women from a diverse ethnic background who were older than 18 years of age. No vulnerable populations participated in this study. The sample demographics included in this study and obtained anonymously from participants in Summer 2016 were age,

sex, ethnicity, current course academic average, and prior enrollment in NUR 1141. Matching demographic data of students who completed NUR 1141 during Summer 2015 were collected and aggregated by an authorized employee at the institution and provided to the researcher in an anonymous manner. In addition, examination scores of students in NUR 1141 during Summer 2015 were aggregated by the same instructor teaching the Summer 2016 course and provided to the researcher in an anonymous manner. The secondary data set helped determine how the intervention and control group were statistically similar or different at baseline, with intent to remove bias from this study.

An adequate sample size was needed to determine a level of significance in this study, which was detected with a priori power analysis in advance of the research. This analysis is useful in determining a sufficient sample size needed in this study to reduce the risk of making a type I error. Power depends on the significance level, the size of the treatment effect (number of groups and measurements), and the total sample size. Effect size can either describe the differences in means relative to the study's variability or determine how much variability can be attributed to the intervention conditions. For example, if the NUR 1141 Summer 2016 class size was small, the flipped instruction method needed to have a moderate or strong effect on examination scores to detect any difference.

Using G*Power software version 3.1.2, three separate power analyses were included to determine the effect based on the sample size to address the two research questions. The calculation for the power analysis for Research Question 1 was as follows. A MANOVA repeated measures between factors statistical analysis was used to compare student exams scores in NUR 1141 taught with flipped instruction in Summer 2016 and traditional instruction in

Summer 2015. The recommended total sample size was 52 students based on the following calculations:

1. The number of groups = 2 and number of measurements = 3
2. Significance level of .05,
3. An effect size of .30
4. The desired power level of .95 is concluded

A MANOVA repeated measures between factors statistical analysis was used for the second measurement of Research Question 1, which looked at overall final examination scores between students in the Summer 2015 and 2016 courses. The recommended total sample size was a total of 52 students based on the following calculations:

1. The number of groups = 2 and number of measurements = 1
2. A significance level of .05,
3. An effect size of .30
4. The desired power level of .95 is concluded

For Research Question 2, a repeated measures ANOVA, within factors statistical test was used, testing three measurements with two groups which provides the following results: Significance level was .05; effect size was .25; and desired power level was .95. This projected a desired total sample size of 44, which allowed room for participants who needed to be excluded or were unwilling to participate. This projected small sample number and lower power analysis was a limitation to this research study.

The researcher anticipated having a sufficient population sample of students in NUR 1141 for Summer 2016 based on the previous semester's sample of 41 students, in addition to a sufficient sample size available to address Research Question 1. The potential student pool size in NUR 1141 during Summer 2016 included 60 students. Inclusion criteria included enrollment in the program of nursing and willingness to participate in the study. Students were not required

to participate or penalized in any way for deciding to self-opt out of the study at any point of the semester. Students who withdrew from the course before taking exams for all modules and the final exam were excluded from this study.

Recruitment and Access

The researcher had access to the sample and setting because of employment, but was not the instructor for NUR 1141. Therefore, no advertisements were used to recruit. Even though the researcher had entrance to the study site, permission to conduct the research was required and obtained from the Dean of Health Sciences, the Director of Nursing, and the institution in addition to receiving student informed consent to be a participant. To recruit participants, the researcher presented information on the first day of class, within approximately 10 minutes, about the study with the purpose, procedure, associated risks and benefits, methods to maintain confidentiality of this research study on a lecture day prior to the implementation of the instructional method (intervention).

Students were informed that there was no cost to participate, participation was confidential and voluntary, the ability to withdraw at any time during the study was possible if desired, and there were no consequences on grades for refusing to participate in the study. Participants were made aware that they would all be educated with the same instructional method, regardless of participation in this study. The intent of not having the course instructor recruit was to ensure students did not feel coerced to participate in the study. The researcher ensured that all students understood the intentions of the study and clarified any questions.

The researcher asked for students agreeing to participate to complete a separate anonymous demographic sheet (see Appendix A) that was provided at the same time as the informed consent document. Each participant had sufficient time to read the informed consent

and consider participation. All students had until the next scheduled class to submit the consent form. Each student placed the document in an envelope that was located in the front of the classroom at the start of class. In addition, the anonymous demographic questionnaire was placed in a second envelope next to the informed consent. The researcher collected both envelopes at the beginning of the next scheduled class and provided the instructor with the names of students who had signed the consent form. This was the only record the researcher had that linked the participants and the research; thus, a potential risk of a breach of confidentiality could occur, but this would not be ethical. Otherwise, minimal risk to participants in this study was anticipated by the researcher.

Ethical Considerations

Ethical considerations were taken to ensure the participants and the institution were protected. This was accomplished through obtaining approval to perform the research from the College Institutional Review Board for the institution at which the study took place and from the Institutional Review Board for the institution at which the researcher is enrolled as a doctoral student (see Appendix B). Students agreeing to be participants were informed that agreeing was anonymous and grades would not be impacted by participation, which was stated on the informed consent document. The researcher collected all forms, which may or may not have been signed by students, in an envelope placed in the front of the class. This ensured confidentiality for students unwilling to participate. Additionally, this was the only contact the researcher had with the participants.

In order for the researcher to obtain student exam scores for NUR 1141 Summer 2015 and 2016 in a confidential manner, the course instructor assigned a random numerical code to each participant to replace the student's name, social security number, and/or student

identification number. This process of anonymizing the data was crucial by the researcher and host institution to comply with FERPA regulations. The course instructor provided the researcher with this information in an Excel document, which was safely secured in a locked desk and will eventually be shredded for disposal or emailed with a password for protection. Student demographic data were compiled by an authorized employee and provided to the researcher in an anonymous manner using the same email password protection system.

Research Design

A quasi-experimental study, with a nonequivalent control group, post-test design, in a total of two sections of a nursing pharmacology course taught over Summer 2015 with lecture instruction and 2016 with flipped instruction was utilized for this quantitative research study. Quasi-experimental designs are useful in determining causality between an intervention and an outcome (Creswell, 2009). A quasi-experimental design is most advantageous for this research because the groups are selected without random assignment (Polit & Beck, 2008). Participants were not placed by the instructor or researcher into a course section during the registration period. The experimental and control groups were formed randomly based on the section a student registered for during the spring term. The study occurred in the nursing classroom, which made a true experimental design unfeasible for this research. The researcher had to use the naturally formed groups of participants already placed in the course sections (Creswell, 2009); thus, the groups were unable to be randomized.

