ACTIVE LEARNING IN NURSE ANESTHESIA DIDACTIC EDUCATION

Rice Giffin & Caala Sweet

AdventHealth University

Abstract

Active learning is an innovative pedagogical approach to teaching where instructional methods other than lecture allow students to become active participants in their education during didactic sessions. Many disciplines within graduate-level medical and healthcare education report positive outcomes with active learning implementation; however, a gap in the literature exists regarding nurse anesthesia educators' understanding and use of active learning in the didactic setting. An online anonymous survey, including demographics, qualitative questions, and ordinal quantitative questions, was performed by the American Association of Nurse Anesthetists. Data analysis revealed how nurse anesthesia didactic faculty were implementing active learning prior to and after the COVID-19 pandemic began, with frequency distribution for the pre-pandemic period, and an assessment for pandemic-induced modifications to active learning strategies/implementation. Study findings included quantitative evidence on the implementation of question and answer, computer-based interaction systems, peer-teaching, formative quizzes and surveys, cooperative learning, case studies, application activities, and cooperative case work. Qualitative analysis demonstrated methods prior to the pandemic closely aligned with this evidence, while exhibiting varying degrees of student involvement. Continued analysis showed many nurse anesthesia educators had attempted to adapt active learning techniques/implementation due to pandemic-induced teaching restrictions and that most of those educators did not previously have methods in place to ease the transition. The implications of this study are profound when the concept of engagement is considered, where engaging students is constructing knowledge, allowing for further discussion and exploration, enhanced implementation, and future innovations in active learning within nurse anesthesia didactic education.

Keywords: active learning, nurse anesthesia, evidence-based, didactic

Contents

List of Figures and Tables

See Appendices G, H, & I.

Active Learning in Nurse Anesthesia Didactic Education

Currently, it is unclear to what extent faculty in nurse anesthesia (NA) graduate-level education are utilizing active learning (AL) techniques within the didactic setting. Use of the AL pedagogy in graduate medical education (GME) and graduate healthcare education (GHE) classrooms has been associated with improved knowledge retention, learner engagement, and enhanced analysis of learned concepts (Critz & Knight 2013; Hew & Lo, 2018; Lancaster et al., 2012; Marchalot, et al., 2018; Martinelli, et al., 2017; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016). Current NA graduate healthcare education encompasses the didactic classroom setting, online learning, and simulation training, combined with the required clinical experiences (Council on Accreditation-Supporting Quality Assessment and Improvement in Nurse Anesthesia Education, 2020). AL techniques are intrinsic to each of these areas, but the determination of the extent of implementation of AL by faculty within the NA didactic setting was unexplored.

Section One: Problem and PICOT Questions

Significance and Background

The predominant educational paradigm in higher education centers on traditional classroom lecturing, where faculty-centered didactic sessions place students in a passive learning role (Betihavas, Bridgman, Kornhaber & Cross, 2016; Hew & Lo, 2018; King, et al., 2019; Lujan & DiCarlo, 2006; Martinelli, et al., 2017; Miller & Metz, 2014; Park et al., 2018; Wittich, et al., 2018). Within the GME and GHE realms, the focus is shifting toward greater adoption of AL (Burns et al., 2013; Hew & Lo, 2018; King, et al., 2019; Lancaster et al., 2012; Marchalot et al., 2018; Martinelli, et al., 2017; Miller & Metz, 2014; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016; Wittich, et al., 2018). Research has shown that implementation of AL methods in various areas of graduate-level learning has proven beneficial (Critz & Knight 2013; Hermanns, Post & Deal, 2015; Hew & Lo, 2018; Lancaster et al., 2012; Marchalot, et al., 2018; Martinelli et al., 2017; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016).

Faculty in GME & GHE programs also experienced benefits from the adoption of AL but faced multiple barriers (Ellis, 2016; Hermanns et al., 2015; Miller & Metz, 2014). The time required by faculty to realize the adoption of AL was found to be the highest associated cost of implementation (Critz & Knight 2013; Hermanns, et al., 2015; Hew & Lo, 2018; Marchalot et al., 2018; Martinelli, et al., 2018; Miller & Metz, 2014; Park et al., 2018). Effects within the graduate NA education spectrum remain limited to date, as little has been published on the use of AL strategies and implementation. Therefore, the purpose of this project is to determine how NA didactic faculty in the United States understand and implement AL in the classroom setting, both prior to and with the advent of social and physical distancing requirements in the Spring of 2020.

