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THE IMPACT OF THE FLIPPED CLASSROOM APPROACH ON THE DEVELOPMENT OF SELF-DIRECTED LEARNING READINESS OF THE UNDERGRADUATE NURSING STUDENT

An Evidence-based Practice Capstone Project

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science in Nursing

Cynthia R. Wallis

Messiah College

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School of Graduate Studies

Graduate Program in Nursing

We hereby approve the Capstone Project of

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Abstract

For the baccalaureate nursing student preparing to enter today's dynamic, information-rich, and highly collaborative healthcare environment, the ability to actively engage in lifelong self-directed learning is recognized as an essential nursing competency. The application of team-based flipped classroom curricular design that incorporates active learning strategies has been linked to the improvement of students' independent learning behaviors. Minimal research has been conducted, however, to document the impact of the flipped classroom model on self-directed learning readiness (SDLR) of the undergraduate nursing student. This evidenced-based practice implementing project used the Self-directed Learning Readiness Scale for Nursing Education (SDLRSNE) to measure the change in self-directed learning readiness of nursing students participating in a pediatric nursing course involving five flipped classroom learning experiences. No significant change in SDLR was demonstrated over the six week period of this study. The results of this EBP project, however, do support the need for further longitudinal nursing research that examines SDLR as a developmental process that occurs across the entire continuum of the baccalaureate nursing curriculum through the use of active learning experiences embedded in the flipped classroom model.

Keywords: life-long learning, team-based learning, active learning, flipped classroom, self-directed learning, nursing education, graduate attributes, self-directed learning readiness scale, nursing competency.

The Impact of the Flipped Classroom Approach on the Development of Self-directed Learning Readiness of the Undergraduate Nursing Student

The dynamic knowledge base upon which contemporary nursing practice is built challenges the nursing educational community to prepare graduates who can effectively self-direct their own knowledge acquisition throughout a lifetime of professional practice (Davis, Taylor & Reyes, 2014). An international call for the implementation of active, student-centered pedagogies in nursing education has been sounded in the nursing literature (Benner, Stephen, Leonard, & Day, 2010). This urgent call for radical transformation of the nursing curriculum is based on a growing consensus that the traditional, passive didactic teaching strategies that have been the mainstay of traditional nursing education do not result in the self-directed learning competency needed to maintain a vibrant, relevant professional practice today (Benner et al., 2010; Davis, Taylor & Reyes, 2014). This consensus has resulted in a growing awareness in nursing education that enhancement of the undergraduate nurse's competency to think, work, and act within a complex, ever changing, and frequently ambiguous practice environment will require a transformed educational milieu (Hanson, 2015). This heightened awareness has led to a timely discussion in the nursing educational literature regarding the use of pedogologic methods that create a contemporary undergraduate classroom experience that facilitates more than the acquisition of knowledge that may soon become obsolete. The critical focus of this discussion has now turned to seeking evidence to support how nursing education will best promote the self-directed learning skills that will be needed by future nurses to continuously discover, critically

appraise, and apply the new knowledge that will be required for lifelong learning throughout their professional career.

Benner et al. (2009) have paved the way for this important discussion by calling for a transformative, radical change in the contemporary nursing classroom that results in engagement of students in active learning. Benner et al. (2009) further challenge the nursing educational community to consider that passive learning strategies are less effective than an active learning approach in developing the undergraduate nurse's ability to become the skilled critical thinkers and confident contextual learners they need to become for excellence in future practice. The benefits of an active learning style have been echoed by numerous nursing educational leaders who point to the need to engage the nursing undergraduate in active learning to gain skills that will be applicable to contemporary practice (Benner et al., 2009; Brooks, 2015; Cheng et al., 2014; Davis et al., 2010; O'Shea, 2003). These skills include self-directed learning that supports independent problem solving, clinical reasoning, and the application of theory to actual practice. Self-direction, as an important aspect of lifelong learning is emphasized by Davis et al. (2014) in their groundbreaking definition of lifelong learning as a formal and informal process characterized by self-initiated questioning of the individual nurse's environment, knowledge, skills, and interactions. This definition also recognizes the critical importance of a self-directed learning skillset characterized by a positive view and self-actualized lifelong commitment toward independent learning (Davis et al., 2014).

Statement of the Problem

The emerging use of the flipped classroom approach as an active learning strategy in today's nursing classroom reflects the nursing educational community's current search to identify and implement the best evidence based active learning strategies that will translate into

self-directed lifelong learning of the nursing graduate. However, existing evidence regarding the impact of the flipped classroom approach on the development of the undergraduate nurse's self-directed learning readiness has been extremely limited to date. The SDLRSNE has been identified as a valid tool to measure SDLR in nursing education, but has not been applied to measure the effect of the team based flipped classroom approach on the maturation of self-directed learning readiness of the undergraduate nursing student.

Lack of self-directed learning opportunities in tradition curricular design.

The impetus for the current paradigm shift in nursing curricular design from a passive instructor-centered format to active student-centered approach has been influenced by two major factors. These include the increasingly predominant recognition of the undergraduate nursing student as an adult learner and as a future professional who will be responsible for their own learning (Betihavas, Bridgman, Kornhaber, & Cross, 2016). As an adult learner the nursing graduate will emerge from their undergraduate education to practice within a healthcare environment characterized by rapid and constant technological, organizational, and social change. This dynamic healthcare environment will demand that they identify and actively seek to meet their own learning needs. Nurse students have not traditionally been perceived as adult learners and as a result adult learning principles have not always guided nursing education teaching learning strategies. An andrological approach, however, to nursing education that uses Knowles' (as cited by Betihavas et al., 2016) key elements of adult education, including self-direction, has been identified as the optimum approach for meeting the learning needs of the contemporary adult nurse learner.

Despite this recognition, the translational approach to teaching the undergraduate nursing student persist today (O'Shea, 2003). This traditional pedagogic model reinforces the passive

role of the nursing student in their own learning by using a primarily lecture-based method of information transmittal (Betihavas et al., 2016). This didactic model is based on the perception of the learner as an empty vessel into which the nurse educator, as the expert, pours essential knowledge. There is agreement that the translational teaching method primarily engages the student in lower order cognitive skills (Clark, M., Nguyen, H., Bray, C., & Levine, R., 2008). Engagement of the nursing student in employing higher order learning skills such as processing, critically appraising, and applying knowledge in the context of the actual situations that arise in the professional practice environment does not typically result from this traditional approach.

Need for learning strategies to promote SDLR.

Because of the significant limitations of the passive learning model in the current nursing classroom setting, an essential shift away from this traditional approach to incorporation of more active learning experiences has become a transformative goal of nursing curriculum design today. There is a growing consensus that the ability of the nursing student to take greater responsibility for their own learning is cultivated through repeated active self-directed learning opportunities (Cheng et al., 2014). Evidence for selection of the best active learning formats and the determination of their optimum timing and frequency of use in the nursing curriculum, however, remains a subject of debate and research in the nursing educational community.

Evidence needed to support value of flipped classroom in facilitating SDLR.

Coinciding with the recognition of the value of self-directed learning readiness as an essential competency of the nurse graduate, a recent surge in the use of the flipped classroom approach as a student-centered instructional model for nursing curricular design has been noted (Betihavas et al., 2016). Application of this active learning strategy in varied formats in nursing education is a recent phenomenon, although the flipped classroom has been used in the

educational setting of a number of other disciplines for more than a decade (Clark, Nguyen, Bray, & Levine, 2008; Schlalret et al., 2014). A body of evidence is just beginning to emerge regarding its value as an active learning intervention for achieving key learning outcomes for the nurse learner (Betihavas et al., 2016; Schlalret et al., 2014). There remains a significant lack of evidence to support the flipped classroom approach as a learning strategy to promote the development of self-directed learning readiness of the BSN graduate.

Background and Need

From its inception as a profession, nursing has evolved from a historical foundation that is based on the lifelong learning process (Steelman, 2014). There is no greater advocate for this process as an essential nursing competency than Florence Nightingale, the founder of modern nursing, who modeled a continuous pursuit of knowledge and excellence as she engaged in a lifetime pursuit of self-directed research on patient care needs and evidence based practice (Steelman, 2014). Contemporary nursing continues to embrace Nightingale's example through its recognition of the relevance of self-directed lifelong learning for today's nurse practicing in complex, collaborative, and rapidly changing healthcare settings (Phillips Turnbull, & He, 2015). The Institute of Medicine 2011 report, *The Future of Nursing: Leading Change, Advancing Health* (IOM, 2011) emphasized the essential link between the ability as a profession to educationally prepare nurses to implement change and promote health as a respected member of the healthcare team and a commitment to ensure that nurses engage in lifelong learning.

SDLR as an essential competency of the undergraduate nurse. A critical component of baccalaureate curriculum design for the 21st century is the inclusion of active teaching and learning strategies that facilitate the development of self-directed learning competency for future practice (AACN, 2010; NLN, 2011). Today's nurse graduate must be competent to engage in

critical thinking that requires the learning skills of comprehension, reasoning and alternative frames of reference within the unique and changing context of their individual practice (Hoke as cited by Schlalret et al., 2016). In the real world of nursing practice, these learning activities will be personal responsibility of the graduate professional nurse throughout their career trajectory and will be self-directed within a demanding, dynamic and complex practice environment (Davis et al., 2010). Adequate preparation to independently implement these learning skills will require competence in self-directed learning readiness on professional entry into nursing (Banfield et al., 2012).