For this research study, the method of instruction was the independent variable whereas academic performance was the dependent variable. Academic performance was operationally defined and measured as the examination scores on module exams and the final exam score in the course. A flipped classroom instructional method was introduced as the intervention in three

out of six designated unit modules of NUR 1141 during Summer 2016, in the absence of randomization (Polit & Beck, 2008). Each student in the class received the instructional intervention and potentially benefitted, whether or not they participated in the study. The two sections of NUR 1141 during Summer 2015, taught by the same instructor, served as the nonintervention group and were designated as the control group. Student exam scores on each unit module exam and the final exam were compared with the experimental group exam scores (students receiving the intervention). To control for potential confounders, the NUR 1141 Summer 2016 course was taught by the same instructor who taught the prior summer and shared identical course outcomes and lesson objectives. In addition, all unit modules were presented in the same chronological order, with the same content, and evaluated with the same unit examinations. Students completed the unit exam after each unit was taught per the lecture schedule. Furthermore, student demographics for summer 2015 and summer 2016 courses were obtained anonymously to account for group equality.

Overview of Course Instructional Methods

It is important to highlight that the amount of face-to-face time a student in the Summer 2016 course spent in a classroom was not different from a student taught in Summer 2015 with traditional lecture instruction. The NUR 1141 course content for each unit, the textbook resources, and the instructor were identical for Summer 2015 and Summer 2016. The instructor strictly followed the instructional format in each of the outlined module units in the study. For both classes, students were provided the same syllabus and lecture schedule, with topics introduced in the same order. The module exams and final exam utilized for Summer 2016 were identical to the module exams and final exam used during Summer 2015. In addition, all exams were scheduled in the same timeframe and order during both of the terms. The exam questions

were randomized to prevent academic dishonesty. Student learning outcomes were assessed in an identical manner with a total of five unit exams and one comprehensive final. The content on the final exam that relates to the sixth unit module content for all NUR 1141 sections used in this study was extracted by the course instructor and students were designated a module exam score by the course instructor. Additional assignments and participation grades were not included; therefore, academic achievement was not determined by the final course letter grade rather it was measured using module examination scores and the final exam score. Students who withdrew from the class before taking exams for all modules and the final exam as in addition to students who missed a scheduled exam were excluded from this study.

Traditional classroom instruction. Students who took NUR 1141 during Summer 2015 were taught all the content in the unit modules with traditional pedagogical methods. Within a traditional learning environment, students learned the content via lecture instruction using PowerPoint presentations during scheduled class time, which was heavy in content and instructor-driven, thus placing students in a passive learner role. Students were encouraged to bring the PowerPoint handout notes to class to follow along and take notes while the professor introduced new course material. Students did not have video lectures available to them. The NUR 1141 instructor was the only educator of the course and did not miss a scheduled lecture day.

For NUR 1141 during Summer 2016, students were taught with lecture-based instruction, similar to the summer prior, for module units 1, 3, and 5. Students were encouraged to bring the same PowerPoint handout notes to class to follow along and take notes while the professor introduced the new course material. Students were not mandated to review materials on Blackboard prior to attending class.

Flipped classroom instruction. Flipped pedagogy was implemented, as the active learning instructional intervention, in NUR 1141 during the summer term of 2016 to teach module units 2, 4, and 6, which were considered the experimental modules. Unit exams respectively followed according to the lecture schedule. Students instructed with the flipped classroom educational intervention were introduced to new material via the course learning management system, Blackboard, prior to attending the scheduled class. All lectures were shortened to review the material in each assigned chapter and delivered via prerecorded videos using Camtasia. The lecture videos were downloaded to an embedded tool in the Blackboard course management learning system called Calturia. The audio lectures were created by the course instructor and ranged from 15 minutes to 30 minutes long. The audio lectures followed the course instructors' lesson plan notes, which were utilized during the Summer 2015 NUR 1141 course, taught with traditional lecture. This was to ensure the videos presented the same content as the live lectures. Students who accessed the recordings were able to pause, rewind, fast forward, and review multiple times; thus, self-pacing and personalizing the learning experience. This advantage contributes to the attribute of flexibility that is highlighted with this pedagogy and in a student-centered learning environment. In addition, handouts in the format of PowerPoint slides, reflecting the voice-over lecture capture lectures, were available to enable students to take notes while viewing. Students were required to learn the unit content by viewing the recorded video lectures that delivered the class material prior to attending the scheduled class.

Consequently, during scheduled face-to-face class time, students were not instructed with a lecture format. Instead, in the flipped classroom environment, lecture content was reinforced with learning experiences that included active learning exercises such as assessment quizzes with

application style questions, pair and share questions, and/or group discussions and presentations about case scenarios. All activities involved independent or collaborative problem solving. Activities were not graded, but utilized for the instructor to assess learning throughout the scheduled class period. The instructor's role was to present and facilitate the activities and circulate the classroom to interact with all the students. Essentially, the classroom shifted to a student-centered learning environment. Table 4 depicts the instructional methods and learning environments used in this research design.

Table 4

Comparison of Traditional and Flipped Classroom Instruction

Instructional Methods	**Inside classroom activity**	**Outside classroom**
1.Traditional (Control) *(Summer 2015)* *(Summer 2016 in module units 1,3,&5)*	Lecture-based instruction with use of Power Point presentations and notes for students to follow.	Homework includes: Textbook chapter readings assignments with application practice questions.
2.Flipped (Intervention) *(Summer 2016 in module units 2,4,&6)*	Active learning exercises including: Group discussions, Peer instruction and presentations, Case scenarios and case studies with application practice questions.	Homework includes: Textbook chapter readings and online lecture instruction via lecture recordings and videos with the course management system that students are required to view prior to attending scheduled class.

Instrumentation

Students' academic performance with both instructional methods (flipped and traditional) was measured by completing a multiple choice exam comprised of 50 questions on the content

taught in the unit. The questions were evenly distributed to reflect the learning objectives. The questions have been utilized repeatedly and tested for content validity using the statistics provided in the program Test Generator. Additionally, a testing committee made up of nursing faculty across semesters reviews all exams prior and after implementation for validity. If the committee and course instructor decided there was a discrepancy in the analyzed data, the question would not count in the exam. The questions were derived from the test bank that accompanies the course and measures students' knowledge application.

Data Collection

First, the researcher obtained informed consent from participants prior to the educational intervention (flipped instruction). The NUR 1141 course instructor, who taught both classes (the experimental and control) for this study, in order to remove instructor bias toward a preferred teaching method, administered and proctored each posttest in the testing center to prevent academic dishonesty. The course instructor collected all of the participants' exam scores to measure their academic performance. After all the final grades were submitted to the institution, the examination scores for module units 1-6 and the final examination were provided as anonymous data to the researcher. To maintain anonymity, the course instructor assigned a random number to each participant rather than using student names and identifying information, and provided the researcher with, via a password protected email, an Excel spreadsheet document containing the exam scores for NUR 1141 taught in Summer 2015 and Summer 2016.

