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## Transforming Expectations

Flipped Classroom Design within a Graduate Level Pathophysiology Course

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### **Abstract**

Nurse educators have long accepted the monumental responsibility of preparing clinically competent and globally relevant nurses. Complicated by a vastly increasing current and prospective nursing shortage coupled with high nursing attrition rates especially among new graduate nurses, nurse educators are under greater pressure to teach new generations of nurses clinical competence, clinical judgment, as well as compassionate and respectful patient care (Benner, Sutphe, Leonard, & Day, 2010). Blended learning formats, including completely flipped classroom designs as described in this paper, have been used successfully in introductory pathophysiology courses (Blissitt, 2016). However, not all courses – particularly complex concept courses such as advanced pathophysiology – lend themselves easily to such presentation styles in addition to conveying the necessary elements of content required for course completion and, hopefully, retention. The purpose of a flipped classroom design is able to create meaningful learning experiences which engage students with the learning process and acknowledge the students' ability to manage their own learning. The nature of redesigning a course from a strict lecture format to a blended and flipped format requires unique engineering, utilizing Fink's (2013) backward course design as a foundation. In this paper, the complexities of redesigning a graduate level Advanced Pathophysiology course to incorporate clinical competence, clinical judgment and reasoning, as well as compassionate and respectful care of the client along with essential course content is described.

*Keywords:* blended learning, flipped classroom, graduate nursing, nursing students, nurse education, pathophysiology

This thesis investigates the literature related to the use of blended learning formats, including flipped classroom designs, as well as the educational theories which support the application of flipped classroom designs; describes the redesign of a master's level pathophysiology course; and illuminates the student outcomes related to flipped classroom design within a master's level pathophysiology course. This paper will also delve into the implications of flipped classroom designs in nursing education.

### **Background**

Previous offerings of the course NURS 6160: Advanced Pathophysiology across the Lifespan in the Graduate Nursing Programs (GNP) at St. Catherine University (SCU) presented numerous challenges to the learner. Though the course was intended for nursing students, the class was taught by a physical therapist who lacked the understanding for the nuances of advanced pathophysiology as they related to safe and holistic nursing practice. The faculty member's knowledge of the intricacies of physiology was vast, but the ability to translate this comprehension to meaningful learning to the graduate nursing student was lacking.

Additionally, previous course teaching strategies utilized Powerpoint (PPT) presentations with hundreds of slides per week as the primary approach to learning. These presentations were read verbatim during each three-hour class period. Students expressed frustration with the lack of meaningful learning experiences, confounding exams, and limited accessibility to faculty. Ultimately, students stated they felt, "we were largely left to learn on our own."

NURS 6160: Advanced Pathophysiology across the Lifespan presented a unique challenge in the redesign process, as three programs of study at St. Catherine University utilized this course to complete program requirements. The Master's of Science in Nursing – Nurse Educator Emphasis; Master's of Science in Nursing – Entry-Level (MSNEL); and Doctorate in

Nursing Practice (DNP) required NURS 6160 as a requisite as a part of their programs. The foundations of this course, therefore, were intended to meet the constraints of all three programs.

The curricular maps of the three programs designated NURS 6160 as the sole contributor to the accomplishment of genetic competencies and the research and utilization of evidence-based guidelines as stipulated by the AACN's Master's and Doctorate Essentials. Program parameters placed upon this course were the offering of the class solely in the spring semester for the MSNEL student cohorts and summer semester for nurse educator student and nurse practitioner student cohorts. Based upon marketing of all three programs, the course was required to comply with blended learning formats with some content offered online and the rest of the content offered in face-to-face settings.

Based upon the student feedback received from previous cohorts and the recognition of the high standards for success of the three academic programs and the countless students who utilize the course, NURS 6160: Advanced Pathophysiology across the Lifespan was being called to be so much more than what previous student cohorts had experienced within the confines of this class. Student feedback showed how this course was failing to engage students in adequately meaningful learning experiences, excite them about discovering the depths of intricacies between pathophysiology and application of nursing practice, and exert an influence to create lifelong self-motivated learners. The desire of the redesign team was to focus student learning into significant and profound interactions with the curriculum and with one another, foster an appreciation for appropriate nursing interventions and the rationales for them based upon pathophysiology concepts, and fortify foundations of knowledge and creativity upon which learners could build for years to come. In the following section, a review of the literature on blended learning formats, flipped classroom techniques, and their applicability to the redesign

pertaining to this Advanced Pathophysiology course is explored as our means of achieving these aims.

### **Literature Review**

The literature review was conducted through the CINAHL database with parameters of English language, publication date since 2007, and apply related words. Further search criteria included pathophysiology, advanced pathophysiology, nursing, nursing education, nurse education, nurse educators, blended learning, and flipped classroom. Additional research was unearthed by reviewing reference lists pertaining to research articles which added to the understanding of the topic being investigated. Some of these reference lists and associated research articles led to other databases such as Elsevier, Health Source, and Medline. Textbooks utilized in the primary researcher's master's program of nurse education were also reviewed and applied as appropriate.