The flipped classroom approach as a self-directed learning experience. Despite the nursing education community's clear recognition of self-directed learning as a valuable attribute of the competent BSN graduate, it has been slow to embrace supportive teaching learning strategies that build self-directed learning competence in the BSN curriculum. It has only been within the last ten years that a slow, but essential, shift in awareness in the nursing literature reflects increased attention on the need to transform nursing education's passive educational approach to one that is active and that teaches the independent learning skill necessary for understanding, critical evaluation, and action in patient care situations (Benner et al., 2009; Davis et al., 2014). Continued reliance on pedagogical strategies that are predominately passive and lecture-based in nursing undergraduate education, however, is emphasized in the Carnegie report (Olshansky, 2010). There is a recognition that these methods fail to encourage the level of active student engagement in the undergraduate nursing classroom that will develop the self-directed learning skills needed to meet the demands of independent learning in practice (Olshansky, 2010).

Davis et al. (2010) suggested that before the culture of the nursing classroom can be transformed into an environment that encourages open discussion and questioning leading to mutual discovery, more nursing research is needed to validate active learning models that promote the development of self-directed learning readiness. A team based learning strategy referred to as the flipped classroom is one learning strategy that is beginning to be recognized as facilitating student-driven active learning in the undergraduate classroom (Cheng et al., 2014). There is a distinct lack of research available, however, that lends support to the flipped classroom approach being a facilitating factor of the development of self-directed learning readiness in the BSN students.

Measuring the effect of the flipped classroom on SDLR. Measuring self-directed learning readiness over time has been noted to hold many advantages for the educator seeking to improve curricular design (Cadorin, Suter, Dante, Williamson, Devitte, & Palese, 2012). These include providing evidence for the selection of an instructional approach best suited for the learning needs of specific groups of students and as a means to improve these approaches based on research that uses a consistent measurement scale over time (Cadorin et al., 2012).

Nursing educators seeking to create an active learning environment that promotes self-directed learning readiness are no exception to these beneficial aspects of ongoing measurement of SDLR. In nursing education the SDLRSNE has been identified as the instrument of choice to measure the self-directed learning readiness of nursing students due to its demonstrated validity and reliability in nursing education settings (Newman, 2004; Bridges et al., 2007; Smedley, 2007). Because of this scale's repeated use and factor reliability, its application as a reliable measurement to measure the development of self-directed learning readiness in the flipped classroom can viewed as plausible (Fisher & King, 2010). Few studies which use the SDLRSNE

are currently available to compare and contrast self-directed learning readiness outcomes resulting from the flipped classroom approach in nursing education curriculum. As a result, this evidence based practice project was designed to provide evidence to answer this significant knowledge gap regarding SDLR and flipped classroom learning experiences.

Purpose statement.

The purpose of this study is to explore the effect that participation in team-based learning experiences using a flipped classroom approach has on the self-directed learning readiness of junior level undergraduate baccalaureate nursing students as measured by the *Self-directed Learning Readiness Scale for Nursing Education* (SDLRSNE) (Fischer & King, 2010).

Need/rationale for study

The ability to actively engage in learning that is self-directed is identified as an essential learning competency for professional nursing practice within today's rapidly changing healthcare environment (Benner et al., 2010). Acquiring the mindset and skills necessary for self-directed learning readiness is a process that is most beneficial for the practicing nurse as a lifelong learner when it begins at the undergraduate nursing level (0'Shea, 2003). To effectively engage BSN students in this developmental process nurse educators are challenged to develop and evaluate curricular models that facilitate this process. Team based learning (TBL) using a flipped classroom approach is one educational strategy that is being used on an increasing basis to foster independent learning of nursing students. Its effect, however, on self-directed learning readiness has not been thoroughly studied (Cheng et al., 2014). With the combined development of a nurse-specific definition of self-directed learning (Davis et al., 2014) and a valid tool to measure its attributes in nurses (Fischer & King, 2010), research in this area is now possible.

Research question.

With this purpose and rationale in mind, the evidence-based question to guide this investigation is: Does participation in a team-based learning experiences that use the flipped classroom approach promote the development of self-directed learning readiness in junior level undergraduate nursing students as measured by *Self-directed Learning Readiness Scale for Nursing Education* (SDLRSNE) (Fischer & King, 2010)?

Significance to the field.

The competence of the contemporary nurse graduate to independently make deliberate evidence-based choices for quality nursing care is dependent on the development of a personal and professional repertoire of self-directed learning behaviors (Cheng et al., 2014; Davis et al., 2010; Govaerts, 2009). Readiness to learn in a self-directed manner is a developmental process which involves the maturation of self-management, a positive desire to learn, and self-control (Fisher et al., 2001; Kocaman, 2009). The opportunity to engage in active learning strategies in the undergraduate setting has been shown to facilitate the maturation of self-directed learning skills and attitudes (Cheng, 2014).

Increasing the nurse educator's knowledge of when, how and why active learning during team-based flipped classroom experiences impacts the development of self-directed learning readiness of the BSN undergraduate is a key element in relevant curriculum development. Measuring self-directed learning readiness before and after nursing courses that use the flipped classroom approach can provide important evidence to support the best time, frequency, and content of these learning experiences in the undergraduate nursing learning environment. This evidence can be ultimately applied to curriculum design decisions that optimize the undergraduate nurse's preparation for independent lifelong learning.

Definition of Terms.

There are six conceptual definitions presented in Table I that are integral to the exploration of this research question. These definitions share a common theme of learning self-direction that is key to measuring its effect on the undergraduate nurse's development of this skill through the flipped classroom approach.

Table I. Conceptual Definitions Related to Self-direction of Learning

Term	Conceptual Definitions
Self-directed Learning (SDL)	"A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, Identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." (Knowles, 1975, p.18)
Self-directed Learning Readiness (SDLR)	The degree to which and individual possesses the attitudes, abilities, personality characteristics necessary for self- directed learning. (Wiley, 1983) SDLR is characterized by three skill subsets that include self- control, desire for learning, and self-management. (Fischer et al., 2001)
Lifelong Learning in Nursing	"…a dynamic process, which encompasses both personal and professional life. This learning process is also both formal and informal. Lifelong learning involves seeking and appreciating new worlds or ideas in order to gain a new perspective as well as questioning one's environment, knowledge, skills and interactions. The most essential characteristics of a lifelong learner are reflection, questioning, enjoying learning, understanding the dynamic nature of knowledge, and engaging in learning by actively seeking learning opportunities. Keeping the mind active is essential to both lifelong learning and being able to translate knowledge into the capacity to deliver high quality nursing care." (Davis et al., 2010, p.)
Active Learning	A multidirectional student-centered learning experience that is action based, interactive, nursing competency oriented, and continuously self-evaluative. (Fay, Selz & Johnson, 2005)

Team Based learning	A three phase active learning strategy that emphasizes students' abilities to actively engage in out of class self-directed learning, in-class collaboration learning in small groups, and effectively debate areas of disagreement with faculty members by means of evidence based arguments (Cheng et al., 2014)
Flipped Classroom	An inverted classroom format in which lecture material is reviewed by the students prior to class and class time is used to engage students in a wide variety of activities that facilitate the instructor–student interaction as they practice and apply the course material. (Schwartz, 2014)

Defining self-directed learning and its theoretical background.

Several educational theorists have informed nursing education's current understanding of the relationship of self-directed learning and the development of classroom strategies to facilitate the development of lifelong learning competency in today's undergraduate nurse. Initially, nursing education borrowed from the general educational literature's broad definition of self-directed learning (SDL) originally developed by Knowles (1974). Knowles (1974) described SDL as a self-initiated process completed with or without the assistance of others in which the learners identify their own learning needs, goals, and resources. Independently selecting and applying the best learning strategies for each learning situation and evaluating one's own learning outcomes are also an integral part of Knowles' conceptual framework regarding self-directed learning (Knowles, 1974).

O'Shea (2003), in tracing the theoretical development of self-directed learning theory, credited the educational theorist Isasiw (as cited in Knowles, 1974) as building on the Knowles' work by further emphasizing elements of students' responsibility for planning, implementing and evaluating their own work as self-directed learners. Both Knowles and Isasiw theorized that

self-directed learning is present in multiple pedogologic methods and exist on a continuum based on the extent of a student's control over the learning process (O'Shea, 2003).

Kolb's experiential learning model has also been widely recognized as a dominant conceptual foundation from which team-based learning and the flipped classroom approach has developed (Baker et al., 2007). In this model Kolb (1984) delineated four distinct learning modes that the learner needs to master to develop active experiential learning skills. In the context of Kolb's framework, a learning skill is considered to be a combination of acquired knowledge and experience that is intentionally developed to enable the learner to respond competently within a specific situation (Baker et al, 2007). Kolb (1984) theorized that the learning modes of concrete experience (feeling), reflective observation (watching), abstract conceptualization (thinking), and active experimentation (doing) are fundamental to the mastery of active learning competency for a lifetime (Boyatzis, & Kolb, 1995).