Data Analysis

Data were analyzed with descriptive and inferential statistics using the statistical software package, Statistical Package for the Social Sciences (SPSS) version 22. All statistical tests were performed with a 0.5 alpha level. The first research question was addressed by comparing the

academic performance of the students' receiving the intervention (flipped classroom instruction) with the students' in the control group who were taught with traditional lecture instruction. To analyze and compare both groups' module and final examination scores, a MANOVA was used. The second research question used ANOVA repeated measures with covariance to analyze the dependent variable (academic performance) after the intervention (flipped instruction) was implemented in three modules units. The covariate was the modules taught with traditional instruction.

CHAPTER IV

RESULTS

The purpose of this research study was to determine if flipped classroom pedagogy compared to traditional instruction improved students' academic performance in nursing pharmacology. In this chapter, the description of the participants is presented. Additionally, the results of the data analysis of the two research questions will be provide and described.

Description of Participants

Participants consisted of two groups of undergraduate associate degree nursing students from a college in South Florida. The control group was enrolled in two sections of NUR 1141: Introduction to Nursing Pharmacotherapeutics during Summer 2015 and the experimental group was enrolled in two sections of the Pharmacotherapeutics nursing course during Summer 2016. Fifty-five of the 57 students enrolled during the summer of 2016 were available to participate in the study. A total of 38 of those participants completed the entire course, taught with both traditional and flipped instruction, completing six module exams and a final exam. During Summer 2015, 42 of the 52 students enrolled in the course completed the entire course, which was exclusively taught with traditional instruction. Demographic information for students during Summer 2015 and Summer 2016 is displayed in Table 5.

A Chi-Square test analysis was performed to detect the demographic differences between the experimental and control group and can be viewed in Table 6.

Table 5

Demographics of Sample

Demographics	Categories	Participants 2016	Percentage Experimental	Participants 2015	Percentage Control
Academic Average	A	1	1.8%	25	48.1%
	B	35	61.4%	25	48.1%
	C	21	36.8%	2	3.8%
	< C	0	0%	0	0.0%
Sex	Female	51	89.5%	41	78.8%
	Male	6	10.5%	11	21.2%
Race/Ethnicity	African American/ Black	16	28.1%	19	36.5%
	Asian	4	7.0%	1	1.9%
	Hispanic/Latino	10	17.5%	13	25.0%
	Multiracial	0	0.0%	2	3.8%
	Caucasian/White	26	45.6%	15	28.8%
	Pacific Islander/ Native Hawaiian	0	0.0%	2	3.8%
	Not listed	1	1.8%	0	0.0%
Age	18-24	18	31.6%	22	42.3%
	25-30	17	29.8%	12	23.1%
	31-40	11	19.3%	14	26.9%
	41-50	8	14.0%	3	7.7%
	> 50	3	5.3%	0	0.0%
	Prefer not to respond	0	0.0%	0	0.0%
First Time Enrolled in the Course	Yes	41	71.9%	51	98.1%
	No	16	28.1%	1	1.9%

Table 6

Demographic Differences

Demographics	*P*
Academic Average	.000
Gender	.127
Race/Ethnicity	.117
Age	.220
First Time Enrolled in the Course	.000

During Summer 2016, the mean academic average was a B, which is a grade point average of 2.0-3.0, reported by 61.4% of the participants. Those with a C average (36.8%), less than 2.0 grade point average, were more likely to withdraw from the course prior to the third module exam. During Summer 2015, 25 students (48.1%) had an academic average of an A and 25 students (48.1%) had an average of a B. The control group appeared academically stronger than the experimental group (see Table 1) and there was a statistical difference between the two groups (p = .000).

The second question addressed gender. The experimental sample (Summer 2016) consisted of 51 female (89.5%) and 6 (10.5%) male students. Likewise, the majority of students during Summer 2015 were female [41 participants (78.8%)] with 21.2% males. This is reflective of gender demographics in the nursing discipline. The experimental and control group were reasonably similar with respect to gender (p = .127).

Race and ethnicity revealed participants in the experimental group (Summer 2016) identified with most of the categories, except Multiracial and Pacific Islander. Race and ethnicity were more evenly divided among all the options for the students during Summer 2015,

which can be seen in Table 1. In the experimental sample, the participants marked Caucasian (45.6%) followed by African American/Black (28.1%). This differed with the control group in that 19 students (36.5%) marked African American/Black followed by a lower number of students that marked Caucasian (28.8%). The other race and ethnicity categories were relatively comparable. There was no statistical difference between the control and experimental group (p = .117). Racial/ethnic diversity was reflective of the institution in this study and registered nurse demographics.

The fourth question addressed age. During Summer 2016, the population sample represented across each age category with the exception of older than 50 years old. whereas in the control group, three students in the course were older than 50 years old. Aside from this difference, the control and experimental group were for the most part equivalent (p = .220) with the majority of the class under 40 years of age.

Students were surveyed about their prior experience of being in the NUR 1141 course to ascertain the number of student repeaters. In Summer 2016, 16 participants (28.1%) repeated this course compared to 1 participant (1.9%) in Summer 2015; hence, the two groups were nonequivalent (p = .000) with regard to this question. Academic performance on exams could have been potentially impacted if a student who was previously enrolled and repeated this course had more exposure to course material.

Results of Data Analysis

The research questions and null hypotheses that guided this study were

1. Does flipped classroom pedagogy improve examination scores for students taught with flipped instruction compared to traditional lecture?

NH1: There is no difference in academic performance between students taught with flipped classroom instruction compared with traditional lecture instruction in nursing pharmacology.

2. Will there be an improvement in students' academic performance measured by examination scores after implementation of flipped instruction in nursing pharmacology?

NH2: There is no difference in students' academic performance after implementation of flipped classroom instruction in nursing pharmacology.

Research Question 1

Does flipped classroom pedagogy improve examination scores for students taught with flipped instruction compared to traditional lecture? By means of multivariate analysis of variance (MANOVA) between factors statistical analysis, students' who were taught nursing pharmacology with traditional pedagogy during summer 2015 were compared with students' during summer 2016 who received flipped classroom instruction. MANOVA tests for differences between two or more vectors of means and is an analysis of variance (ANOVA) with several dependent variables (Morrison et al., 2004). This statistical analysis captured the correlations between the exam scores by testing the hypothesis that the covariance matrices of the dependent variables (examination scores) was equal across the two groups. Box's test of equality of covariance matrices (see Table 7) is sensitive to violations of normality.

Table 7

Box's Test of Equality of Covariance Matrices

Box's M	29.425
F	.950
df1	28
df2	20748.441
Sig.	.540

This analysis shows no violations in assumption of MANOVA (p = 0.540). In comparing the control and experimental group using MANOVA, there was no statistically significant difference in academic performance between the groups in the multivariate tests, F (7, 72) = .907, p = .506; Wilk's Λ = .919, partial $\eta 2$ = .081. Thus, based on these findings, it was not necessary to perform further analysis.