For the vast majority of the research reviewed and used in this paper, the publication date of 2013 was employed with a few notable exceptions. Some of the textbooks used were published as early as 2010; however, the concepts and ideas noted within them were still relevant and cited in multiple research articles used in this paper. Akinsanya (1987) was the first individual to question the necessity of a solid, science-based core curriculum for nursing students, including pathophysiology. By all current research, Akinsanya's work is still considered "landmark" and was, thus, included in this paper. Further research on Akinsanya's original work was not conducted until the late 1990's when Jordan (1994) began to wrestle with the concepts of high-fidelity bioscience courses and their impact on nursing students and their implications for the nursing profession. For this reason, this paper also utilizes Jordan's work

(Jordan, 1994; Jordan & Hughes, 1998; and Jordan & Reid, 1997) as sentinel pieces to establish the need and impact of high-quality science course for nursing curriculum.

Themes identified in the research conducted were varied, as this paper is the first of its kind to use the flipped classroom design in a master's level pathophysiology nursing course. However, among the research identified, common themes included enhanced student outcomes (better exam scores and improved satisfaction); enriched student experiences through engagement in active learning exercises, collaborative effort and team-based learning; and better patient outcomes through improved clinical judgment and reasoning skills of nursing students and more efficient and effective utilization of healthcare resources. Because flipped classroom design demands that the student become active in the learning process, the student has greater control over the depth and breadth of their learning experiences. A student cannot sit passively in class and expect to "be taught," because each student is responsible to engage with the course material and with one another during each class period.

Another theme of note was the pervasiveness of flipped classroom design among most disciplines and at all levels of education. From high schools to medical schools, from algebra to pharmacology to engineering, flipped classroom design has allowed faculty members to incorporate active learning experiences into the seemingly more mundane venues of academia and stimulate excitement for these courses once again. Students are able to apply what they are learning to real-world problems which they can manipulate and solve, creating self-confidence and actual value in the learning experience. No other educational design has disseminated so quickly to all corners of academia as the flipped classroom design has done since its introduction in 2000 (Lage, Platt, & Treglia, 2000).

Blended learning formats have been used successfully in introductory pathophysiology courses (Blissitt, 2016); however, blended learning formats have not been attempted in an advanced master's level pathophysiology course. Further, a completely flipped classroom design has not been attempted in an advanced master's level pathophysiology course either. There have been endeavors made to partially flip challenging courses such as pharmacology, but these opportunities were thwarted by switching to flipped classroom techniques in the middle of the semester, creating chaos as they tried to cope with new teaching, learning, and studying habits (El-Banna, Whitlow, and McNelis, 2017).

### **The Call for More Effective Teaching Methods in Pathophysiology**

Today's challenging and dynamic healthcare demands nurses which are proficient in the understanding of pathophysiological concepts and their contribution to disease processes. Comprehension of such concepts enables nurses to care more efficiently for individuals with multiple comorbidities and reduce unnecessary interventions and costs through application of clinical judgment and clinical reasoning (Akinsanya, 1987; Jordan & Reid, 1997; Jordan & Hughes, 1998). Further, the American Association of Colleges of Nursing (AACN) Master's Essentials underscores the magnitude of graduate-level competency in pathophysiology for master's level nursing students upon the quality of patient care and the control of healthcare costs (AACN, 2011, p. 9). However, as cited by Mortimer-Jones and Fetherston (2018), nurses prefer biosciences to be taught by fellow nurses, but few nurse educators have a solid grasp on pathophysiology concepts to teach the course content effectively. Nonetheless, Mortimer-Jones and Fetherston (2018) advocate the "nursification" of the biosciences required in nursing curriculum to promote the applicability of bioscience courses to the development of nursing judgment and clinical reasoning skills. Nursification of bioscience courses allows nurse



educators to cultivate clinical intuition through utilization of real-world problems from nursing practice to enhance concept comprehension.

Currently, master-level nursing programs fail to captivate our students in the completion of the necessitated, and often dreaded, pathophysiology core curriculum. Clifton and McKillup (2013) concluded that graduate-level nursing students consider pathophysiology “difficult and anxiety-provoking.” However, Clifton and McKillup also discovered that students can deem pathophysiology courses as highly satisfying if the students find value and gain constructive learning in the delivered content, which was reiterated of the assertions made by Hawks (2014). Fink (2013) described the phenomenon of students failing to see “value or significance of what they are learning” and subsequent de-valuation of the curriculum by students (p. 5). Nurse educators have a responsibility to provide quality, relevant content with which nursing students can build clinical judgment and reasoning.