Canning (2010) added to the adult educational community's understanding of SDL by proposing that the self-directed learning continuum progresses from pedagogy to andragogy to heutagogy based on the learner's level of maturity and autonomous learning skill. The impact of the learner's level of cognitive development required for critical thinking and discourse has been noted by Blaschke (2014) as a significant factor in the educator's selection of the optimum level of self-direction to implement in the educational setting. The heutagogical approach to teaching and learning uses this continuum to guide the application of self-directed learning strategies. Heutagogy is a learning theory that emphasizes the highest degree of learning self-direction through a student-centric holistic approach to the experience of learning This approach requires the educator to relinquish ownership of student learning while facilitating it through the self-directed efforts of the student (Hoke, 2005).The goal of self-directed learning within the

heutagogical theory is development of the learner's independent competency in mastering skills and knowledge and their confidence in effective problem solving (Schlairet et al., 2014). Bhoyrub et al. (2010) recognize heutagogy as a relevant theoretical framework for learning in nursing education. This is based on the concept that the heutagogical approach facilitates the level of self-directed learning readiness graduate nurses will require to practice and learn on a life-long basis within a complex, rapidly changing, and ambiguous healthcare environment.

The theoretical rationale for the need to develop learning strategies for the nursing classroom that promote self-directed learning readiness can also be drawn from the nursing community's definition of lifelong learning. In 2014 Davis et al. published a study intended to arrive at an initial consensus among nursing experts in education regarding the attributes of the nurse as a lifelong learner. The ultimate goal of this study was to develop a more comprehensive definition of the concept of lifelong learning on which to base teaching strategies in the undergraduate nursing classroom (Davis et al., 2014). Their definition of lifelong learning indicated agreement within the nursing educational community that lifelong learning is a dynamic, formal and informal learning process characterized by self-directed questioning of the individual nurse's environment, knowledge, skills, and interactions. The characteristics of the nurse as a lifelong learner that nurse educators agree are essential include the ability of the student to critically question and reflect on all information presented to them academically and through actual experience and relationships (Davis et al., 2014). Davis et al. (2014) also noted consensus among nursing experts that nurses who continue to engage in a lifetime of active learning consistently express enjoyment of the learning process and a fundamental understanding of the dynamic nature of knowledge.

From these early theoretical roots, team-based learning (TBL) has emerged as an active, small group learning strategy (Michaelson & Richards, 2005). Originally developed by Michaelson in 2002, team based learning (TBL) has longstanding roots in the business and scientific communities but is relatively new to nursing education (Cheng et al., 2014). This learning strategy aims to immerse students in the process of solving real world problems within a team through shifting the classroom focus from passively absorbing knowledge to actively applying that knowledge critically to experiential classroom learning opportunities.

The application of the concept of team based learning to increase learning self-direction has been further refined by Bergman and Sams (as cited in Della-Ratta, 2015), who introduced the concept of the flipped or inverted classroom approach in 2006. In this approach the traditional teacher-centered focus of the classroom characterized by passive learning is shifted to a student centered perspective through learning that is active and self-directed. The timing of learning activities are reversed so that classroom lectures, which would normally be presented in class were assigned as homework. Class time is instead used for discussing the complexities of the material that the students have reviewed and in engaging in problem solving and application learning activities involving that material.

The concept that self-directed learning readiness can be measured was first introduced by Guglielmino (1978) who developed the 58 item Self-Directed Learning Readiness Scale (SDLRS) which has been used worldwide in adult education in numerous disciplines. The use of this scale has been discontinued due to the lack of confirmation of the validity of the scale and the scale's complex factor structure and high usage fee (Fisher et al., 2001; Fujinoyama, Maeda, Amaru & Inoue, 2016). Fisher, King and Tague (2001) subsequently undertook research to develop a nurse-specific version of the SDLR containing items that were identified by a panel of

eleven nursing education experts as reflecting SDLR in the nursing educational setting. This scale has been repeatedly cited for its concept reliability and validity in nursing educational setting.

Ethical Considerations.

This evidence-implementing project was undertaken to improve the flipped classroom teaching method already in existence in the pediatric nursing course at Messiah College. After a preliminary review of the project purpose and design, the Messiah College Institutional Research Review Board deemed that it was not necessary to submit this project for approval by the board.

Participation in this project was voluntary and anonymous. Completion of the SDLRSNE (Fisher et al., 2001) and demographic form implied consent to participate in the study. No compensation or additional course credit was provided to the participants. Participants were informed that they could choose not to participate in the project or voluntarily withdraw from the study at any time without prejudice. Each participant was informed that they would have access to a summary of the results of the completed study.

Review of the Literature

Contemporary nursing education faces the ongoing challenge of providing strategic learning opportunities that prepare the undergraduate nursing student for a complex, dynamic, and sometimes ambiguous setting for future practice (Bahn, 2007; Davis et al., 2010; O'Shea, 2003). This rapidly evolving healthcare environment requires that self-directed learning readiness (SDLR) becomes an essential learning outcome for every nursing graduate in order for them to maintain a safe, competent and relevant knowledge base for professional practice (Bahn, 2007; Brooks, 2015; Davis et al., 2010; O'Shea, 2003;). Effective development of self-directed learning readiness of the nursing student requires the implementation of evidence based learning

strategies that result in the measurable characteristics, attitudes, and skills associated with independent learning (Davis et al., 2010; Cheng et al., 2014; Fisher et al., 2001; O'Shea, 2003). The active learning model of the flipped classroom has been identified as a potential strategy for promoting SDLR of the undergraduate nurse. Minimal evidence currently exist, however, to support the impact of the flipped classroom model on the development of self-directed learning readiness through the use of a valid and reliable measurement scale.

A review of the literature was performed for the purpose of exploring the existing evidence regarding the definition of self-directed learning (SDL) and factors that influence readiness to learn in a self-directed manner in the context of contemporary nursing education and practice. The state of the evidence regarding facilitation of SDLR through the active learning strategy referred to as the flipped classroom approach was also undertaken during this review. The development and use of reliable, valid tools to measure self-directed learning readiness within the setting of nursing education was also explored.

A literature search was performed using the three databases, Cumulative Index of Nursing and Allied health Literature (CINHAL), Pub Med, and the Educational Resources Information Center. The articles reviewed were primarily selected from the time period of 2005-2016 with several older seminal articles included in the review to enhance the description of the theoretical underpinnings of self-directed learning. Only peer reviewed journals were included in the review. The search terms used to conduct the literature search include *life-long learning, team-based learning, active learning, flipped classroom, self-directed learning, nursing education, graduate attributes, self-directed learning readiness scale, nursing competency.*

The literature search yielded a total of 60 articles. After a preliminary review of the available literature, 38 articles were selected for in depth review. Nine of these articles related to

the definition of the concept of self-directed learning and its importance in nursing education and eight studies to the development of a tool to measure self-directed learning readiness. Although eleven studies were identified that discussed the application of team-based learning and the flipped classroom approach as an active learning strategy, only three of these sources addresses the relationship of the team based learning to the development of self-directed lifetime learning competency (Cheng et al., 2014; Ratta, 2015). No studies were identified that documented the use of the Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE) to measure the impact of participation in flipped classroom learning experiences on the self-directed learning readiness of undergraduate baccalaureate nursing students.

SDLR as an essential competency of the undergraduate nurse.

The once in a lifetime completion of a baccalaureate degree in nursing no longer guarantees continued competence in nursing practice (Bahn, 2012; Benner et al., 2009; Davis et al. 2014, O'Shea, 2003). Successful completion of the N-CLEX will open the door for entry into professional nursing as an initial credential of competence, but this competence will need to be maintained through an ongoing commitment to lifelong learning (Bahn, 2007; Davis et al., 2014). The exponential growth in innovations in healthcare delivery, technology, and the nursing profession's knowledge base demands a more dynamic learning approach that will allow the nurse graduate to successfully adapt to these ongoing changes throughout the duration of their professional career. Requisite skills for engaging in this type of learning approach has been characterized by numerous nursing educational leaders as including a continuous spirit of inquiry, self-responsibility for learning, and self-directed learning readiness (Davis, et al.,2010; Fisher at al., 2001;O'Shea, 2003, Ponton, 2008; Winch, 2008). To successfully engage in this type of learning, the contemporary nursing student will need to learn how to learn. This will

require that nurse learners continue to evolving toward a mature, skilled, and autonomous adult learning style in order to conceptually infer, evaluate, and appreciate a wide spectrum of information within the context of their practice environment (Davis et al., 2010).

Recent educational literature recognizes a significant disconnect between the learning strategies being used in the nursing classroom and those that will be required for current practice (AACN, 2010; Benner at al., 2009). Traditional nursing educational approaches have been based on a perception of the nurse learner as a passive recipient of knowledge within a classroom learning experience that is instructor led and driven. Recent discussions in the literature regarding self-directed learning readiness and the flipped classroom strategy also reflect a very slow progression toward the use of nursing educational theory that views the undergraduate nurse as an adult learner who is capable and responsible to direct their own learning.

Importance of SDLR for nurses. A significant paradigm shift regarding the critical importance of self-directed learning readiness as an essential competency of the graduate nurse as a lifelong learner has gradually emerged in the literature. Slow, inconsistent, and even reluctant application of this proposed change in nursing educational philosophy has been consistently noted (Fisher et al., 2001). Barriers to implementation that have been cited include an inconsistent perception of the level value of self-directed learning for the nurse learner by nurse educators and students alike (Fisher, et al., 2001; O'Shea, 2003). The literature also has identified a resulting persistent resistance by some nurse educators to relinquish traditional instructor controlled teaching methods in favor of a more active and student directed learning approach in the nursing classroom (Fisher et al., 2010; O'Shea ,2003). An unclear definition of self-directed learning readiness pertinent to nursing education has also delayed its acceptance as an essential quality of the nurse learner (Davis et al., 2010; Fisher et al., 2010; O'Shea, 2003).