Therefore, the null hypothesis for the first research question was not rejected. There was no difference in academic performance between students taught with flipped classroom instruction compared with traditional lecture instruction in nursing pharmacology. While there was no multivariable effect in exam scores, it is worthwhile to illustrate a comparison of the mean scores between the Summer 2015 and Summer 2016 groups (see Table 8).

Table 8

Comparison of 2015 and 2016 Groups

Dependent Variable	Year	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Exam 1	2015	80.474	1.511	77.466	83.482
	2016	79.476	1.437	76.615	82.337
Exam 2	2015	81.737	1.562	78.628	84.846
	2016	83.619	1.485	80.662	86.576
Exam 3	2015	77.053	1.827	73.416	80.689
	2016	74.833	1.737	71.374	78.292
Exam 4	2015	85.632	1.399	82.846	88.417
	2016	87.048	1.331	84.398	89.697
Exam 5	2015	84.763	1.504	81.769	87.757
	2016	84.286	1.430	81.438	87.134
Exam 6	2015	89.474	1.442	86.603	92.345
	2016	92.119	1.372	89.388	94.850
Final Exam	2015	80.395	1.597	77.216	83.573
	2016	79.167	1.519	76.143	82.190

The means of exams 2, 4, and 6 were higher in the intervention group (2016), who were taught those modules with the flipped classroom instructional method compared to the control group (2015) who were taught with traditional instruction only. In contrast, the exams taken without flipped instruction (exams 1, 3, and 5) were lower in the experimental group (Summer 2016). The comprehensive final exam mean was slightly lower in Summer 2016, but revealed no

statistical difference (p = .579). This may be attributed to the new teaching strategy implemented this term. However, students may have done academically worse on exams 2, 4, and 6 if it had not been for the flipped classroom intervention. Examining the means of the grades of the modules taught with flipped classroom instruction revealed an increase in scores from module 2 to module 6, which can be viewed in Table 9.

Table 9

Means of Exams with Flipped Instruction

Dependent Variable	Year	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Exam 2	2016	83.619	1.485	80.662	86.576
Exam 4	2016	87.048	1.331	84.398	89.697
Exam 6	2016	92.119	1.372	89.388	94.850

Research Question 2

Will there be an improvement in students' academic performance measured by examination scores after implementation of flipped instruction in nursing pharmacology? By means of analysis of variance (ANOVA) repeated measures, six exams for the Summer 2016 experimental group were compared to each other to detect significant differences. Repeated measures is used when the same entities take part in all conditions of an experiment (Morrison et al., 2004), thus, data were related. The assumption is the level of dependence between pairs of groups is roughly equal, which is referred to as sphericity. Mauchly's Test of Sphericity was conducted and not violated for test (p = .7333) and test by learning (p =.988). As seen in Table

10, using a repeated measures ANOVA, there were significant differences between the measurements of test, learning, and test by learning ($p < .001$).

Table 10

Tests of Within-Subjects Effects

	Df	F	H	*P*
Test Time	2	25.838	.387	< .001
Teaching Method	1	69.455	.629	< .001
Test Time*Learning Method	2	8.150	.166	.001

Post hoc analysis on the comparison of teaching method (traditional vs. flipped) revealed a significant difference with traditional (mean=79.532, standard deviation = 8.087) and flipped classroom instruction (mean=87.595, standard deviation = 6.266). There was a significant difference on exams in which the participants were instructed with flipped classroom (modules 2, 4, and 6) and traditional instruction ($p < .001$). Comparing mean exam scores indicates the flipped classroom instructional method had a mean difference 8 points higher than traditional instruction. Thus, the null hypothesis for the second research question was rejected. There was an improvement in exam scores of students taught with the flipped classroom instructional method in nursing pharmacology.

Summary

The results indicated that the first null hypothesis was not rejected. There were no differences in academic performance between students taught with flipped classroom instruction compared with traditional lecture instruction in nursing pharmacology. However, the second null hypothesis was rejected. Examination scores improved when students were taught with the

flipped classroom instructional method in nursing pharmacology. The next chapter will discuss the implications of these findings.

CHAPTER V

DISCUSSION

The purpose of this study was to determine the effectiveness of flipped classroom instruction compared with traditional instruction on student academic performance in a nursing pharmacology course. A quasi-experimental study, with a nonequivalent control group, post-test design, in four sections of a nursing pharmacology course was utilized for this quantitative research study. The researcher performed ANOVA and MANOVA statistical tests to analyze the data. This chapter explains the discussion of the research findings, limitations of the study, implications for nursing education practice, and recommendations for future research.

Major Findings

Research Question 1

Research Question 1 asked "Does flipped classroom pedagogy improve examination scores for students taught with flipped instruction compared to traditional lecture?" Statistical analysis did not detect existing significant differences in academic performance between nursing students taught with flipped classroom instruction compared to traditional lecture instruction in nursing pharmacology. Therefore, the null hypothesis was not rejected. In this study, nursing pharmacology students taught with the flipped classroom method did not improve in academic performance compared with traditional lecture instruction.

However, upon examining the means of the examination scores and comparing the control group (Summer 2015) with the experimental group (Summer 2016), while not statistically significant, the means were higher for the intervention group than the traditional

group on exams in which students' in the intervention group (Summer 2016) were taught with flipped classroom instruction. These results may imply that students in the experimental group (Summer 2016) perhaps did benefit from flipped classroom instruction for the specific modules taught with flipped classroom instruction. On the contrary, test means of students in the intervention group scored lower for units 1, 3, and 5, which were taught with traditional instruction compared with the control group (Summer 2015) who were also taught with traditional instruction. This could indicate that lecture instruction may be an ineffective method to utilize for units 1, 3, and 5 in this course, therefore, incidentally supporting the need to implement a nontraditional teaching method such as the flipped classroom model.

Additionally, the mean final exam grade during Summer 2016 was slightly lower compared with the mean final exam grade during Summer 2015. This may be attributed to the new educational method, flipped pedagogy, which was implemented in every other unit, combined with traditional lecture, which was revealed to be ineffective in improving academic performance for this group of students. This also may be credited to the finding concerning students' reported academic average on the questionnaire, which revealed that the two groups were nonequivalent. Students enrolled during Summer 2015 had higher grades to begin with, perhaps having some bearing on the control group performing academically better on the final exam.

There is a dearth of studies in the literature on flipped classroom pedagogy in nursing education, determined by Betihavas et al. (2015), who conducted a systematic review of the literature on flipped pedagogy in nursing academia between 2013 and 2015. Five studies comparing students taught with a flipped classroom versus the traditional approach were included and indicated varied findings (Critz & Knight, 2013; Geist et al., 2015; Harrington et

al., 2015; Missildine et al., 2013; Simpson & Richards, 2015). Two studies in Betihavas et al.'s (2016) literature review measured examination scores on unit tests and showed the average grade scores to be significantly higher ($p < 0.001$) with the flipped classroom approach compared to the traditionally taught control group (Geist et al., 2015; Missildine et al., 2013). However, two of the studies in Betihavas et al.'s literature review revealed no significant difference in the final exam score (Geist et al., 2015, Harrington et al., 2015). In this regard, the results of the current study performed were similar to these claims found in nursing literature. The current study's findings may be attributed to using students in the summer term, which is conducted in a shorter time frame (12 weeks) compared to the other academic terms (16 weeks) or the statistical difference found in academic average between the two sample groups.