PICOT Evidence Review Questions

The PICOT question guiding the literature search assesses educator understanding and methods of implementation of active learning prior to social distancing impacts on educational methods: How do graduate healthcare education didactic faculty (P) define and describe active learning techniques (I) for use within classroom settings (O) before the advent of social and physical distancing requirements in Spring 2020 (T)?

The innovation PICOT focuses on the NA didactic setting, with an element to assess modifications since social distancing became mandated: How do nurse anesthesia didactic faculty in the United States (P) describe and implement active learning techniques (I) to enhance their classroom teachings (O) and what adaptations have they made to active learning techniques since the advent of social and physical distancing requirements in Spring 2020 (T)?

Section Two: Literature Review

Search Strategies

The search strategy included databases: PubMed and Google Scholar. Search limits were English language, free full-text articles, human subjects. Exclusion criteria were letters, reviews, or editorials, as well as non-peer reviewed journal articles, and studies conducted in settings below the collegiate level or outside of the didactic classroom. Key search terms included *anesthesia* AND *anesthesiology* AND *active learning* AND *faculty perceptions*, *graduate medical education* AND *active learning*. MESH terms included: *anesthesia, nurse anesthesia, medical*, *education*, *methods*, *teaching*, *faculty*, *learning*, *anesthesiology/education*, *educational measurement*, *clinical competence*, *health occupations*, *program evaluations*, *universities*, *attitude*, and *graduate*. A total of 456 articles were identified and ten items were selected: a meta-analysis, a systematic review, three prospective-controlled studies, two phenomenological studies, and three cohort studies. Constrained snowballing sampling techniques were then applied to identify a further twelve studies focused on advanced practice nursing and nurse anesthesia specifically: five mixed methods studies, three cohort studies, two quantitative comparative studies, a meta-analysis, and a systematic review.

GRADE Criteria

Grading of Recommendations, Assessment, Development and Evaluation (GRADE) criteria were used to analyze the strength of the research chosen. Initial evidence ratings were low to moderate, based upon the literature consisting of several rigorous methodological types, including two meta-analyses, two systematic reviews, and two phenomenological studies. Small sample sizes, convenience sampling, risk of bias, and inconsistencies caused some of the research articles to be rated down. Six articles were graded up with consideration that all possible

confounders increased confidence in the estimated effect or for the estimated magnitude of effect. Overall, the GRADE criteria were determined to be low to moderate.

Literature Review

This section includes descriptions of operational definitions, theoretical framework, and a review of the selected literature on AL in graduate education. Topics discussed in the literature review include areas demonstrating AL adoption in graduate-level education, methods of AL implementation in graduate-level education, and effects of AL in graduate-level education.

Operational definitions and objectives.

Active learning. Active learning will be defined as any instructional method other than lecture, that promotes student engagement and by which a student becomes an active participant in education, while present in a classroom, or in concurrent online classes which are not exclusively lecture based (Bonwell & Eison, 1991; King, et al., 2019; Miller & Metz, 2014; Vetter & Latimer, 2017).

Active learning methodologies. Active learning methodologies include the flipped classroom or in-class activities, such as audience response systems, brainstorming, case studies, concept mapping, data analysis, debate and Socratic questioning, games, group presentations, jigsawing, journal article review, memory matrix, minute papers, muddiest point of the lecture, pause procedures, peer review, problem-solving, problem-based learning, pro-con exercises, question-moderated discussions, quiz exercises, role-playing, scenario-based activities, sequencing exercises, self-assessments, small group presentations, student-generated test questions, and think-pair-share exercises (Brame & Biel, 2015; Martinelli et al., 2018; Miller & Metz, 2014; Vetter & Latimer, 2017).

Didactic classroom. Didactic classroom is defined as any teaching setting within a formal educational institution which consists of face-to-face interactions, to include online concurrent classes. This does not include simulation training periods, lab time, or clinical experiences (Brame, 2016).

Implement (-ing, -ation). Implement is defined as putting into effect, to carry out, or accomplish (Merriam-Webster, n.d.).

Nurse anesthesia faculty. Nurse anesthesia faculty will be defined and limited to nurse anesthesia didactic educators in the United States.