Perceived value of SDLR for nurses. The nursing literature indicates that the reported degree to which self-directed learning readiness is valued in nursing education is highly varied from the viewpoint of both nursing educators and students (O'Shea, 2003). A seminal study on self-directed learning in nursing by Wiley (1983) examined the effect of nursing student's preference for structure on their performance of a self-directed learning project. This study included 104 undergraduate nursing students who were divided into an experimental and control group. The experimental group were required to do a self-directed learning project while the control were taught through the more traditional and passive lecture method. Gunther's scale for measuring preference for structure and Guglielmino's SDLR (1978) were administered to both groups. Wiley(1983) concluded that student's with a low need for structure benefited from the opportunity to self-direct their own learning, whereas those with a high need for structure did not find the self-directed learning experience as a valuable an approach to learning.

A subsequent experimental study by Russel (1990) looked at the relationship between preference for educational structure and self-directed learning of 40 registered nurses (as cited by O'Shea, 2003).This study also used Gunther's scale to measure preference for structure and Guglielmino's SDLRS (1978). This study indicated that the greater the nurse's need for structure in the educational setting, the lower the level of self-directed learning readiness (as cited by O'Shea, 2003). The results of both of these studies concluded that self-directed learning approaches were not necessarily valued as a learning approach for all nursing students. These studies, however, had significant limitations based on their sample size and use of Guglielmino's SDLRS which has since been discredited in the nursing literature (Candy, 1991; Field, 1989). Fisher et al. (2001) using a Delphi technique with a panel of 11 nurse educators to explore the

content and construct validity of self-directed learning readiness scale items have also have cast doubt on the results of these studies which use Guglielmino's SDLRS.

A more recent systematic review of the literature by Betihava et al. (2016) which looked specifically at the current a state of the evidence regarding the flipped classroom self-directed learning experience in nursing programs in the United States found several significant student and faculty perceived barriers to self-directed learning. The five studies summarized by Betihava et al. (2016) also reflected that the perceived value of self-directed learning was dependent on the goodness of fit between the learning style and need for structure of the student and the teaching method of the educator. This systematic review also revealed a consensus by educators that providing self-directed learning experiences required a considerable investment of time in new curricular structure which often did not meet the learning needs of the students for which it was designed (Betihava et al., 2016). Based on this systematic review, resulting change in learning outcomes compared to traditional pedagogical methods were neutral or only slightly improved which led educators to question the ultimate value of the flipped classroom model. Betihava et al. (2016), however, concluded that self-directed learning required by the flipped classroom approach had transformative potential for nursing educational reform although further evidence was needed to verify its value. This review (Betihava et al., 2016), although limited by the small number of available studies meeting the authors search criteria, used a rigorous and inclusive review method which included 11 quality indicators for study selection by four independent reviewers during the selection and extraction process.

The dilemma of defining readiness for SDL in nursing. The nursing literature reflects the perspective that effective integration of active learning strategies within the undergraduate nursing curriculum requires that the nursing educational community arrive at a consensus on the

concept of self-directed learning (SDL) and its attributes in the nurse learner (Cheng et al., 2014; Davis et al., 2014: Fisher et al., 2001; Eason, 2008; Middleton, 2013). Findings from reviewed literature reflected the evolution of the contemporary definition of self-directed learning and its associated characteristics in the nurse learner as deriving their shared theoretical roots from Knowles's Theory of Self-Directed Learning (1975) which has been researched and practiced in the general education literature for over 30 years (Davis et al., 2010; Merriam, Caffarella, & Baumgartner, 2006). Knowles conceptualized SDL as a six step learner-initiated process of independently identifying ones learning goals, resources, strategies, and target learning outcomes as the conceptual basis of the definition (Knowles, 1975).Without exception, all ten sources identified by this search describing the concept of SDL in the nursing educational setting identified Knowles (1975) as the conceptual basis of the definition. of SDL (Bahn, 2007; Baldwin et al., 2014; Benner at al., 2010; Betihava et al., 2016; Fisher et al., 2001; Langtree, & Mills, 2014; Davis et al., 2014; Eason, 2010; Olshansky, 2010; O'Shea, 2003; Sisk; 2011).

Use of only Knowles' (1975) broad definition of self-directed learning is identified as problematic for undergraduate nursing education because without a relevant definition specific to the nursing profession, it is difficult to effectively foster this attribute in students (AACN, 2010; Davis et al., 2014; Fisher et al., 2001; Smedley, 2007). The nursing education literature repeatedly emphasizes that before a culture of lifelong learning can be fully realized, it is essential to identify what lifelong learning means within the context of the nursing profession (Baldwin et al., 2014; Betihava et al., 2016; Davis et al., 2015; Murad, & Varkey, P. 2008; Smedley, 2007). The specific verification of characteristics needed by nursing graduates to remain lifelong learners throughout their practice is also needed (Baldwin et al., 2014; Betihava et al., 2016; Davis et al., 2015; Murad, & Varkey, P. 2008; Smedley, 2007). O'Shea (2003), in an

extensive review of 24 research articles in the literature on self-directed learning in nursing education, described the definition of SDL as highly variable throughout the nursing literature. O'Shea (2003) concluded that this has resulted in making the definition difficult to apply for the purpose of undergraduate nursing curriculum development. O'Shea's (2003) review also revealed that nurse educators and their students often do not have a parallel understanding of the concept of SDL and its purpose, significantly hampering its effective use in the nursing classroom. Although O'Shea's (2003) review of the literature regarding the nature and definition of SDL within a nursing context was rigorous and inclusive at the time of its publication, the state of the evidence regarding a more nurse specific description of SDL has evolved considerably in the current literature since this seminal study.

Since O'Shea's (2003) review, the subsequent identification of knowledge gaps in the nursing education literature regarding the definition of self-directed learning has been the impetus for numerous nursing research studies to better define SDL and its characteristics within a nursing educational context (Davis et al., 2010). Ongoing attempts to define lifelong learning in the nursing literature have focused on describing isolated attributes of the nurse learner such as the development of critical thinking and introspection regarding the details of patient care (Eason, 2010), and the ability to recognize and understand information (Winch, 2008). Self-direction in learning has also been recognized as an important characteristic of the nurse who engages in lifelong learning confidently, actively making informed choices (Davis at al., 2010; Winch, 2008). Effective independent learning has also been associated with the learning characteristics of patience, self-control, persistence, and careful attention to detail (Winch, 2008; Ponton, 2005; O'Shea, 2003). Jannsen, van den Berg, Tattersall, Hummel and Koper (2007)

confirmed that the development of nursing students' ability to think independently is central to lifelong learning competency.

Nursing research (Davis et al., 2014; Winch, 2008; O'Shea, 2003) has revealed that lifelong learning, that is inherently self-directed, extends far beyond informational literacy, content memorization, and even continuing education. Rather, it is an attitude and learning skill set that are characterized by a quest for an autonomously directed discovery of new knowledge in today's dynamic healthcare settings that involve the whole nurse, personally and professionally (Davis et al., 2014).

Davis et al. (2014) made a significant contribution to the nursing profession's working definition of SDL through employing a three phase study design using a Delphi technique to better define lifelong SDL based on the consensus of 38 nursing experts in nursing education, clinical practice, and nursing education. Survey Monkey was used to elicit responses to questions which included, "What are the characteristics and/or behaviors of lifelong learner?" A Likert scale was used to rate the importance of the characteristics identified. Davis et al. (2014) concluded from this study that learning and knowing in nursing is a dynamic, lifetime process that requires a highly developed ability to self-direct one's own personal and professional learning. The study revealed a high level of agreement of 4.50 on a Likert scale completed by respondents that a basic nursing education is an entry level qualification for professional nursing, but continuing to independently learn is integral to maintain nursing competence for the provision of quality nursing care. Davis et al. (2014) conclude that this implies that it is imperative for nurse educators to teach, model, and develop the self-directed learning attitudes and skills of the undergraduate nursing student for maintaining their competence in future practice. This study, although limited by its small number of participants, was seminal in its

focus for beginning a meaningful dialogue on the concept and learner characteristics associated with self-directed learning readiness for lifelog learning in the nursing profession.

SDL has also been defined a developmental process that is supported by an educational approach that encourages undergraduate BSN students to self-direct their acquisition of new knowledge with confidence, creativity, and enjoyment of new learning (Middleton, 2011; Davis et al., 2014; Cheng, et al. 2014).The theory that self-directed learning readiness is a maturational process was described by Grow (1991) who characterized the self-directed learning as being developed by the learner in four stages. This developmental process begins with learning that is dependent and directed by the educator the educator, moving to learning that is driven by learner interest, progressing participative learning and ultimately to learning that is self-directed. How and why the self-directed learning developmental process successfully occurs in the nursing classroom has only been briefly alluded to in the nursing literature (Baldwin et al., 2014; Cheng, et al. 2014; Davis et al., 2014; Middleton, 2011). No studies in the nursing literature were identified by this review that addressed the specific developmental process underlying SDLR of the nursing student throughout the entirety of their undergraduate nursing education. This lack of evidence on SDL as a developmental process points to a significant need for ongoing research in this area for future use in meaningful transformation of the undergraduate nursing curriculum.