Furthermore, there were two existing research studies that examined academic performance in nursing pharmacology content using the flipped classroom educational approach. One of the studies, by Geist et al. (2015), showed that there was no statistical significance on the final exam, but the variance in performance on exams across the course was highly associated with the flipped teaching method. However, this research was performed with students at the baccalaureate nursing degree level, unlike the current study. Another difference is the Geist et al.'s research showed flipped classroom pedagogy was effective in improving knowledge acquisition of nursing pharmacology, whereas in the current study it was determined that there were no statistical differences between students taught with the flipped classroom method compared with traditional lecture format.

The majority of existing studies on flipped classroom pedagogy examined the variable of students' academic performance, which does demonstrate mixed findings (Betihavas et al., 2016; Findlay-Thompson & Mombourquette, 2014; LaFee, 2013; Little, 2015; McCalum et al., 2015).

The findings of the current study were broadly in line with the finding by Harrington et al. (2015), which suggested students taught with the flipped classroom model showed no significant improvement in grades. On the other hand, the findings of this study contradicted the research conclusions by Tune et al. (2013), Della Ratta (2015), Hessler (2016), McLaughlin et al. (2013), and Wong et al. (2014) who offered support for increased grades with flipped learning. While there is a growing body of research on flipped classroom pedagogy at large that determines positive academic outcomes, this finding runs counter to that notion.

Research Question 2

Research Question 2 asked "Will there be an improvement in students' academic performance measured by examination scores after implementation of flipped instruction in nursing pharmacology?" Results demonstrated examination scores did improve when students were taught with the flipped classroom instructional method in nursing pharmacology, thus, rejecting the null hypothesis. There was a significant difference between exam scores on modules taught only using traditional instruction (1, 3, and 5) and modules taught with the education intervention, flipped classroom (2, 4, and 6). More specifically, flipped classroom instruction yielded an average mean difference of 8 points higher on exams when compared to traditional instruction.

The flipped classroom instructional method was introduced after exam 1, with a mean score of 83.619 for unit exam 2. The next module unit that was taught with the flipped classroom model was 4, which showed a mean score of 87.048 on the exam. While this exam score was higher than the mean score for the second exam, the highest mean score of 92.119 was achieved for exam 6, which was the subsequent module that was taught with flipped classroom instruction. This may suggest that the longer students are exposed to flipped classroom

pedagogy, the more their academic performance on exams improves. Perhaps this is because students become more comfortable with participating in learning in addition to being more engaged by the active learning methods used during the scheduled class time. This would correlate with Carini et al.'s (2006) conclusion that lower achieving students benefit from active learning strategies because of a strong link between student engagement and academic performance.

To determine if, in fact, flipped instruction was effective for participants in the experimental group, further analysis was conducted on the control group. A paired samples *t*-test was performed on mean exam scores for units 1, 3, and 5 compared with 2, 4, and 6, wherein all modules were taught with traditional instruction and assessed using the same exams as the experimental group. The findings of this statistical analysis revealed significant differences where students in the control group also achieved significantly greater exam scores on exams 2, 4, and 6. This can indicate the nature of the content for these modules 2, 4 and 6 may have been easier than content for modules 1, 3 and 5, flipped instruction may not have made a difference, or the exam questions assessing knowledge application may have not been difficult. However, when examining the test means for the modules, even though both groups scored higher on modules 2, 4 and 6, the control group scored higher than the experimental group on the modules taught traditionally for both groups (1, 3, 5), while the experimental group scored higher than the traditional group on the modules taught with flipped learning for the experimental group (2, 4, 6). These findings insinuate that perhaps lecture instruction, in general or for the selected unit topics, continues to be ineffective in enhancing student academic performance. This suggestion would align with the fairly strong evidence that lecture instruction used in the classroom environment ineffectively engages students (Little, 2015). Also, traditional pedagogy is

inadequate for learning pharmacology (Blouin et al., 2008) because of limited student involvement in the classroom environment (Bernot & Metzler, 2014) and limited involvement in higher cognitive order learning activities (King & King, 2010).

The current study validated the existing literature on flipped classroom pedagogy that encourages classroom instruction of pharmacology to migrate away from traditional pedagogy and include more active learning (Blouin et al., 2008; See & Conry, 2014). Yet, the majority of existing studies on flipped classroom pedagogy that investigate students' academic performance illustrated mixed findings (Betihavas et al., 2016; Findlay-Thompson & Mombourquette, 2014; LaFee, 2013; Little, 2015; McCalum et al., 2015). Assessing the results of Research Questions 1 and 2 speaks to this. However, it is clear that the current research study does reveal flipped classroom pedagogy has a positive effect on academic performance in a nursing pharmacology course in one term. Additionally, the conclusions of this current study were similar to the findings presented by Tune et al. (2013), McLaughlin et al. (2013) and Wong et al. (2014) unveiling improved academic performance with flipped pedagogy by comparing examination scores between students taught with the flipped classroom model and traditional instruction.

Discussion

Active learning pedagogies utilized in nursing education should have significant potential to equip graduates with the knowledge and skills for 21st century health care environments. Evaluating the success or failures of new active learning pedagogical practices enables nurse educators to effectively select instructional approaches that best support student learning outcomes such as improving academic performance (Prince, 2004). Moving away from traditional teacher-centered methods, one instructional strategy that has gained interest is the

flipped classroom model (Critz & Knight, 2013; Herreid & Schiller, 2013), which has yet to be fully determined as an effective mode of teaching.

Flipped classroom instruction is an emerging educational trend in higher education, implemented across academic disciplines. In the health sciences, particularly nursing and pharmacy fields, the current literature presented varied views pertaining to effectiveness of application of flipped pedagogical practices (Meechan et al., 2011). Evidence illustrates flipped instruction provides educational benefits such as flexible engagement with learning material via digital learning, facilitating critical thinking and knowledge application, and encouraging collaboration as well as fostering independent and teamwork skills (Hanson, 2015). While these benefits were not measured as variables in this study, these indicators may provide further support of flipped classroom pedagogy if examined through qualitative or mixed methods future research. In this study, flipped instruction, to some extent, did statistically show improvement in academic performance.