United States. The United States (U.S.) is defined as any area included in coverage by the American Association of Nurse Anesthetists (AANA); this consists of all 50 states and Puerto Rico (State Associations, 2020).

Theoretical framework.

AL concepts in graduate education are primarily derived from two theories: humanistic learning and constructivist theory. Humanistic learning theory focuses on the individual as the subject. It asserts that learning is a natural process that helps a person self-actualize by emphasizing their choice and control over the course of their education (Torre, Daley, Sebastian & Elnicki, 2006). Constructivist learning theory places emphasis on the individual's past experiences or ideas combined with new skills or ideas to allow for the formation of new understanding as learners acquire, acclimate to, or alter knowledge (Torre et al., 2006). With the combination of the two learning models, learners are in the position of owning their learning, applying their previous experiences or knowledge, and enhancing or developing new knowledge for themselves. Both models indicate teachers are guides who foster personal growth and development while maintaining a mutually respectful environment for educational exchanges

where meaning is derived jointly with learners (Torre et al., 2006; Badyal & Singh, 2017). Together, these learning theories allow for the actualization of AL in graduate medical and healthcare education and provide educators with a variety of methodologies that can become the logical basis for curricular design changes and modifications in evaluation strategies (Torre et al., 2006).

Review of literature.

Beginning in 2010, the National League for Nursing (NLN) determined that nursing-based education needed faculty who constantly seek creative, innovative, emboldened or original methods to have greater impact by "creating and implementing transformative strategies with daring ingenuity" (p. 2). Shortly afterward, in 2011, the Institute of Medicine (IOM) indicated that all clinically based decisions should be founded upon evidence-based practices (EBP) by the year 2020 (Institute of Medicine, 2011). For this metric to be achieved, the IOM noted that educators must use evidence-based teaching practices to adequately prepare students at every degree level (Kalb et al., 2015). Since that time, active learning has been researched at every level of education and determined to be an effective instructional method with many benefits, making utilization of the AL pedagogy evidence-based (Burns et al., 2013; Critz & Knight 2013; Hermanns et al., 2015; Hew & Lo, 2018; Lancaster et al., 2012; Marchalot et al.; 2018; Martinelli et al., 2017; Micheal, 2007; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016; Schwartz, 2014).

Active learning is not a new concept in education. Initially becoming popular early in the 21st century, AL is now employed at every level of education, including many different areas of graduate-level education, including anesthesiology, critical care medicine, dentistry, internal medicine, pharmacy, nursing, and nurse anesthesia (Anderson & Burns, 2013; Betihavas, 2016;

Critz & Knight 2013; Freeman et al., 2014; Hew et al., 2018; King et al., 2019; Marchalot et al., 2018; Martinelli et al., 2017; Martinelli et al., 2018; Micheal, 2007; Miller & Metz, 2014; Morton & Colbert-Getz, 2017; Park et al., 2018; Schwartz, 2014; Torre et al., 2006; Vetter, 2017; Wittich et al., 2018). As it is deployed in a range of contexts, AL is not a one-method-fits-all approach, and implementation methods have varied in graduate education, with the majority choosing the flipped classroom model and using face to face activities such as minute papers, question-moderated discussions, think-pair-share, audience response systems, journal reviews, and case studies and analyses (Anderson & Burns, 2013; Burns et al., 2013; Critz & Knight 2013; Hermanns et al., 2015; Hew et al., 2018; King et al., 2019; 2018; Lancaster et al., 2012; Martinelli et al., 2017; Martinelli et al., 2018; Micheals, 2007; Miller & Metz, 2014; Schwartz, 2014; Vetter & Latimer, 2017).

The effects of AL implementation on course-specific assessments were found to be varied as well. These results ranged from no change in grades to improvements on quizzes and summative examinations (Anderson & Burns, 2013; Burns et al., 2013; Critz & Knight 2013; Freeman, et al., 2014; Hew & Lo, 2018; King et al., 2019; Lancaster et al., 2012; Martinelli et al., 2017; Morton & Colbert-Getz, 2017; Schwartz, 2014). Several articles provided evidence of demonstrable beneficial effects on student outcomes, including engaged learning, knowledge retention, analysis of critical concepts, behavioral changes, or improved scores on summative national examinations (Burns et al., 2013; Critz & Knight 2013; Hermanns et al., 2015; Hew & Lo, 2018; Lancaster et al., 2012; Marchalot et al.; 2018; Martinelli et al., 2017; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016; Schwartz, 2014). Student satisfaction with AL approaches was noted throughout the research, but such studies also found that flipped-classroom settings required increased pre-class preparation by students, leading to increased time

consumption (Anderson & Burns, 2013; Betihavas et al., 2016; Critz & Knight, 2013; Lancaster et al., 2012; Mudd & Silbert-Flagg, 2016; Schwartz, 2014; Vetter & Latimer, 2017).