Fink (2013) described the need for “significant learning experiences” across all levels of formal education, echoing the paradigm shifts, specifically those in nursing education which were championed by Benner, Sutphen, Leonard, and Day (2010). Novel learning environments and meaningful educational experiences create a more engaging and stimulating curriculum in which nursing students can apply clinical judgment and reasoning skills in settings which minimize risk and potentiate the learning. Nursing students rely not only upon their own understanding of the issues but can also incorporate the classmate’s comprehension of the situation into a more holistic integration of problem solving, a precept endorsed by Hawks (2014) who stated flipped classroom techniques “facilitate communication, conflict resolution, and team building” (p. 265). Bradshaw and Lowenstein (2014) advocated the use of collaborative educational designs in the promotion of clinical judgment and reasoning (pp. 65-

75). This collaborative effort to achieve greater comprehension of difficult nursing concepts such as the application of pathophysiology to disease processes garners creativity in problem-solving and more holistic solutions to complicated patient care. In the pursuit of meaningful learning experiences, Marques and Correia (2017) noted that problem-based (PBL) hybrid pathophysiology courses improves student comprehension of content, builds clinical reasoning skills, and enriches students' learning experiences.

### **The Support for a Flipped Classroom Design**

In recent decades, flipped classrooms instructional techniques have been implemented with varying degrees of success in nursing education. Flipped classroom techniques can enhance students' clinical judgment skills, improve patient outcomes and overall decrease in healthcare costs. As cited in Betihavas, Bridgman, Kornhaber, and Cross (2016), through flipped classroom designs, "students engage as active learners, content is taught in-context, and educators facilitate clinical reasoning and critical thinking rather than imparting factual information." Flipped classroom techniques allow for students to take greater control in their learning (Critz and Knight, 2013) and increases student satisfaction regarding the quality of education received (Critz and Knight, 2013; Presti, 2016). Simpson and Richards (2014) revealed the success of flipped classroom design in population health nursing. They utilized flipped classroom design to build relevance into population health nursing concepts and create meaningful learning experiences for their students. The students in Simpson and Richards' research (2014) indicated they thrived in the supportive and active learning environment, with over two-thirds of the students requesting flipped classroom design in more nursing courses.

However, lack of adherence to flipped classroom design (i.e., switching between flipped classroom design and traditional lecture methods within the same course) tends to lower student

satisfaction with the learning strategy and increase student frustration with the course overall (El-Banna, Whitlow, & McNelis, 2017). In their study, El-Banna, Whitlow, and McNelis (2017) found no significant difference in the testing scores of nursing students in a pharmacology course who split the semester in flipped classroom design and traditional lecture formatting, but the researchers conducted their study in a six-week course which utilized one learning strategy for the initial three week period and the alternative learning strategy for the second three week period. Students were forced to acclimate to two uniquely different learning strategies which affected the ways in which they were required to prepare for class periods and study for exams in a very short period of time.

When used appropriately, flipped classroom techniques increases students' retention of course content and develop critical thinking regarding information consumption, creating lifelong learners. Missildine, Fountain, Summers & Gosselin (2013) noted that students who participated in flipped classroom design demonstrated greater comprehension of concepts (mean test scores (M) = 81.89, SD = 5.02) compared to their lecture-only counterparts (M = 79.79, SD 4.51,  $p < 0.001$ ). Similarly, Geist, Larimore, Rawiszer, and Al Sager (2015) stipulated enhanced knowledge requisition and concept retention as well as increased student satisfaction in a nursing pharmacology course utilizing a flipped classroom design. Their pretest-posttest quasi-experimental design depicted enriched learning environments in which students performed better on unit exams compared to previous cohorts which had employed traditional lecture formats. However, as noted in Presti (2016), students' overall satisfaction with the flipped classroom design was lower than cohorts which utilized traditional lecture formatting. Nonetheless, as cited in Ratta (2015), student satisfaction does not necessarily accurately indicate of student success (p. 3). Further, Tan, Yue, and Fu (2017) performed a meta-analysis on flipped classroom

instructional techniques which showed statistically significant improvement of students' test scores [SMD = 1.13, 95% CI (0.76, 1.49),  $p < 0.00001$ ] and functional knowledge scores [SMD = 1.68, 95% CI (1.24, 2.12),  $p < 0.00001$ ]. Tan, Yue, and Fu (2017) showed that flipped classroom design has a substantial impact on the quality of student outcomes.

### **Educational Theories Which Support Flipped Classroom Design**

Fink (2013) first described his backward design in 2003, endorsing the idea that instructors need to purposely build their courses by critically thinking about what their students must achieve to successfully complete the course objectives and program goals related to the specific course. By identifying the end goals, the instructor can then construct the course backwards, dismantling each component of the goal which needs to be mastered over the semester to reach the end goal. Eventually, the instructor is left with the building blocks of the end goals with which to assemble significant learning experiences to meaningfully link the class objectives to the end goals of the course and program. Over the semester, the instructor builds each concept upon one another, creating an interwoven fabric of education. Flipped classroom designs lend themselves well to this ideology, as flipped classroom designs also work to build upon concepts previously covered in pre-classroom activities during in-class practical application exercises.