Fisher et al. (2001) added to nursing education's understanding of self-directed learning through a study that explored attributes of the nurse learner that indicate readiness to engage in the self-directed learning process. This study expanded on Wiley's (1983, p.182) definition of self-directed learning readiness as the 'degree an individual possesses the attitudes, abilities, and personality characteristics necessary for self-directed learning' (as cited by Fisher et al., 2001). Although Fisher et al. (2001) concur with this definition, they illuminated three assumptions

about SDL that are inherent within this definition that they deemed important to consider. These include the assumption that adults are inherently self-directed in their learning, but self-direction of the learning process on an individualized basis occurs along a continuum (Fisher et al., 2001). Secondly, Fisher et al. (2001) described self-directed learning competency as a skill that can be learned and enhanced through repeatedly engaging in autonomous learning. Fisher et al., (2001) caution, however, that the assumption that the ability to learn in a self-directed manner in one context can be transferred to other settings, is not necessarily always the case. Competence in self- directed learning readiness, is therefore, context specific according to Fisher et al. (2001). Govaerts (2008) also supported this underlying assumption that competence in SDL requires that the learner make deliberate choices for integrating knowledge, skills, judgements, and attitudes for handling situations within the specific contexts of professional practice (as cited by Cheng et al., 2014b).

The flipped classroom as a self-directed learning experience.

There is a growing body of evidence that active learning strategies yield desirable learning outcomes including self-directed lifelong learning behaviors (Cheng et al., 2014b; Clark et al., 2008; Mennenga, 2013). This literature review specifically focused on the active learning strategy of the team-based flipped classroom approach which has only recently been introduced into the undergraduate nursing educational setting. Within the constraints of these search criteria only seven nursing studies were identified as applicable to the scope of this review.

A 2011 review of the literature by Sisk (2011) confirmed the limited evidence available on this topic and revealed 17 studies related to the effectiveness of the team based learning approach. Thirteen of these studies involved medical students, one on industrial psychology students, and only two involving nursing students. Cheng-Yu et al. (2014) and Searle et al.

(2003) noted that although TBL has been used in the field of business and science, minimal research has focused on its application in nursing education limiting the available evidence of its effect in the nursing undergraduate classroom.

This review of the literature identified only three nursing research studies that specifically described the effect of team-based learning on self-directed learning behaviors in undergraduate nursing studies. The first study by Cheng et al., (2014a) used a one group pretest–posttest design to study team based learning as an intervention in a maternal-child nursing course in a Taiwanese RN to BSN program. This study (Cheng et al., 2014a) included two student cohorts with a total of 207 participants. Comparison of the overall grade point average and final examination score of each student in the course with the student's response on three subjective questions regarding there TBL experience in the course. These questions explored how their participation in TBL affected their assessment of personal level of classroom engagement, value of teams, and level of self-directed learning (Cheng et al., 2014a).

The second study, also by Cheng et al. (2014b) used the same pretest–posttest design to study team based learning as an intervention in a broader group of 387 students in the same RN to BSN program involved in four courses. These courses included adult health, community health, maternal-child health, and medical-surgical nursing. This study, used four different scales to evaluate classroom engagement, the value of teams, nursing core competencies, and self-directed learning. Learning self-direction was measured using the Self-directed learning Inventory (Cheng, Kuo, Lin & Hsieh, 2010) containing 20 items to measure students' ability in self-directed learning developed by the authors of the study.

Both studies by Cheng et al., (2014a, 2014b), verified a significant improvement in nursing students' level of engagement in the classroom, ability to effectively work as a team to

solve problems, and to self-direct their own learning. Cheng et al. (2014) also concluded in both studies that TBL had a measurable effect on increasing out of class preparation by the majority of students resulting in a classroom environment that was much more conducive to learning that is active and self-directed than the traditional lecture based approach. In both studies by Cheng et al. (2014) self-directed learning was measured using the Self-directed Learning Instrument (SDLI) developed by Cheng and her colleagues (Cheng et al., 2010). This scale consisted of a 20 items measured on a 1-5 Likert scale that focused on the four domains of learning motivation, planning and implementing, self-monitoring, and interpersonal communication. These four domains of the scale were found to have a Chronbach's alpha of .80, .86, .79, and .77 respectively indicating that they measured the targeted characteristics in these specific studies. The reported overall validity of this scale was confirmed using factor analysis that yielded a Chronbach's alpha of .87 also indicating a good fit for the studies (Cheng et al., 2014a). An analysis of individual items contained in the SDLI accounted for only 54.39% of variation in students' self-directed learning (Cheng et al., 2014). Generalizability of this data regarding self-directed learning as measured by the SDLI (Cheng et al., 2010) is limited, however, due to lack of repeated use of the scale in a variety of nursing education settings to verify its reliability and validity in measuring self-directed learning.

Della-Ratta (2015) examined the effect of the use of TBL using an embedded flipped classroom approach on student evaluation of learning in two sequential sections of a two part nursing fundamentals course which included 80 and 40 undergraduate nurse participants respectively. During the second semester, a component of the flipped classroom was added to the curricular design of the course. This study used instructor observations, student course

evaluations, and final exam grades to gather evidence regarding the effect of the team-based flipped classroom approach on student learning.

Della-Ratta (2015) reported that course evaluations revealed that students viewed the flipped classroom approach as more effective when used in the smaller of the two class sizes during the second semester. A perceived increase in lifelong learning skills including collaboration, clinical decision making, and the ability to self-direct their own learning was also indicated by students in the course evaluations (Della Ratta, 2015). Based on the qualitative course evaluations obtained in a narrative format, Della Ratta (2015) concluded that the team based flipped classroom approach elicited increased self-directed student learning behaviors. Student scores on a standardized test of nursing fundamentals was also reported as being significantly higher by students who participated in the flipped classroom experience as opposed to those that did not (Della Ratta, 2015). The results of this study exhibit significant weaknesses due to the absence of a detailed description of the course evaluation, and quiz and standardized testing tool used to measure the reported learning outcomes. These limitations, combined with lack of rigor and specificity in the statistical analysis of the results of this study, made it difficult to objectively compare and contrast these results on learning outcomes with those of other studies on the flipped classroom approach. Della-Ratta's descriptive narrative on lessons learned from implementing this approach does provide focus of future studies of SDLR in the nursing flipped classroom. These insights include that moderate levels of student satisfaction with the flipped classroom method may simultaneously o-exist with improved student performance. (Della-Ratta, 2015).This indicates that student satisfaction may not be the optimum indicator of learning for this innovative teaching method (Della-Ratta, 2015).

In a previously mentioned systematic review of the recent review of the literature by Betihavas et al. (2016), the application of the flipped classroom strategy in undergraduate

nursing settings in the United States was examined in the recent nursing literature spanning the time period 2013-2015. For the purposes of this review four studies identified by Betihavas et al. (2016) are instructive for specifically examining the learning outcomes of the flipped classroom model in undergraduate nursing education.

The first study cited in this review (Geist, Larimore, Rawiszer & Sager, 2015) examined the effect of the flipped classroom effect on knowledge acquisition in consecutive semesters of an undergraduate pharmacology course. This study used a quasi-experimental pretest-post-test design that compared exam scores of a control group (n=40) using a traditional teaching approach and a treatment group (n=46) using the flipped classroom format. Analysis of the results on three unit test in this course showed significantly higher performance by the flipped classroom cohort (p=0.001). No significant difference was found between final exam performance of the traditionally taught and flipped classroom cohorts.

A subsequent study cited by this review (Harrington, Vanden-Bosch, Schools, Beel-Bares & Anderson, 2015) used an experimental design to compare learning outcomes in an undergraduate medical-surgical course between a traditionally taught control group (n=40) and an intervention group which were taught using the flipped classroom approach. Performance was measured using three exams, 24 quizzes, and one written paper. Results were measured using descriptive and inferential statistics. A MANCOVA was performed using exam scores specifically for the independent variable of test items related to knowledge and application. Harrington et al. (2015) found in using this measure that the difference between groups was not statistically significant (Wilks lambda = 0.851, p = .057). This study (Harrington et al., 2015) provided a final analysis of covariance (ANCOVA) to capture any difference in mean course grade between learning outcomes of the groups. No significant difference was found (F = 0.002,

p = .961) revealing no statistically significant difference in academic performance between the traditional and flipped classroom group on any of the learning outcome measures included in this study (Harrington et al., 2015).

The third study included in this review (Missildine, Fountain, Summers & Gossilin, 2013) used a quasi-experimental design and a large convenience sample of 589 students to examine the effects of the flipped classroom on academic success and student satisfaction. This study used average of total student exam scores and a faculty developed student satisfaction survey to obtain data. The outcome of this study revealed significantly higher exam scores (p=0.0001) for the flipped classroom intervention group. Student satisfaction with the flipped classroom format was significantly less, however, with the flipped classroom strategy.

The three studies included in this review (Betihavas et al., 2016) appear rigorous in design and statistical analysis revealing either the absence of improvement or moderate improvement in overall exam scores coupled with decreased or mediocre student satisfaction with the flipped classroom method. None of the studies extracted evidence related to change in level of self-directed learning readiness of students involved in flipped classroom experiences. This brings up the possibility that the level of SDLR of students participating in of the flipped classroom learning experience may have a yet to be determined effect on the resulting learning outcomes of this teaching strategy. This lack of evidence represents an important unexplored area of research regarding the flipped classroom approach.