Educator-reported benefits of AL strategies were noted within the literature as well. These benefits included job satisfaction, expanded creativity, increased confidence, increased ability to focus on individual student learning, and expanded rapport with students (Critz & Knight, 2013; Hermanns et al., 2015; Miller & Metz, 2014). Faculty-centered articles also reported that educators frequently expressed eagerness to know more about AL and methods of implementation (Critz & Knight 2013; Martinelli et al., 2018; Miller & Metz, 2014; Park et al., 2018; Mudd & Silbert-Flagg, 2016; Schwartz, 2014).

Active learning is a method exhibiting promise for graduate education, and the use of AL within NA programs needs to be considered, defined, and described (Critz & Knight 2013; Hermanns, et al., 2015; Hew & Lo, 2018; Lancaster et al., 2012; Marchalot et al.; 2018; Martinelli et al., 2017; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016; Schwartz, 2014; Vetter & Latimer, 2017). Many forms of graduate-level medical and healthcare education are already adopting, researching, and reporting such outcomes; however, a gap in the literature exists for NA educators' understanding and use of AL in the didactic setting (Critz & Knight 2013; Freeman et al., 2014; Hew & Lo, 2018; King et al., 2019; Lancaster et al., 2012; Marchalot et al., 2018; Martinelli et al., 2017; Morton & Colbert-Getz, 2017; Mudd & Silbert-Flagg, 2016; Schwartz, 2014; Vetter & Latimer, 2017). Therefore, the purpose of this project was to determine how NA didactic faculty in the United States understand and implement AL in the classroom setting, both prior to and with the advent of social distancing requirements in the Spring of 2020.

Applicability to practice/contribution to professional growth.

Didactic success in nurse anesthesia programs culminates with program completion and subsequent success on the national certification exam (NCE). First-time NCE test takers experienced a downward trend in pass rates, from 89.6% to 84.5%, between 2009 and 2019 (NBCRNA, 2009; NBCRNA, 2019). Small fluctuations in NCE pass rates over the last three years demonstrate little change and negligible improvements from prior years (NBCRNA, 2017; NBCRNA, 2018; NBCRNA, 2019). These decreased pass rates warranted further investigation into current nurse anesthesia modalities of teaching to discover AL methods to assist educators and improve didactic knowledge retention in students. As AL methodologies have demonstrated benefits in other forms of graduate education, consideration of enhanced use in NA education may assist with changing the current trend in NCE pass rates.

By beginning the research with a survey of NA didactic faculty in the U.S., the design of the project sought to influence the consideration of enhanced adoption, recording, and reporting of AL and its outcomes in the field of NA education. This project used a systematic analysis of voluntary survey responses to define, quantify, and report how NA didactic faculty perceived that AL was being implemented in their classrooms. Publication in a journal for educators on the results seeks to increase the knowledge base of AL methodologies within the target population. The potential exists for future impacts in NA didactic settings. This study on AL in NA teaching opened the door for educators to continue with further discussion, exploration of the topic, enhanced implementation, and future innovations.

Section Three: Methodology

Project Aims/Objectives

The primary aim of this project was to determine how NA didactic faculty in the U.S. understand and implement AL in the classroom setting, prior to the social distancing requirements in Spring 2020. Secondary aims included identification of AL strategies in NA didactic teaching, frequency of AL method implementation in NA didactic settings, as well as determination of AL adaptations arising from social distancing requirements which began Spring 2020. This project also aimed to provide relevant data to nurse anesthesia didactic and clinical educators in the United States. The objectives were therefore understood to be:

1. Determine what AL in the didactic setting means to NA didactic faculty in the U.S.
2. Determine how NA didactic faculty in the U.S. were implementing AL strategies in the classroom setting prior to the social distancing requirements of Spring 2020.
3. Determine how often NA didactic faculty in the U.S. were employing AL strategies during class periods prior to the social distancing requirements of Spring 2020.
4. Determine how NA didactic faculty in the U.S. have adapted AL strategies since the social and physical distancing requirements of Spring 2020.