Fink (2013) also discusses team-based learning as a modality for creating meaningful learning experiences (p. 146). One of the mainstays of the redesigned course at St. Catherine University was the foundation of the class on team-based learning, including a team-based component of examinations. Powers, Staton-Williams, Sheeler, and Howard (2017) noted that collaborative, team-based learning opportunities enabled nursing students to develop effective communication and negotiation skills which are critical for practicing nurses to prevent adverse

events related to patient care within the “healthcare team” care delivery model. Nursing students who participate in team-based learning experiences are able to cultivate and hone essential communication, critical thinking, and clinical reasoning skills required as they work with the collaborative healthcare team. Further, these skill sets assist new graduate nurses in acclimating to their role as a professional nurse, integrating their knowledge base with the wisdom and insight of other healthcare disciplines. In their research, Pluta, Richards, and Mutnick (2013) iterated, “drivers such as accountability to self and team, life-long learning, and clinical problem solving are all in play in the move to team-based learning.” This concept is of overwhelming importance, as nursing professionals must continuously study new nursing techniques and question their own understanding of care-related concepts. Further, nursing professionals are called upon to interplay well within the healthcare team and utilize critical thinking and critical reasoning skills to solve increasingly complex patient care dilemmas. Pluta, Richards, and Mutnick (2013) remarked that collaborative learning serves the best interests of student nurses as well as their future professional peers and patients by “raising the bar” through development of clinical judgment and intuition via the solving of complex patient care scenarios in a team setting.

The learning strategy of collaborative testing provides a unique opportunity for students to exhibit mastery of content learned as well as reinforce course content which the student may not fully comprehend with the setting of peer instruction instead of teacher-led instruction. As cited in Martin, Friesen, and De Pau (2014), collaborative testing created “enhanced critical thinking, less anxiety, improved peer relations, and increased motivation to learn.” These authors discovered that collaborative testing increases test scores by 7.99 points on average (5.21-10.77,  $p < 0.0001$ ) with a cumulative effect of the students’ course grades of average of 1.2

points. Further, students indicated they felt they were motivated to learn and retain course content, gained confidence in their knowledge and skills related to course content, and cultivated the skills of negotiation and critical thinking. These findings are supported by the research conducted by Molsbee (2013) who found the same benefits to students through the use of collaborative testing. However, Molsbee (2013) studied data from student cohorts in lower level nursing courses which utilized collaborative testing either failed or dropped out of the program when these learning strategies were not employed in upper level nursing courses. Molsbee (2013) concluded that students who had obtained passing grades in lower level nursing courses were ill-prepared for upper level nursing courses because those students had relied upon the wisdom and knowledge of the group instead of fully comprehending the course content of the lower level courses. Thus, when those students met with advanced concepts in upper level courses, those students could not master the advanced concepts due to their incomplete understanding of lower level course material and reliance upon collaborative testing to ensure those students passed the lower level nursing courses. Molsbee (2013) claimed that collaborative testing, when used as the sole measurement of students' learning achievements, predisposed certain students to depend upon a peer's knowledge for passing a lower level nursing course instead of mastering course content for themselves.

The constructivist learning theory, as denoted by Keating (2015), was also an integral theory in the redesign of NURS 6160, as the constructivist learning theory seeks to synthesize a student's previous knowledge base with the course content which was presented each week and a student's developing clinical reasoning skills to create meaningful learning experiences (pp. 74-75). Duane and Satre (2014) also acknowledged the importance of permitting students to assemble their own framework for integrating previously acquired knowledge with advanced

pathophysiological concepts, generating clinical judgment and reasoning skills. In fact, Duane and Satre (2014) found that utilizing collaborative learning as discussed previously greatly enhanced the overall effect of the constructivist learning for individual students and their class as a whole entity. Similarly, McDaniel and Tomwall (2016) theorized that students could generate their own meaningful learning experiences if allowed to construct content for the course. The idea to encourage students to create pathophysiology content not only engaged students with the course materials but also served as an impetus to peer instruction and enhanced content retention and student satisfaction. Students assembled case studies related to advanced pathophysiological concepts which were then utilized by their classmates to augment the learning experience for all participants.