These three studies (Geist et al., 2013; Harington et al., 2015; Missildine et al., 2013) did revealed distinct challenges outline by Betihavas et al.(2016). These included student reported difficulty in adjusting the flipped classroom approach, amount of out of class preparation time, difficulty staying organized, and dissatisfaction with group assignments. Faculty challenges

included inexperience in using this teaching method and preference for the more familiar didactic approach. Operation challenges included significant dependence of this method on cutting edge information technology and lack high speed computer access for rural and remote student participation,

None of the studies extracted evidence related to change in level of self-directed learning readiness of students involved in flipped classroom experiences. This brings up the possibility that the level of SDLR of students participating in of the flipped classroom learning experience may have a yet to be determined effect on the resulting learning outcomes of this teaching strategy. This lack of evidence represents an important unexplored area of research regarding the flipped classroom approach.

Only one study on the flipped classroom included in Betihavas' et al. (2016) review included elements in the study results pertinent to examination of self-directed learning readiness outcome. This study by Simpson and Richards (2015) focused on the rational for implementation of the flipped classroom and an evaluation of learning outcomes resulting from this approach in public health science and population health courses within an undergraduate nursing program. This descriptive study used a convenience sample of third year undergraduate nursing students in these courses with 64 and 93 participants respectively. Six items from a university sponsored course evaluation, faculty observation, and in-class student satisfaction study were used to measure the difference in learning outcomes and student satisfaction in the flipped classroom cohort of these course to the traditionally taught cohort in the same classes the previous semester.

Simpson and Richards (2015) reported that the student course evaluation revealed increased ability to engage in practical application of course content. The student satisfaction survey revealed a perception of greater autonomy, flexibility, self-responsibility for their own

learning during the course that they felt increased their critical thinking skills (Simpson & Richards, 2015). Students also identified the flipped classroom approach as enhancing their interaction and engagement in class (Simpson & Richards, 2015). 68% of the respondents indicated that more classes in the curriculum should be flipped indicating a moderate level of satisfaction with the flipped classroom format (Simpson & Richards, 2015).

This study was limited by the small number of participants. It did yield descriptive results on self-directed learning characteristics such as autonomy, self-responsibility for learning, and active engagement in the learning process that are instructive for areas on which to focus further research regarding SDLR outcomes resulting from the flipped classroom approach. The use of institutional and course-specific instruments to measure these characteristic is problematic for generalizing the findings for use in other nursing education settings and studies. In the systematic review of this study Betihavas' et al. (2016), however, proposes that the study lends support to the transformative potential of the flipped classroom to reform the nursing classroom in the future.

The seven studies selected for review to explore the team based flipped classroom as a self-directed learning experience revealed a primary focus in the literature on changes in exam scores and student satisfaction levels resulting from this learning method. This review reveals an emerging consensus in the nursing educational community regarding the value of flipped classroom to support SDLR. Refinement in the use of the conceptual definition of self-directed learning readiness and its characteristics in the nurse learner is needed to better inform development of these skills and attitudes within the context of the flipped classroom model. None of the studies reviewed provided data describing self-directed learning readiness as a developmental process over an extended period of time within the undergraduate nursing flipped

classroom setting. Evidence of measurement of self-directed learning readiness in the flipped classroom learning experience using a consistent tool whose reliability and validity has been repeatedly verified in the undergraduate nursing context was also not found by this review. These significant gaps in evidence regarding SDLR as a specific learning outcome of team based flipped classroom learning experiences points to the need for nursing educational research on this topic that can be generalized to diverse nursing educational settings.

Measuring the effect of the flipped classroom on self-directed learning readiness.

As the definition of the concept of self-directed learning and its associated skills in the nursing student gradually unfolds within nursing educational research, the literature simultaneously documents the emergence of several instruments to measure SDLR. For the flipped classroom learning strategy to be considered for a broader application in the nursing classroom, the confirmation of this model's effect on SDLR efficacy using a statistically valid and reliable instrument that is nurse-specific is indicated (Fisher et al., 2001; Fisher & King, 2010).

Several scales for this purpose have been identified and analyzed in the literature. These include the Self-directed Learning Readiness Scale (SDLRS; Guglielmino, 1977), the Oddi Continuing Learning Readiness Inventory (OCLI; Oddi, 1990), and the SRSSDL (Williamson, 2007). The most nurse-specific SDL measurement tool currently available is the Self-Directed Learning Scale for Nursing Education (SDLSNE; Fisher et al., 2001; Fisher & King, 2010).

Cadorin (2013) indicates that Guglielmino's Self-directed Learning Readiness Scale (SDLRS) (Guglielmino, 1978) and the Oddi Continuing Learning Readiness Inventory (OCLI) (Oddi, 1990) have been repeatedly analyzed to review their constructs. Cadorin (2013) documents no recent validation studies of the OCLI (Oddi, 1990) but has noted considerable

evidence in the literature to support the discontinued use of the SDLRS ((Guglielmino, 1978) due to serious issues regarding its use, validity, and cost. Fisher et al. (2001) also identified significant problematic aspects underlying the theoretical constructs and factor structure of the SDLRS (Guglielmino, 1978) prompting the development of their own scale to measure SDLR.

The literature reports that Williamson's Self-Rating Scale of Self-Directed Learning (SRSSDL) (2007) was originally validated by the author among a group of nursing students a Thames Valley University in London (Cadorin, 2013). An Italian version of the SRSSDL was subsequently validated in a study that included nursing, radiology technician students and other professionals (Cadorin, 2103). No factor analysis of the subscales of the SRSSDL have been performed to measure its reliability in capturing the SDL characteristics of the nurse learner.

The Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE) (Fisher & King, 2010) is a 40 item scale consisting of three subscales which include 'Self-Management', 'Desire for Learning' and 'Self-Control'. It was developed as an alternative to Guglielmino's Self-directed Learning Readiness Scale (SDLRS (as cited in Fisher et al., 2001). Fisher et al. initially developed the scale in three phases. First, a Delphi technique was used to obtain consensus form a panel of eleven nursing academics and educators on whether each of 93 items reflected the characteristic required for SDL in nursing education. Following two Delphi rounds, fifty two of these items were selected and piloted using a convenience sample of 201 undergraduate nursing students at the University of Sydney.

To test the internal consistency of the SDLRSNE, item unidimensionality was tested using item to sum correlation. This analysis reflected the extent to which each item measured the same concept with an item to sum correlation of greater them 0.3 indicating the item belong to the overall scale (Fisher et al., 2001). Fisher et al., found that 42 items had a sum correlation of

greater than 0.3 indicating that these items belonged to scale. The ten items that did not achieve a 0.3 sum correlation were dropped from the SDLRSNE.

The instrument was them subjected to a factor analysis to determine if the remaining 42 items could be summarized by a smaller set of component scores (Fisher et al., 2001). Scores for the 201 respondents were intercorrelated and examined using a principle component analysis. This analysis suggested that the three subscales should be retained for further interpretation. A varimax rotation was performed and indicated little overlap in the subscale items with the exception of two which were dropped from the scale. A Cronbach alpha correlation was obtained for each subscale (self-management subscale = 0.857; desire for learning subscale = 0.843; self-control subscale = 0.830) indicating the reliability and internal consistency of the subscales (Fisher et al., 2001).

Distribution of total scores on the final 40 item scale by the 201 respondents ranged from 100 to 197 with a mean of 150.55 (Fisher at al., 2001). Fischer et al. (2001) suggested that a score of 150 indicated an acceptable level of SDL readiness. Thirty of the 201 students participating in his study fell below this benchmark indicating they were not ready for self-directed learning approaches. In examining the age of participants compared to SDLRSNE total scores, Fisher et al., (20010 suggested that younger students may be less ready for self-directed learning which is increased with life experience and suggested further research is indicated in this area to optimize the timing of self-directed learning activities in the nursing curriculum.

Because of the Self-Directed Learning Readiness Scale for Nursing Education's (SDLRSNE) specificity to the nursing educational setting, the authors of the scale (Fisher & King, 2010) report frequent requests to use the scale in nursing education research since its development in 2001. Frequent use of the scale in a variety of nursing settings has resulted in

close scrutiny of the scale's internal consistency and validity by the nursing educational community (Fisher & King, 2010). The nursing literature documents verification of the SDLRSNE's subscale reliability and internal consistency in a study by Smedley (2007) in the undergraduate nursing setting. The study assessed the self-directed learning readiness of freshman nursing students (n=67), supported the statistical reliability of the total score and subscale scores obtained by Fisher et al. (2001). The Cronbach alpha correlation obtained by Smedley (2007) for each subscale (self-management subscale = 0.810; desire for learning subscale = 0.790; self-control subscale = 0.844) were very similar to those obtained by Fisher et al. (2001) verifying the reliability and internal consistency of the subscales. Smedley (2007) also found a similar distribution of total scores on the final 40 item scale by the 67 respondents ranged from 100 to 197 with a mean of 151.09 to the distribution found by Fisher et al. (2001). Smedley (2007) concluded that the SDLRSNE (Fisher at al., 2001) should be investigated further to explore shortening the scale, while maintaining its reliability and validity. Further longitudinal studies with groups of students using different learning strategies was also suggested to further verify the instruments use in more varied nursing educational settings over a longer period of time (Smedley, 2007).

In 2010 (Fisher & King) the authors of the SDLRSNE, performed a confirmatory factor analysis of the scale with a sample of 227 Australian freshmen nursing students ages 17-55 years. This analysis provided reasonable evidence that supported the validity and continued use of the scale to measure the self-directed learning readiness of the undergraduate nursing student, although 11 subscale items were found to be redundant (Fisher & King, 2010). The authors (Fisher & King, 2010) concluded that use of the scale with different student samples would contribute to a further understanding of the relationship of items across the subscales, but that the

original 40 item structure of the SDLRSNE should be retained until further research with larger student samples can be obtained.