The research questions examined in this study determined whether flipped classroom pedagogy compared with traditional lecture instruction improves nursing students' academic performance. The first finding uncovered there was no statistically significant difference in mean examination scores for students enrolled in NUR 1141 during summer 2016 (experimental group) compared with summer 2015 (control group). Conceivably, the limitations could have affected the results more than originally indicated. Another factor affecting the findings could be the control group was academically stronger than the experimental group, with fewer repeaters, according to the comparison of demographics. While comparing the control group to the experimental group revealed no statistical difference in academic performance, this may be a significant finding to educators considering implementing this method of instruction. For

example, critics of this approach convey concerns over the amount of preparation time and effort to create video lectures, learn to navigate the online technology components, compile appropriate group active learning exercises, and adjust content as needed (Findlay-Thompson & Mombourquette, 2014; Roehl et al., 2013). Perhaps for these reasons, and if lecture instruction indicates no difference in academic performance, the flipped classroom model may not be the preferred choice of instructional method.

Additionally, this finding does correspond to the existing flipped classroom literature that shows flipped classroom pedagogy presents with challenges, thus establishing its difficulty to demonstrate effectiveness in use for a variety of reasons. First, some students have not developed strong study skills, which corroborate with findings of Strayer (2012). The flipped classroom requires students to independently view lectures online prior to scheduled class time and they are expected to apply the newly learned information, using independent or group active learning exercises facilitated by the instructor (Bergmann & Sams, 2012). This can also lead to the second challenge. Lage et al. (2000) shared from their research that there are some students who do not work well in the group setting or are not ready for the personal accountability for learning, which is necessary for success in the flipped classroom model as declared by the findings of Lo and Monge (2013).

Another difficult aspect of the flipped classroom method is students are often comfortable learning in a traditional classroom setting with lecture instruction as the method (Bishop & Verleger, 2013). Likewise, Mason et al.'s (2013) findings reveal students expressed frustration with the course structure and amount of time to view the lecture videos in the flipped classroom. All or some of these reasons may be why the current research study found the control group academically performed better on the exams taught with traditional lecture instruction.

Assessing students' learning style and preferences, motivation level, and satisfaction with flipped classroom pedagogy may be useful to investigate.

Another variable to examine in future research is student demographics, specifically racial and ethnic student diversity. The findings in this study revealed there was no statistical difference in race and ethnicity between the control and experimental group. Students reflected the diverse racial and ethnic composition of the college setting utilized for this study, wherein more than half the student population represented members of Black non-Hispanic, Hispanic, Asian, and Native American groups. However, the racial and ethnic makeup of students in this study were dissimilar to the diverse composition of registered nurses nationally. Only 16.8 % of registered nurses represent diverse populations according to the *National Sample Survey of Registered Nurses* (U.S. Department of Health & Human Services, 2010). This is an interesting consideration that may set the findings of this study apart from other research conducted on active learning pedagogies in nursing education.

The current study did reveal implementation of the flipped classroom model in a nursing pharmacology course during one term (Summer 2016) did improve students' mean examination scores. However, one may question if the educational intervention was effective because the level of difficulty of the exams and/or nature of the course material student learned in the units taught with flipped instruction.

An interesting comparison of improved academic performance with flipped classroom pedagogy can be made with the results of a study by Tune et al. (2013). They evaluated the effectiveness of traditional lecture methods compared with a flipped classroom in a graduate physiology course at the Indiana University School of Medicine by measuring student performance on examinations in cardiovascular, respiratory, and renal topics. Students in the

flipped course scored significantly higher ($p < 0.05$) on weighted cumulative sections by an average of more than 12 percentage points; thus indicating this method to be effective. Likewise, research outcomes from McLaughlin et al. (2013) revealed considerably higher grades than the traditional lecture format ($p = 0.001$) for first year pharmacology students at the University of North Carolina. Similarly, Wong et al. (2014) found increased academic performance with the flipped classroom model implemented in a pharmacy course. Mean examination scores in the intervention group ($n = 103$), students taught with flipped instruction, were significantly higher than the class that was taught with traditional methods for the topic of cardiology. Their findings supported that flipped classroom methods can improve academic performance and corroborate with the literature that advocates utilization of active learning instructional methods to promote favorable learning outcomes (Bonwell, & Eison, 1991).

In addition, this research study is aligned with the definition Bonwell and Eison (1991) designated as active learning, which involves students in doing activities and thinking about what they are doing. The active learning activities utilized in the flipped modules of this study included group discussion with application questions, case scenarios, case studies, and peer instruction and/or presentation (see Appendix C, Appendix D, and Appendix E). Similarly, this is consistent with Benner et al. (2010) who claimed that active learning must occur in the classroom by faculty providing meaningful activities that foster critical thinking and socialization during class time. Multiple research findings in the literature of active learning pedagogies declare students being actively engaged in the learning process with classmates, instructors, and course material in undergraduate education are more likely to increase their motivation, attitude toward lifelong learning, and critical thinking skills (Barkley, 2010; Lo & Monge, 2013; McLoughlin & Luca, 2002; Prince, 2004; Schlairet et al., 2014). While the

current study solely focused on measuring academic performance by means of exam scores, measuring other performance outcomes such as motivation or critical thinking in future research could provide support in using flipped classroom pedagogy as an effective active learning strategy in the classroom environment.

Furthermore, this finding suggests that the innovative flipped pedagogical method holds true to its design, which is to create a learning environment juxtaposed with traditional, passive centered instruction. The aim for student-centered classrooms is for students to construct knowledge by participating and engaging in the learning process at all times (Doyle, 2008; Hannafin et al., 1997). Additionally, nursing curriculum reform activists encourage pedagogical practices that can move students beyond rote memorization of information to application of learning (Everly, 2013; Giddens et al., 2012). Student-centered learning is a conceptual paradigm that is grounded in the social constructivist learning framework. The social constructivist theoretical framework guided the current study researcher in the creation of the active learning exercises used to facilitate learning in the classroom setting, with the teacher as a facilitator of learning. Also in line with the premises of the social constructivist perspective, is that learners create cognitive links from new material to their own prior knowledge by becoming actively engaged individually or together in mindful activity with a scaffolding approach (Paily, 2013). While the flipped classroom intervention in this study did to some degree appear to be an effective pedagogy, additional research on student-centered environments and active learning pedagogies, such as the flipped classroom model, in higher education is needed to determine the impact on academic performance.

Overall, the results of this study were consistent with current research on flipped classroom pedagogy, which indicated inconsistencies in academic performance outcomes in

higher education courses using the flipped classroom model as an instructional strategy. For this reason and given the dearth of published evidence on the use of flipped classroom instruction in nursing education, the findings of this study are particularly relevant. Additionally, these results suggest educators should not overlook utilizing the flipped classroom model to teach nursing pharmacology as it appears to be a potentially beneficial instructional method to promote academic achievement by fostering active involvement in student learning. Offering educational experiences to promote active learning in the classroom environment is argued to be effective in improving academic achievement to a diverse group of students in nursing programs and should be reflective of the knowledge and skills essential for entry-level professional nursing practice roles.