Methods

The proposed project used an online anonymous survey of NA didactic faculty. The study utilized both ordinal quantitative variables and two open qualitative questions. The Active Learning Inventory Tool, which was validated for "A Tool for Measuring Active Learning in the Classroom" (Amburgh, Devlin, Kirwin, & Qualters, 2007) where the researchers were seeking to identify an inventory tool to quantify and characterize the use of active-learning methods by faculty members, was adapted for the purpose of this study. Adaptations included omission of

course types, discipline, time of day, and type/location of room within the demographic data portion of the original tool. These areas were omitted as they were deemed unnecessary for the purpose of this project, their impacts on data analysis were negligible, or they did not apply, as this project is focused only on nurse anesthesia graduate didactic education. Other omissions included removal of the coding table and AL Quantitative Summary chart. Each was omitted due to the self-reported nature of the voluntary response survey method this project will use, whereas the original tool was completed by class observers and was not self-reported.

Adaptations for the purpose of this project also include the addition of a faculty rank assessment, the two open qualitative questions, the frequency of use metric for each style of AL listed in the original tool, and the addition of an opening question which assessed whether respondents met inclusion criteria. An open qualitative question was created by the researchers to assess baseline understanding of active learning prior to the respondents being exposed to methods and definitions within the body of the tool. The frequency was added to the answer options of the tool to allow for self-reporting followed by quantitative assessment and analysis of AL strategies. Another open qualitative question, which followed the tool, was created by the researchers to identify adaptations which may have arisen due to social and physical distancing requirements resulting from the COVID-19 pandemic. All adaptations received approval from the contacting author of the original tool.

Setting, subjects, sample size and recruitment.

This project took place within nurse anesthesia educational programs in the United States. The AANA online survey service had modifiers which were selected to ensure the target population of NA faculty employed by colleges or universities received the invitation letter and research survey, as well as the two-week reminder email. A voluntary response sample was used

for the purpose of this research project. The survey period spanned four weeks in the Summer of 2021. The only inclusion criterion was any NA faculty member or adjunct faculty member who were AANA members who had taught SRNAs in the didactic classroom setting within the last five years. Exclusion criteria were faculty or adjunct faculty who were not AANA members, faculty or adjunct faculty that did not teach in didactic settings, such as clinical preceptors, simulation instructors, and laboratory professors, as these were all deemed to be intrinsically active learning settings. Demographic data was collected for analysis but was used as exclusionary criteria.

The Council on Accreditation (COA) reported there were 123 nurse anesthesia programs in the United States (COA, 2020). AANA reported that there were 663 members who identified themselves as employees of a college or university (Study Tool, 2021). Dissemination of the survey to all 663 of those members was expected to elicit a response rate of 16-20%, although at times AANA response rates had been reported to be as low as 3% according to Lorraine Jordan, PhD, CRNA, CAF, FAAN, who is the AANA Chief Advocacy Officer and prior Director of Quality & Research for AANA. This meant an approximate average of 76 faculty respondents were anticipated in total.

Data collection, storage, and analysis.

The contacting author approved a validated tool to be used for this project, with allowances for modifications. Demographic data was collected, as well as data on various methods of AL techniques and frequency of AL employment in didactic settings prior to the Spring of 2020. Data was primarily quantitative in nature, with two open questions added to the pre-identified tool which allowed for a baseline AL understanding assessment and identified adaptations brought about by the COVID-19 pandemic since the Spring of 2020.

All data collection was performed by the AANA online survey service, aggregated by AANA, and then returned to the researchers. The researchers chose to utilize total anonymity for all respondents meaning neither the AANA nor the researchers themselves were able to link any responses to any member once the survey was submitted. At no time were the researchers able to access AANA member email addresses or any members' identifiable information. AANA keeps surveys and responses for a period of 12 months after the initial launch of the survey and then destroys them. The survey site is periodically reviewed and updated with security measures to ensure the best possible protection for electronic data. The survey site stores personal information of members and panelists in secure databases protected by passwords as well as database and network firewalls to prevent loss, misuse, or alteration of personal or survey information. In addition, the hosting facility conducts regular and ongoing independent audits and supplies data for optimization. Data from surveys is stored at a secure hosting facility with both physical and software-based security systems. The survey site provides SSL encryption for survey participants. The AANA does not maintain any hard copies of the electronic surveys.