The state of the evidence in the nursing literature supports the use of the SDLRSNE as a valid and reliable tool to measure SDLR of the nursing undergraduate population. This search of the literature, however, yielded no available studies in the nursing literature to date describing the use of the SDLRSNE (Fisher et al., 2001; Fisher & King, 2010) to measure the effect of team-based flipped classroom learning experiences on the development of self-directed learning readiness of the undergraduate nursing student. This provides a window of opportunity for this pilot study design to apply the SDLRSNE to explore the flipped classroom strategy's impact on SDLR and provide evidence on the impact of this innovative active learning strategy in the undergraduate nursing setting.

Methods

This evidence based practice project (EBP) employed a quantitative non-experimental model using a one group survey pre-test post-test design. The project was designed to address the following research question:

> What effect does participation in team-based learning experiences using a flipped classroom approach have on the self-directed learning readiness of junior level undergraduate baccalaureate nursing students as measured by the *Self-directed Learning Readiness Scale for Nursing Education* (SDLRSNE) (Fischer, King, & Tague, 2001)?

The flipped classroom approach was embedded in five separate class sessions of an undergraduate pediatric nursing course. The content of the class sessions was developed through the combined efforts of two maternal child health faculty members based on the curricular goals of the course and was taught using a team teaching approach. Student self-directed learning

readiness was measured prior to beginning the course and after completion of the five flipped classroom learning experiences. Pre- and post-intervention data were collected using a demographic data collection form developed by the author and the Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE) (Fisher et al., 2001). The data collected was analyzed using descriptive and inferential statistical methods.

Setting

This EBP project was implemented within the context of the junior year of a four year baccalaureate nursing (BSN) program of Messiah College. Messiah is a private, faith-based academic institution located in a suburban area of central Pennsylvania. The BSN program is nationally accredited by the CCNE. Delivery of curricular content is directly influenced by Messiah's BSN program mission to facilitate the development of contemporary nurse graduates that excel in the delivery of quality nursing care to diverse populations through a holistic approach that integrates a Christian world view of nursing practice.

Participants

The sampling procedure used in this EBP project was a convenience sampling that was restricted to BSN students enrolled in the first section Nursing 313: Nursing Care of Infants, Children, and Adolescents during the spring semester in the junior year of the program. All 19 members of this class section were offered the option to participate in the project on a voluntary basis and all accepted the opportunity.

The participants were homogenous group in age, gender, cultural background, and educational level at entry into the BSN program (Table IV). The age range of participants was 20-23 years indicating a class makeup of primarily millennial learners. Eighteen of the nineteen participants identified themselves as Caucasian and one participant identified as being of Afro-

American descent. The majority of the participants entered the BSN program directly from high school and one participant had a technical school learning experience prior to entering the program. The participants varied in their prior exposure to the flipped classroom model with 11 participants having prior flipped classroom learning experience and 8 having no prior experience.

Intervention and materials

The intervention used in this evidence generating project consisted of four flipped classroom sessions and one simulation using the flipped classroom approach. The flipped classroom modules focused on the pediatric nursing content areas of musculoskeletal, respiratory, gastrointestinal, and genitourinary conditions of infancy, childhood, and adolescence. The simulation flipped classroom experienced focused on blood product administration to the pediatric population.

The flipped classroom learning experiences were structured in a team based format and were delivered in three phases which included pre-class, classroom, and post-class learning activities. These phases are depicted in greater detail in Figure I.

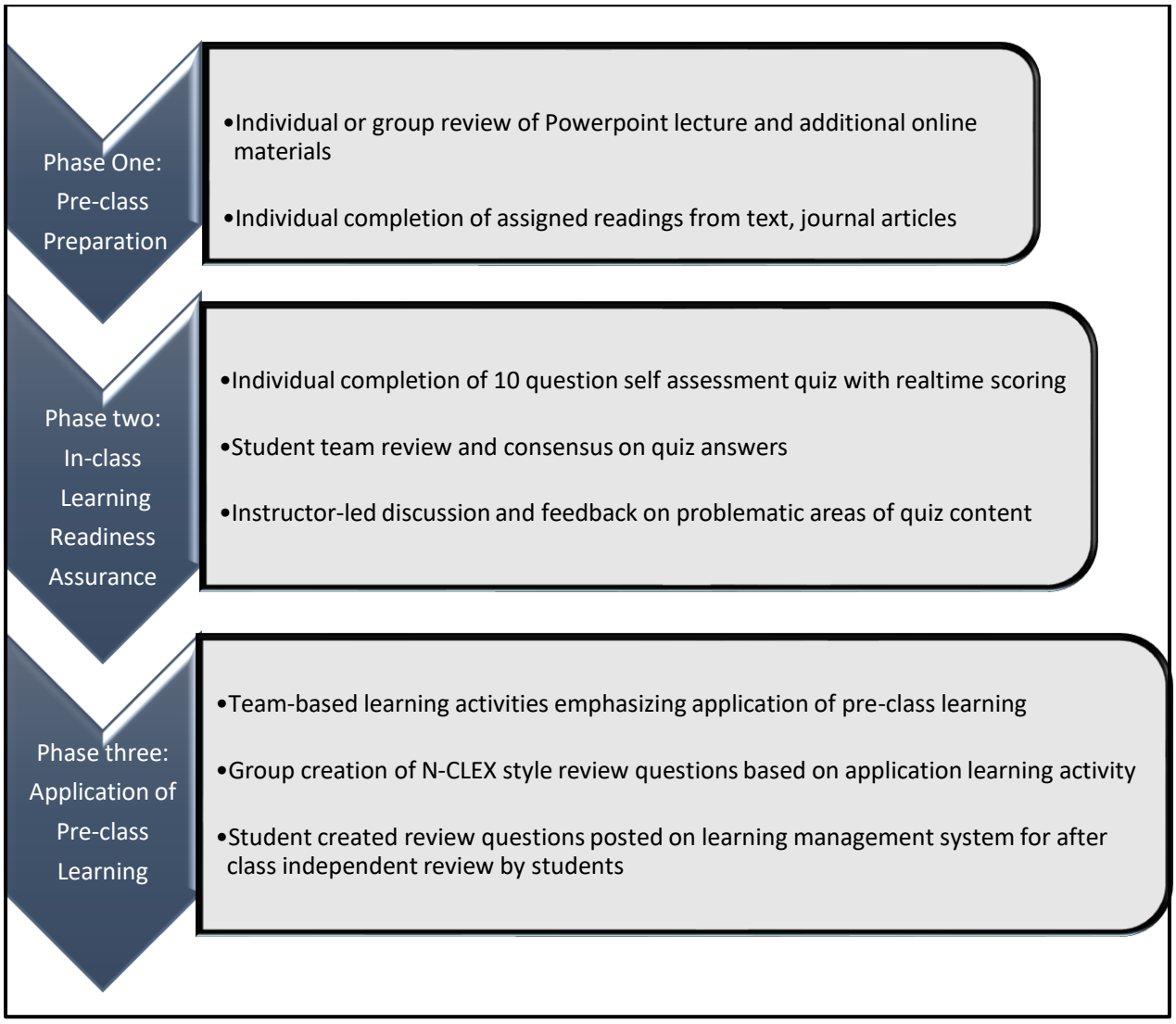
Each team consisted of 3-4 students and the teams were self-determined by the students at the beginning of the course. Student membership in a specific team remained consistent throughout the course.

The first phase of each flipped classroom module included pre-class review of PowerPoint lectures, assigned readings, and pre-recorded videos relevant to each content area. The PowerPoint lectures were created by the instructors and were based on course competencies which reflected overall curricular competencies of the program and the AACN Essentials of Baccalaureate Nursing Education.

Phase two of the flipped classroom experiences focused on learning readiness assurance. Each flipped class began with a ten question self-assessment quiz based on expected learning outcomes of pre-class preparation. Students then divided into their respective teams and compared and contrasted their quiz answers and arrived at consensus on the correct response. This process was followed by an instructor-led discussion of the quiz and rational underlying the correct answers. Remedial review by the instructor on problem areas revealed by the quiz scores was interspersed throughout this class discussion.

The third phase of the team-based flipped classroom format focused on application of pre-class learning through a wide range of small group learning activities. During this portion of the class students participated in unfolding case studies, created skits, designed schematic diagrams, produced videos, and created games, and developed N-CLEX questions to elaborate on and further discuss assigned course content with their student peers. Guest speakers were also invited to share their lived experience of dealing diagnoses which were the focus of the class session engage students in a discussion following their presentation. These learning activities were followed by a question and answer period between students and instructor followed by a brief focused review of any material the students or instructor identified as needing further explanation.

Figure I: Three Phase Team-based Flipped Classroom Model



Measurement Instruments

The Self-directed Learning Scale for Nursing Education (SDLRSNE) (Fisher et al., 2001; Fisher & King, 2010) was the instrument selected for this study to measure the self-directed learning readiness of study participants. A six item demographic information form designed by the researcher accompanied the survey. Permission of the authors of the SDLRSNE was received in writing prior to the beginning of the study. No cost was incurred in the use of the scale, but an agreement to share the study outcomes with the authors of the scale was signed.

The SDLRSNE is a 40 item scale consisting of three subscales which included 'self-management', 'desire for learning', and 'self-control' which intended to measure learner characteristic and attitudes related to SDL. Each item is stated as a one sentence statement that asks the participant to indicate level of agreement on a Likert scale as to how that statement characterizes them personally. Examples of sample items include 'I prefer to set my own learning goals' and 'I can be trusted to pursue my own learning' (Fisher et al., 2010).