Metacognition was another formative theory utilized in the redesign of NURS 6160, as various means of reflective self-assessment were utilized throughout the semester. Metacognition, or “the ability to assess one’s own skills, knowledge, or learning” (Keating, 2015, p. 73), is an element of constructivist theory and is also well-suited for adult learners. Adult learners generally have enough life experience to determine how and to what extent they have accomplished their personal and assigned learning goals. Martin, Friesen, and De Pau (2014) observed that “working in a group allows individuals to question each other’s thinking thereby promoting metacognition.” Adult learners are more prone to comparing their learning achievements with their peers and questioning themselves and their peers in an attempt to glean the best thought processes when tackling difficult clinically-based problems. Hsu and Hsieh (2014) hypothesized that metacognition was a synthesis of learning factors which influenced the development of self-reflection and a critical review of one’s personal strengths and weaknesses. As cited in Hsu and Hsieh (2014), students who participated in metacognitive self-analyses were

“more flexible and persevering in problem solving,” as well as a strong correlation with “positive learning behavior and learning performance.” Hsu and Hseih (2014) concluded that metacognition was an essential element of a student’s ability to cope with formal and informal education.

One of the most important foundations of nurse education is the adult learning theory developed by Malcolm Knowles in 1980 (Keating, 2015, pp. 75-77). Knowles’ adult learning theory supposed that adult learners were less focused upon content mastery than application of concepts (p. 76). This distinction is crucial when addressing the learning needs of master’s level nursing students, as these adult students are more likely to be second-career or advanced degree students. These students welcome the chance to incorporate previous knowledge into their learning schemas to solve real-world scenarios based upon newly attained concepts. As cited in Keating (2015), adult learners expect respect for their ideas and previous life experiences; cooperative learning to facilitate comprehension of new topics; and relevant, engaging, and meaningful learning experiences upon which to incorporate knowledge transfer and organize new concepts of knowledge. Curran (2014) reflected these elements of adult learning theory, emphasizing that “adult learners want control over their learning process.” Further, Curran (2014) noted that adult learners are perhaps the best suited student demographic for collaborative learning due to their ability to self-direct their learning and desire to solve real-world problems rather than passively absorbing new information.

### **Summary of Literature Review Findings**

Flipped classroom design is a powerful teaching-learning strategy when applied consistently throughout a course semester (El-Banna, Whitlow, & McNelis, 2017). Flipped classroom design increases student retention of course material, improves student test scores and



overall outcomes, and stimulates the cultivation and refinement of clinical judgment, reasoning, and intuition skills (Simpson and Richards, 2014; Missildine, Fountain, Summers & Gosselin, 2013; Geist, Larimore, Rawiszer, and Al Sager, 2015; Tan, Yue, and Fu, 2017).

Flipped classroom design creates mixed satisfaction among students. While some students have expressed dismay and dissatisfaction with the time requirements and material to be consumed during pre-class activities, most students agree that flipped classroom design improves their retention of course material and enhances their personal abilities to apply concepts to clinical problems (Critz and Knight, 2013; Presti, 2016; Ratta, 2015). Additionally, flipped classroom design increases student control in their education which can influence student perceptions regarding flipped classroom design and course relevance and value (Keating, 2015; Curran, 2014).

Flipped classroom design requires significant time and energy and effort on behalf of the instructor. The instructor must provide substantial effort to convert their courses from traditional lecture format to a flipped classroom design. Most, if not all, class assignments must be reconfigured to comply with and harness the most out of flipped classroom design. If collaborative testing is also utilized in conjunction with flipped classroom design, examinations and testing environments must also be reconstructed to manipulate the full extent of influence between collaborative testing and flipped classroom design (Molsbee, 2013; Martin, Friesen, and De Pau, 2014).

Flipped classroom design incorporates numerous educational theories into a comprehensive curriculum teaching strategy. Flipped classroom design synthesizes adult learning theory, constructivism theory, and metacognition theory (Keating, 2015; Duane and Satre, 2014; McDaniel and Tomwall, 2016; Martin, Friesen, and De Pau, 2014; Hsu and Hsieh,

2014; Curran, 2014). Further, flipped classroom design integrates creative and meaningful learning experiences with team-based learning strategies (Fink, 2013; Powers, Staton-Williams, Sheeler, and Howard, 2017; Pluta, Richards, and Mutnick, 2013).

## **Method**

### **Curricular Redesign at St. Catherine University**

Master's-level nursing students want more application-based, practice-focused pathophysiology content. Reviews of student feedback from five consecutive cohorts who took NURS 6160: Advanced Pathophysiology across the Lifespan indicated the need to radically transform the learning environment and teaching strategies employed in this course. Previous students noted that the lecture format was “a waste of time” with “overwhelming amounts of material to study” and “very little in-depth exploration or connection to real-life experience.” These cohorts sought better use of in-class time through discussion of difficult content and application of pathophysiology and associated nursing implications, which did not occur during their experiences in the class.