Limitations

The following limitations existed that prevent generalizations of major findings across all educational settings. First, there was a small population size of less than 60 nursing students during Summer 2015 and 2016, with the control and experimental group statistically inequivalent at baseline. The control group was statistically academically stronger. Also, the experimental group had 28% of the participants with prior experience taking this course compared to the 1.9% in the control group. In other words, there were some registered students that were repeating this course, hence, had some familiarity with the content compared to students enrolled in the pharmacology class for the first time.

Secondly, attrition could have impacted the results of the study or assessing academic achievement. Participants could withdraw due to failing exam grades in addition to other personal reasons such as employment, family obligations, or course overload. Participants were

able to withdraw or drop a course at any point prior to a predetermined date, which was prior to the fourth exam.

Another aspect that may prevent generalization in using flipped classroom pedagogy includes the sample setting. This study used Associate degree nursing students in a community college in the southeastern United States; thus, limiting generalizability to other nursing programs in other regions of the country and levels of degrees such as licensed practical nursing, baccalaureate, Masters, or Doctoral. It is important to note the success of this instructional method is dependent on student access to computers and the internet, which can be a limited resource for students with limited financial income.

Finally, this study was conducted using a pharmacology course. As a result, generalizations of these research findings can be limited. Perhaps, if a different course was used to implement flipped classroom pedagogy, the outcomes of the study might be different due to the nature of the content or level of difficulty of examinations. In addition, even with randomization of questions on each unit exam, the order of the questions a student received could have impacted academic performance. For instance, some of the participants may have more application level questions in the beginning of the exam, while other participants had received the same questions near the end of the exam.

Implications for Practice

This study provided more literature to the limited and debated evidence of flipped classroom pedagogy in nursing education. The findings of this study can inform educators on the benefits of implementing flipped classroom instruction with respect to facilitating higher academic performance. In addition, this study contributed to the body of research that active learning pedagogies generate improved academic achievement. While significant, with mean

exam scores higher for modules taught with the flipped classroom model during summer 2016, more evidence could reveal whether flipped instruction is a sound pedagogical method to effectively prepare students academically for pharmacological responsibilities in nursing practice. Therefore, additional research concerning active learning pedagogies is also needed to fill the gap in the literature for evaluation of the efficacy of traditional lecture-based instruction and environment (passive) versus flipped classroom instruction and environment (active) delivered to associate degree nursing students.

Recommendations for Future Study

The researcher recommends the following suggestions after analyzing the results, limitations, and implications of this study.

1. Implement flipped classroom pedagogy for the duration of an entire semester, rather than selected unit modules. This may determine if the educational intervention is effective with other course content.
2. Repeat this study using other nursing courses across different educational institutions with a larger sample population.
3. Replicate this study with exclusion of students repeating the course.
4. Apply different active learning methods such as games, concept mapping, or clickers during scheduled class time to determine if flipped classroom pedagogy impacted the study's results.
5. Investigate qualitative components such as student and/or faculty perception, learner satisfaction, motivation, student cooperation, individual learning accountability, or correlation between amounts of time the instructor and student spend preparing for class and academic performance for the flipped classroom instructional intervention.

Summary

Nursing education regulatory agencies stress the significance of implementing active learning instructional methods, shifting the focus of student learning from passive to active by facilitating a student centered classroom environment. Flipped classroom pedagogy is an alternative to traditional lecture instruction and has potential to meet the needs of millennial learners by utilizing technology and active learning. Active learning encourages students to construct and apply their own knowledge through active participation in the learning process and collaboration with others in the classroom (Mostrom & Blumberg, 2012). By and large, nursing faculty continue to utilize lecture instruction, creating concerns that graduate nurses are inadequately applying theory to practice. Specifically, one critical responsibility a nurse has is medication administration, wherein there is an absence of an integrated approach to teach pharmacology across educational nursing programs (King, 2004; McLaughlin, 2014). The purpose of this quantitative, quasi-experimental study was to determine if flipped classroom pedagogy compared with traditional lecture instruction in a nursing pharmacology course improves academic performance by evaluating examination scores. Chapter 1 described flipped pedagogy and pedagogical practices utilized in nursing education, the statement of the problem and purpose, significance of the problem, theoretical framework, research questions, assumptions and limitations of the study, and operational definitions of the terms.

Chapter 2 provided a literature background for this study on research involving flipped classroom pedagogical practices in higher education and nursing curriculum. In reviewing the literature, there was limited and debatable evidence on the effectiveness of flipped classroom pedagogy in nursing education. The majority of the existing studies on flipped instruction that evaluate academic achievement illustrated mixed findings. Social constructivism is a

pedagogical belief emphasizing knowledge to be constructed by learners when actively engaged through social interaction, with mindful activity, within a classroom experience. Under the auspices of this premise is student-centered learning theory, serving as the conceptual paradigm framing this study. Chapter 3 presented the research design and methods including research questions, sample, data collection and analysis methods, and instrumentation. The experimental sample included 38 students enrolled in two sections of an Associate degree nursing pharmacology course during a summer semester, who received flipped classroom instruction for three of the six modules. Also, 42 students, in two sections from the prior summer term, served as the control group and were entirely taught with traditional pedagogical instruction.

Chapter 4 reported a detailed analysis of the data. The research findings and discussion were summarized in Chapter 5. After collecting and analyzing the data, using a MANOVA, for Research Question 1, the findings revealed there was no statistically significant difference in academic performance comparing the control and experiment groups ($p>.05$). Data were analyzed for Research Question 2 by means of ANOVA repeated measures with covariate to analyze academic performance after flipped instruction was implemented for three of the six unit modules within the experimental group. The results showed there was a statistically significant difference comparing mean examination scores. Participants achieved an average mean difference 8 points higher on unit exams (2, 4, and 6) taught with flipped instruction when compared to unit exams taught with traditional instruction (1, 3, and 5).

In conclusion, the findings of this study can inform nurse educators on the benefits of utilizing flipped classroom pedagogy with respect to facilitating higher academic performance on examinations. This research provides more evidence to the literature of flipped classroom

pedagogy in nursing education. This study also extends prior research on active learning methods and the effect on learning outcomes using flipped classroom instruction.

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APPENDIX A

GROUP QUESTIONNAIRE

For demographics, please select one answer to the following questions:

1. Your current academic average is:

a. A (90-100) b. B (80-89) c. C (70-79) d. Below C (69 or below)

2. Your sex is:

a. Male b. Female

3. Your race/ethnicity is:

a. African American/ Black
b. Asian
c. Hispanic/ Latino
d. Multiracial
e. Alaska Native/ American Indian
f. Caucasian/ White
g. Pacific Islander/ Native Hawaiian
h. Prefer not to Respond
i. Not Listed (Specify) _____

4. Your age is

a. 18-24 b. 25-30 c. 31-40 d. 41-50 e. Over 50 f. Prefer not to respond

5. Is this your first time taking this course, NUR 1141 Nursing Pharmacotherapeutics?

a. Yes_____

b. No_____

APPENDIX B

IRB APPROVAL

THE UNIVERSITY OF
ALABAMA®

Office of the Vice President for
Research & Economic Development
Institutional Review Board for the Protection of Human Subjects

May 24, 2016

Nadine Sirota, RN, MSN
Nurse Educator Program
College of Education
The University of Alabama
Box 870302

Re: IRB # EX-16-CM-051 "Nursing Students' Academic Performance with Flipped Classroom Pedagogy in Nursing Pharmacology"

Dear Ms. Sirota:

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your protocol has been given exempt approval according to 45 CFR part 46.101(b)(1) as outlined below:

(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Your application will expire on May 23, 2017. If your research will continue beyond this date, complete the relevant portions of Continuing Review and Closure From. If you wish to modify the application, complete the Modification of an Approved Protocol Form. When the study closes, complete the appropriate portions of FORM: Continuing Review and Closure.