The scale was administered in an untimed pencil paper format. Scoring was based on the total sum of the 40 Likert scale responses with 1=strongly disagree, 2=disagree, 3=unsure, 4= agree, 5= strongly agree. Change in pre- and post-test total scores were then compared. The authors of the SDLRSNE indicate that subscale scores can also be totaled and compared using the same scoring procedure.

A five item demographic information form designed by the researcher accompanied the survey. Items on this scale included age, gender, race, level of education on entry into BSN program, and prior exposure to flipped classroom learning experiences. This results of this questionnaire was summarized using descriptive statistics including frequency and percentage of students providing a specific answer (Table IV).

Prior to selecting this SDLRSNE (Fisher et al., 2001) for use in this study, an extensive search of the literature was conducted to confirm evidence of its reliability was validity. The outcome of this search is described in detail in the review of the literature and confirmed continued recognition of this scale's valid and reliable use to measure SDLR within the context of this study which was conducted in the undergraduate nursing classroom setting.

Procedure

The SDLRSNE (Fisher et al., 2001) and demographic survey was administered to all consenting participants in the class prior to the first flipped class and during the week after the final flipped classroom session. Consent was implied through completion of the scale. The researcher met personally with the participants as a group prior to administering the survey. A brief description of the purpose and voluntary, anonymous nature of the study was discussed and the directions for completing the scale and demographic form were reviewed. No monetary reimbursement or class credit were offered to participating students.

The survey was distributed in pencil paper format. To ensure anonymity of the data, each participant was asked to identify each page of the survey with the last four digits of their cell phone number. Completion of each survey required approximately 20 minutes of in class time per student each time the survey was administered. The measurement scale was distributed and collected by the researcher during the class session in which it was administered.

Data Analysis

Data was analyzed using the Statistical Package for the Social Sciences (SPSS) 17.0 (SPPS Inc., 2015). Students' demographic data was analyzed using descriptive statistics including frequencies and percentages of total responses. The SDLRSNE results before and after

the team based was analyzed through the use of the Wilcoxon-signed rank test to compare the students' responses total scores on pre-intervention and post-intervention scales.

Results

Demographic Characteristics of Participants

The total sample size for this study was 19 participants. The sample was comprised of 18 (94.7 %) female and 1 (5.3%) male junior undergraduate nursing students whose ages ranged from 20-23 years. 18 (94.7%) of the participants were Caucasian and 1 (5.3%) identified as being Black. Only 1 (5.3%) student had previous technical school experience with all other students entering the baccalaureate nursing program directly from high school. 11 (57.9%) of the students reported prior flipped classroom learning experience while 8 (42.1 %) indicated no prior experienced with the flipped classroom approach to learning (See Table IV).

Table II: Demographic characteristics of participants (n=19).

Demographic Characteristics		Frequency	Percentage %
Age	20-23 years	19	100
Gender	Female	18	94.7
	Male	1	5.3
Race	Caucasian	18	94.7
	Black	1	5.3
Program entry level education	High School	18	94.7
	Technical school	1	5.3
Prior flipped classroom experience	Yes	11	57.9
	No	8	42.1

Results of pre-test and post-test SDLRSNE total scores.

A Wilcoxon test examined the change in total score results on the pre-and post-test SDLRSNE. No significant difference was found in the results (Z = .147, p >.05). Total pre-test score results on the SDLRSNE were not consistently higher than total post-test score results following the flipped classroom experiences.

Fifty-seven percent of the sample participants had experience with the flipped class experience which could be a confounding variable. Therefore, it was necessary to determine if there was a difference between participants who had flipped class experience to those who did not. A change score was calculated from pretest to posttest for each participant. An independent-samples *t* test was calculated comparing the mean total change in pre-test and post-test SDLRSNE total scores of students who identified themselves as having prior flipped classroom experience to students who had no prior flipped classroom experience. No significant difference was found (t (17) = -.892, p >.05). The mean total change in pre-test and post-test SDLRSNE scores of students with prior flipped classroom learning experience (M = -3.9091, sd = 7.647) was not statistically different from the mean total change scores of the students who did not have prior flipped classroom learning experiences (M = .7500, sd = 7.582).

Discussion

In this study the impact of participation in five flipped classroom learning experiences on the self-directed learning readiness (SDLR) of junior baccalaureate nursing students in a pediatric nursing course was examined. Change in SDLR was measured through a comparison of the total pre-test scores on the SDLRSNE to total post-test scores. The five flipped classroom learning experiences were completed over a six week period. The student sample included a homogenous group of 19 students, ages 20-23 years, the majority of whom had entered the BSN program directly from high school. The one significant difference between participants was their

prior experience with the flipped classroom format. Slightly over half of the participants reported prior flipped classroom learning participants and 42.1 % reporting no prior experience with this learning model.

Eighteen of the 19 participants also scored above 150 on the pre-test SDLRSNE which is considered by the authors of the SDLRSNE (Fisher, et al., 2001) as indicating a high level of self- directed learning readiness. No statistically significant improvement between the total pre-test and post-test scores on the SDLRSNE was found at the conclusion of the study. A comparison of the change in total scores on the SDLRSNE for students with prior flipped classroom experience and student without this prior experience was also found not be statistically significant within the context of this six week course.

These results suggest that five flipped classroom learning experiences did not significantly increase the SDLR skills and attitudes as measured by the SDLRSNE (Fisher et al., 2001) which are included in the instrument's subscales of 'self-management', 'desire for learning', and 'self-control'. These results are not consistent with previous results in the literature which demonstrated a positive change in self -directed learning readiness by students who participate in active self- directed learning activities using a team-based approach. These studies, however, were conducted over longer periods of time and involved much larger and more diverse student samples that included students in a broader age range and with a wider range of prior academic experience.

The lack of a significant positive change in SDLR during the framework of this study may be due to two important characteristics inherent in the self-directed learning process. The first quality is that SDLR is a developmental process that requires maturation of self-directed learning skills and attitudes (Blaschke 2014; Fisher et al., 2001, Grow, 1991; Kasworm, 1992;

Kocaman et al., 2009). Secondly, this maturational process occurs repeated exposure to active learning experiences over a long period of time to effect a significant change in student's advancement through the self-directed readiness to learn continuum (Kocaman et al., 2009). The change in SDLR in this study was measured over only a six week period. This time frame may not have provided sufficient exposure to the flipped classroom approach over a long enough period of time to significantly effect a positive change in self-directed learning readiness. A longitudinal study that used a consistent flipped classroom approach throughout the curriculum and that followed these same students from program entry to graduation may have demonstrated a more significant increase in the development of self-directed learning readiness skills and attitudes.

An additional factor that may have affected these results is that the millennial learners, who made up 100% of this student sample, may enter the collegiate academic setting with a higher baseline SDLR skillset (McCurry & Martins, 2009). The participants in this study entered the flipped classroom experiences examined in this study with high self-directed learning readiness scores (150 or >). The scope of this study does not provide any evidence to determine whether these students entered the program with this level of learning readiness or whether their high level of SDLR was developed through other learning activities within the program before taking the pediatric nursing course on which the study focused. A longitudinal study that measured SDLR form entry into the program might provide evidence to support this assumption about the millennial nurse learners SDLR at program entry.

Limitations

The scope of this study was limited by a small homogenous sample and short duration of the study. The focus of study was limited to one specific course in one institutional setting which

does not support the generalizability of the findings. The study results reveal only a brief snapshot view of change in SDLR within a very limited six week time frame. The study results led this researcher to consider that undergraduate nursing students may become more self-directed in their learning style as they move from the very beginning of the program to becoming program graduates. A comparison of SDLR throughout the entire continuum of the program might reveal a more significant change in total SDLRNE scores. Inclusion of nurse learners from a wider age range and more diverse academic backgrounds that included primarily traditional learning experiences might also yield different results.

Recommendations for further research

These results indicate no positive change in self-directed learning readiness over a relatively short time period of six weeks with a brief exposure to five flipped classroom learning experiences for this homogenous sample. A longitudinal study that followed the development of SDLR levels from program entry to graduation is indicated to provide more comprehensive evidence of how and why self-directed learning readiness develops in the nurse learner. Future studies that include the flipped classroom approach throughout the entire curriculum might also provide valuable information on the long-term effect of this learning strategy on SDLR throughout an undergraduate nursing program. Inclusion of students from a wider age range and diverse levels of prior active learning experience is also indicated to explore evidence of the effectiveness of the flipped classroom learning strategy on a broader population of nursing undergraduates with varied experience in both traditional and active learning strategies.

Conclusion

Self-directed learning readiness as measured by the SDLRSNE (Fisher et al., 2001) over a brief exposure to five flipped classroom learning experiences did not increase for this limited,

homogenous student population. The active learning skills required by the flipped classroom learning strategy are congruent, however, with the same skills required for self-directed learning readiness and lifelong learning. These skills include the broad categories of self-management, desire for learning, and self-control measured by the SDLRSNE. The optimum length of time over which a nursing student matures in the developmental process of solidifying these SDLR skills was not captured by the results of study. Longitudinal nursing educational research that measures the impact of the flipped classroom model on SDLR throughout the entire length of the nursing curriculum with a larger, more diverse student population may yield valuable information for the its improved design and implementation as a transformative active learning strategy for nursing education.

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