One of the greatest impetuses for change in the course was the student feedback from previous student cohorts. The utter lack of respect for students' concerns and feedback regarding the course textbook, curriculum, and teaching modalities perpetuated the lackluster and disconnected teaching of this course over countless semesters. Student feedback, despite being a mandatory aspect of classroom effectiveness measurement, is a valuable tool which provides insight and a running dialogue which spurs nurse educators to adapt a course to best meet the needs of the student cohort. Student feedback should not be elicited only on the last day of class, but, rather, throughout the semester in order to best harness the ability to amend course materials to meet the needs of students. Of course, not all student needs can be met through these means,

but it is critical to student satisfaction and morale that instructors at least attempt to integrate student feedback into the course while the course is ongoing.

Two common barriers to the use of flipped classroom designs are lack of willingness from instructors to change their teaching modalities which they have witnessed or utilized in the past and the lack of support from institutional leadership. However, in our case, we had one instructor enthusiastic about implementing flipped classroom design – Professor Rebecca Barroso – as well as wholehearted support from Dean Susan Ulrich of the Henrietta Schmall School of Nursing at St. Catherine University. Prior renditions of this course lacked one or both of these essential facets to embrace flipped classroom design and collaborative learning and testing techniques. However, during the course of the semester, the primary instructor experienced negative repercussions from existing nursing faculty related to the use of flipped classroom design and collaborative testing as a learning strategy.

Fink (2013) discussed the critical need to begin curricular redesign with the end in mind (pp. 74-92). Since this course was a requirement for three nursing programs at St. Catherine University (MSNEL, Master of Science in Nursing – Nurse Educator emphasis, and the Doctorate of Nursing Practice), our foundations for this course were intended to meet the educational goals of all three programs. Our work, therefore, started with the need to meet requirements demanded of all three programs of study within their curricular maps. One of the most difficult aspects of all three curricular maps was the designation of the pathophysiology course as the sole contributor to the accomplishment of genetic competencies and the research and utilization of evidence-based guidelines as stipulated by the AACN's Master's Essentials (AACN, 2011).

Fink (2013) also discusses team-based learning as a modality for creating meaningful learning experiences (p. 146). One of the mainstays of the redesigned course at St. Catherine University was the foundation of the class on team-based learning. During the first class period, students completed questionnaires which depicted their preferences for leadership, punctuality, procrastination, comfort with team conflict, and early bird vs. night owl biorhythms. These preferences, in addition to data collected regarding this particular student cohort and the necessity to separate certain individuals, allowed the designers of this course to establish teams based upon their internal strengths and weaknesses. The primary instructor of this course, Professor Barroso, spent time observing the student cohort within other classes and gleaning information regarding the student cohort from other instructors within the MSNEL program. It was apparent from instructor feedback that the student cohort did not produce positive results in the majority of cases. Thus, the course instructors for NURS 6160 decided to create teams instead of allowing the students to choose their own teams.

Our main strategy was blended learning as described in Bradshaw & Lowenstein (2014, pp. 337-354). We provided asynchronous base knowledge content via Panopto presentations on a Desire2Learn (D2L) learning platform. This strategy allowed the 3-hour weekly class time to be dedicated toward the solving of case studies which highlighted various illnesses based upon that week's system of interest (i.e. cardiovascular, renal, neurological, reproductive, etc.). As noted by McDaniel & Tomwall (2016), case studies can be powerful learning tools, as they help students use clinical imagination and hone clinical judgment. Our case studies highlighted common diseases which student nurses are likely to encounter within their nursing practice.

Another major change to NURS 6160 was the use of collaborative testing techniques. No other course within the MSNEL program utilizes collaborative testing as a learning strategy.

However, the MSNEL faculty committee refused to allow collaborative testing as the sole testing strategy within NURS 6160. Therefore, the instructors of NURS 6160 broached a compromise with each exam comprised of individual and team components. While the NURS 6160 instructors would have preferred to evenly distribute weight to the individual and team components, this option was also declined by the MSNEL faculty committee. Rather, the individual element was weighted as 80% of the final grade, and the team element was weighted as 20% of the final grade. With this weighting system, the collaborative testing component of each exam was limited in its effects upon students' exam grades and final course grade. Quizzes were presented weekly to assess the knowledge acquisition related to the pre-class learning activities. Each quiz was compiled from a bank of fifteen questions, and each student could take the quiz twice. The higher score from the two attempts was recorded as part of the student's final grade.

One of the difficulties encountered in this course revolved around the leveling of test and quiz questions. Although this course was taught in the second of three years of the MSNEL program and students should have been transitioning from baccalaureate to master level thinking and testing, it became quite apparent that this student cohort was unable to make that transition in this course. The first examination, along with the first four quizzes, utilized questions which were levelled at a master's level cognition and reasoning. However, poor results on the affected quizzes and examination revealed an apparent lack of ability to shift to higher level thinking and reasoning in this student cohort. Upon further investigation, fellow MSNEL faculty revealed that no attempts had been made to transition this student cohort from baccalaureate to master level reasoning skills. Further, the student cohort had been advised to seek only direct answers to NCLEX-style questions such as those used in this course. However, the fact that NCLEX

does not use straightforward questioning techniques and requires some application of nursing knowledge into the given patient scenario had not been considered by the MSNEL faculty committee.