Please provide a copy of the Palm Beach State College IRB approval documentation for the IRB file prior to beginning any research at Palm Beach State College.

Should you need to submit any further correspondence regarding this proposal, please include the assigned IRB application number.

Good luck with your research.

Sincerely,

[redacted]

358 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127
205-348-8461 | Fax 205-348-7189 | Toll Free 1-877-820-3066

APPENDIX C

FLIPPED CLASSROOM INSTRUCTIONAL ACTIVITIES FOR MODULE 2

Activity 1:

1. Identify three basic functions of the Nervous System?
2. What are the major divisions of the Nervous System?
3. What are the divisions of the Peripheral Nervous System?
4. What are the divisions of the Automatic Nervous System?
   Sympathetic and Parasympathetic

Activity 2: What response is produced on the following?

Stimulated: Sympathetic Nervous System	Stimulated: Parasympathetic Nervous System
Heart:	
Digestive Tract	
Respiratory Tract	
Reproductive Tract	
Arteries:	
Salivary/Sweat Glands	
Eye	

Activity 3:

1. What are the Primary Neurotransmitters of the Autonomic Nervous System?
2. For the Neurotransmitters selected: What are the receptors and response to each?

Receptor	Response
Alpha 1:	
Alpha 2 :	
Beta 1:	
Beta 2:	

Activity 4:

For each medication, answer these questions:

What is the mechanism of action?
What are the pharmacological effects?
What are the therapeutic uses?

Medications:

Phenlephrine (Neo- Synephrine)	Prazosin(Minipress)
Bethanechol (Duvoid, Urecholine)	Physostigmine(Antilirium)

Activity 5:

Answer the questions to this case scenario:

Jay is a 40 year old business man that travels for work and spends a lot of time away from his family. For the past few months he has been anxious and upset about this situation and feeling pressure from his job responsibilities. At his checkup he states, "I am having trouble sleeping at night."

1. What type of anxiety is Jay experiencing and what is the rationale?
2. What education can the nurse provide Jay to manage this anxiety without medication?
3. What assessments should the nurse perform prior and after Jay receives anxiolytics?
4. What drugs can be prescribed for the patient to manage his trouble sleeping?
5. What are safety concerns the nurse explains to Jay after taking meds for insomnia.

APPENDIX D

FLIPPED CLASSROOM INSTRUCTIONAL ACTIVITIES FOR MODULE 4

Activity 1: Complete in your groups, your assigned classification and present to class

CLASSIFICATION	EXAMPLES	MOA	USE/ PURPOSE	SIDE EFFECTS	RN IMPLICATIONS
1.Penicillins					
2.Cephalosporins					
3.Tetracyclines					
4.Macrolides					
5.Aminoglycosides					
6.Sulfonamides					
7.Fluoroquinolones					

Activity 2

Case scenario: Answer the following questions.

A patient has been placed on aminoglycoside therapy to pseudomonas.

1. What two serious toxicities will the nurse monitor for and what are the symptoms of these?
2. Explain the concept of peak and trough levels during aminoglycoside therapy
3. What other lab results should the nurse monitor and explain why.

Activity 3:

Case scenario: Answer the following questions.

The nurse is caring for a patient with AIDS and will be administering zidovudine (Retrovir, AZT).

1. What is the purpose/use of this medication?
2. What side effects may the patient experience that the doctor may change the regimen or the patient may refuse to complete the prescription?
3. What blood work will reveal the effectiveness of this medication?

Activity 4:

Case scenario: Answer the following questions.

The nurse is caring for a patient with ovarian cancer that is receiving chemotherapeutic treatments.

1. What is the purpose and action of antineoplastic drug therapy?
2. Describe the adverse effects of these medications and which symptoms need to be reported to a health care provider.
3. Distinguish between normal cells and cancer cells.

Activity 5

Case scenario: Answer the following questions.

A patient is diagnosed with tuberculosis.

1. What prophylactic medication does the nurse anticipate to be ordered?
2. What blood work should be collected and monitored before starting the therapy
3. What are the side effects of this medication?

APPENDIX E

FLIPPED CLASSROOM INSTRUCTIONAL ACTIVITIES FOR MODULE 6

Directions: Discuss in your assigned group the case study question. Select the best answer and prepare to present your response to the class and address questions.

Topic: Bone, Integumentary, Ear, and Eye

Group 1	Mrs. Pharm has osteoporosis and is taking a supplement of calcium. The nurse is assessing Mrs. Pharms understanding of the importance of calcium supplements. What important questions should the nurse ask?
Group 2	Mr. Pharm has a rash after Mrs. Pharm changed laundry detergents. What type of rash is it and what pharmacologic interventions would be appropriate?
Group 3	Mr. Pharms mom is in a nursing home and has scabies. The nurse is explaining to Mr. Pharm what scabies is and the medicine prescribed for his mom.
Group 4	Mrs. Pharm has glaucoma and is taking Xalatan. Explain to Mrs. Pharm the use, side effects and symptoms to report to the physician.
Group 5	Mr. Pharm has developed an ear infection and is taking antibiotics. The nurse is testing Mr. Pharms knowledge on antibiotics. What important questions would the nurse ask?

Topic: Endocrine and Male and Female Reproductive Systems

Group 1	Mr. Pharm has just been prescribed synthroid and the nurse needs to teach Mr. Pharm regarding the medication. What important information should the nurse give Mr. Pharm? (Use, side effects and symptoms to report to the physician).

Group 2	Mrs. Pharm has just been diagnosed with Type 2 diabetes and is taking metformin. The nurse needs to teach Mrs. Pharm regarding her medication and importance of diet. What information would be important?
Group 3	Mr. Pharms sister is a Type 1 diabetic. Mr. Pharm is asking questions regarding Type 1 diabetes including information regarding different types of insulin.
Group 4	Mrs. Pharm is having dysfunctional uterine bleeding. What pharmacologic intervention would be appropriate?
Group 5	Mr. Pharm has Benign Prostatic Hyperplasia (BPH) and is taking Proscar. The nurse is discussing important information with Mr. Pharm regarding his medication. What information would be important?