Another type of assessment strategy utilized in NURS 6160 included team presentations and an associated disease and disorder paper. For example, a team was assigned genetic diseases and disorders as the overarching theme for their team presentation. Each individual could choose pre-selected genetic diseases or disorders as long as the chosen genetic diseases or disorders had some contingent of continuity which would help connect the team presentation. In this semester, the team assigned to the genetic theme chose to highlight Angelman syndrome, Down syndrome, Prader-Willi syndrome, and Tay-Sachs disease since these conditions are almost always diagnosed at or near the time of birth and each of these conditions have a profound effect on the life of the affected individual and their families.

The team presentations were divided equally into individual and team components. The rationale for this division of points awarded was to motivate students to prepare collaboratively for their team presentation as well as to encourage full participation in the individual portions of the team presentation. With very few exceptions, the students rose to the challenge beautifully in both the individual and team portions of the presentations.

The disease and disorder report was an individual assignment linked to the team presentations. For example, the individual who presented Angelman syndrome wrote a 3-5 page paper detailing the clinical significance of Angelman syndrome; the prevalence, incidence, morbidity, and mortality of Angelman syndrome; and the pathophysiology and clinical manifestations of Angelman syndrome. Lastly, the paper required the typical diagnosis

procedures and criteria for Angelman syndrome. Similar information was required for the team presentation, so the assignments worked in tandem with one another.

The use of multiple feedback tools, as endorsed by Fink (2013, p. 75), were instituted throughout the semester to measure student perceptions regarding the course. Based upon these feedback tools, adjustments were made to the course as the class unfolded. Students felt as though their opinions and suggestions for improvement were at the very least acknowledged and were sometimes implemented to alter the progression of the course. These feedback tools also provided the students an opportunity to reflect on their personal strengths and weaknesses, as well as group dynamics with their teams. The feedback tools utilized allowed students to contemplate their own work both individually and within their team, an opportunity to develop metacognition.

A reflection paper was the final assignment for this course. While not a formal assessment of the student's progression or accomplishments for the course, the reflection paper offered an opportunity for students to examine their thoughts and feelings related to nursing and pathophysiology in addition to changes to their thought processes and abilities to clinically reason through real-world problems and collaborate with other professionals to best serve the needs of the patient.

## **Results**

Without access to the exam score statistics from the previous student cohort in this course, it is impossible to draw conclusions between the current and previous student cohorts in quantitative measurements (i.e., exam scores, etc.). However, qualitative results in the form of student feedback can be analyzed for themes of student responses to the flipped classroom design. Since past student feedback was the primary impetus for curricular redesign for this

course, the author deemed it prudent to assess the effectiveness of the curricular redesign via current student feedback.

Feedback from this student cohort was essential as a measurement of the quality, effectiveness, and relatability of this course within the MSNEL program's curriculum map. Students felt that the curriculum was difficult and challenging, especially since they were required to change the way they studied as it related to this course. Student responses indicated that most students in this course were somewhat overwhelmed with the density of the curriculum. Most students indicated that they needed to spend more than 12 hours per week completing pre-class activities including textbook readings and video and lecture viewing. Additionally, students felt that the first four quizzes and first exam (those levelled at the master's level of cognition) were too arduous. The remaining quizzes and exams were re-leveled to the baccalaureate level of cognition, and the students felt much more capable of handling those assessment techniques.

Students were very supportive of the shift from traditional group work to a team-based learning environment. Students expressed on numerous occasions that the pre-selected teams based upon personality traits crafted more cohesive teams which focused on developing invaluable communication, collaboration, and negotiation skills while navigating the assigned course tasks. Students reflected that previous courses allowed students to choose their own group partners which often led to various group members not fully participating in the work or students with strong personalities dominating the group. In the team-focused approach, each student in the team had an opportunity to engage as the team coordinator (leadership role), a role in which they learned to coordinate team efforts and how to delegate tasks to other team



members. Overall, the team-based learning environment allowed more opportunities for personal and professional growth than the traditional group-work learning strategy.

Of the twelve teams which were constructed, one team initially experienced disruptive team dynamics. Two other teams experienced difficult team dynamics as the semester progressed, eventually leading to the dissolution of the team-centered learning environment for these teams. In one of these instances, a single student within the team was unable or unwilling to fully participate in the team's work. In the second team, the team disintegrated from a strong four-person team into two dyads aligned according to personality differences. In conclusion, ten of the twelve teams were able to overcome differences and work together cohesively to accomplish assigned tasks and the related course objectives.

Students stated they experienced a greater retention of material compared with traditional lecture-based classes they had taken previously. Students verbalized their appreciation of collaborative testing especially, as this learning strategy facilitated students' analysis of the course content from different perspectives offered by their colleagues. The students firmly believed that the ability to "talk through" the course material through collaborative testing solidified their comprehension of the curriculum much better than the traditional individual testing strategies experienced in other courses, stating "I was reminded that multiple minds are better than one." Furthermore, another student added, "Encouraging team member strengths helps improve performance." Students also indicated that the team presentations and case studies expedited their knowledge acquisition related to the diseases and disorders represented in the team presentations and case studies. Further feedback revolved around the concept of collaborative learning including, "Teamwork sometimes is fun! If you have a group that works well together homework can be more enjoyable than when done individually." Also, "it

[collaborative learning] added several layers and perspectives to learning that enriched the experience.” Students discovered valuable insights for their professional growth. One student noted that “tolerance for difference is a must,” and another said, “It is best to be flexible, complete your best work, and to communicate.” Overall, these students found this course challenging but pursuant to their personal and professional growth.

### **Discussion**

Advanced pathophysiology is an extremely dense curriculum to both teach and study. Innovative teaching and learning strategies attempt to allay some of the daunting tasks for both the instructor and the students. Flipped classroom design is an effective and rather well-received alternative learning strategy in this pathophysiology course.

Unfortunately, many limitations exist in our redesign of NURS 6160: Advanced Pathophysiology across the Lifespan. We did not have full access to the data (student exam scores) for previous cohorts in this course, and, therefore, could not conduct statistical analyses of exam scores comparing the current student cohort to previous student cohorts in this course. This lack of robust statistical analysis limited our ability to determine if a flipped classroom design actually improved students’ test scores. Additionally, we structured our redesign on the premise that the students would be cognitively prepared for master’s level work. However, the results from the first content exam indicated that our students were not able to synthesize information to apply clinical reasoning to master’s level questions.

While nursing education is embracing flipped classroom techniques with greater enthusiasm, there is limited research which stipulates flipped classroom techniques as superior to traditional lecture formats. Students appear more engaged with the course content and are better satisfied with the quality of the learning experience, no data exists to suggest that better student

engagement and improved student satisfaction actually increase the students' mastery of content or predicts higher functionality or enhanced cognitive skills of these students when they enter the workforce.

One of the initial difficulties in creating a flipped-classroom design for this course was the fact that none of the other Master of Science in Nursing Entry Level (MSNEL) courses prescribed to or embraced this transformation. In other MSNEL courses, these MSNEL students were provided with only a strict lecture format. Lectures were reinforced through clinical skills labs, clinical simulations, and in-person patient care as the only forms of learning experiences offered to students prior to this semester. Students initially had great difficulty understanding the concepts of team-based work (though they had numerous previous experiences with group work) and the flipped classroom design. While it is optimal to have the entire course founded in flipped classroom design, the authors readily acknowledge that the novelty of a flipped classroom design in the middle of a nursing program which does not use this teaching strategy can seem odd, and even overwhelming, to students unfamiliar with the educational approach.

A progressive levelling of questions could improve the difficulties seen in this course regarding the levelling of questions on quizzes and exams. With full disclosure to students, one recommendation for this course would be to start a MSNEL student cohort with baccalaureate-level questions in the first portion of the semester, create a mixture of baccalaureate- and master-level questions during the middle portion of the semester, and finish with a master-level questions at the end of the semester. If the students are informed beforehand of this gradual increase in the levelling of the quiz and exam questions, they would likely be accepting of the new challenge instead of shocked when major transitions occur without their foreknowledge.

## **Implications for Nursing Education**

Based upon the success of our course, flipped classroom design is an appropriate teaching strategy for master-level advanced pathophysiology courses. However, several considerations must be examined before implementing in all courses, including proper levelling of evaluation methods; creating and achieving high expectations of students and faculty; expecting and facilitating dramatic transformations for students in their personal and professional lives; and promoting stellar student outcomes by embracing new but proven teaching strategies to better engage the dynamic student cohorts which enroll in our programs.

Further, today's nursing students have high expectations of us as educators. Our students demand that we prepare them to the best of our abilities to pursue their callings as nurses. Their future patients, coworkers, and the healthcare world at large also require the best of us as nurse educators to transform nursing education as it stands today and infuse our curriculum with relevant, real-world course content to stretch and grow our students' clinical thinking, clinical judgment and reasoning, and collaboration and negotiation skills.

Lastly and foremost, nurse educators must participate in honest, soul-searching examinations of their current pedagogies and preserve their imagination and courage to improve the quality of nursing education. The nursing profession and the healthcare world at large will demand great things of our student nurses as they enter the nursing profession and propel it forward. We, as nurse educators, must demand great things of ourselves so we might discover, create, and embrace enhanced ways of teaching to help our students reach that goal. We cannot ask of our students something we ourselves are unwilling to do – change and improve the landscape of our profession and our world.

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