All data collected will be stored by researchers for a period of 7 years and protected using password protected computers, after which time it will be destroyed. Coding of the data occurred by the researchers after the receipt of the collected data from AANA, and statistical analysis was performed by a statistician using SPSS software. The data was analyzed using descriptive statistics only, such as frequencies and averages. Analysis of the two open questions occurred by immersion of the data, where the researchers read independently and then reread the responses together to identify themes, unique concepts, and identified outcomes.

Ethical approval and rigor.

This project was submitted to the AdventHealth University (AHU) Scientific Review Committee (SRC) and AdventHealth Institutional Review Board (IRB). AANA would not review the application for the online survey service without prior IRB approval. After acceptance by the AANA for online survey distribution, the anonymous web link was generated for the potential participants to access the survey. A letter of invitation prefaced each survey provided to the potential participants of this research (see Appendix C). If the participant clicked the option "accept to participate in this research", the survey opened. If the participant chose to opt-out of the survey they would not be directed to the survey site; they were instead directed to a webpage that indicated that they had been placed on the opt-out list. The ability to print the letter of invitation was provided to participants prior to their moving on to the survey.

Planning and Procedures/Limitations

Planning.

Key stakeholders for this scholarly project were selected based upon their roles in the university at large, within the nurse anesthesia program specifically, or upon their position in the nurse anesthesia professional organization. Familiarity with scholarly project research and dissemination was an essential consideration in our choices. The selections were as follows: Dr. Alescia DeVasher Bethea-AHU, Chair of the Nurse Anesthesia Department; Charlotte Henningsen-AHU, Director for Faculty Development in Teaching and Learning; Lorraine Jordan-AANA Chief Advocacy Officer. Resources required to center around the capability to survey all nurse anesthesia program directors and assistant program directors in the United States and statistical analysis.

Implementation.

The research began in May 2020 by obtaining AHU faculty approval of AL as a topic. A research question was constructed, and PICOT questions were formulated. Following this, a comprehensive literature review was performed, and a validated tool was identified. A proposed methods PowerPoint presentation with voice-over recording was sent to the project chair and statistician in June 2020, for solicitation of constructive feedback. In Fall 2020, submission of a proposal to the AHU SRC was completed and approval was received. Subsequent submission to AdventHealth IRB followed in late Fall 2020. Project exemption was given by AdventHealth IRB in late Spring 2021. Immediately following this, the validated survey tool was submitted to the AANA for distribution via the AANA's online survey process to all 663 AANA members who identified themselves as employees of colleges or universities in the U.S. during Summer 2021. Following the collection of data, a statistician ran frequency test using SPSS software. Abstract for poster or podium presentation at the 2022 ADCE conference was completed by May 3, 2021. An application for a poster presentation at the 2022 ADCE conference was submitted by the September 2021 deadline. Neither poster nor podium presentation was accepted for the upcoming Spring 2022 ADCE meeting, however an invitation to reapply for 2023 was extended. Dissemination will occur at the Florida Association of Nurse Anesthesiology (FANA) Sand & Surf Symposium in February 2022 via poster presentation and at AdventHealth University's Department of Nurse Anesthesia Program (DNAP) Spring 2022 online research presentations. Applications for publication in a nurse anesthesia-related, peer-reviewed journal will be submitted upon completion of the project.

Barriers and facilitators.

Potential barriers to this scholarly project centered primarily on COVID-19-induced limitations on the time of each stakeholder. Their pre-existing commitments required balance with their buy-in and commitment to this project, in addition to the remote work environment and meetings utilizing online platforms. With appreciation for the individual workload of each stakeholder, the researchers aimed to overcome this barrier by maintaining flexibility in the schedule. The second greatest barrier to the project was potential educator bias. Many NA faculty may have indoctrinated pedagogical approaches to classroom teaching (Chipas, 1995). The ability to overcome this educational practice may have been offset by the potential for innovative discoveries made in research findings and drove participation forward. The researchers anticipated that by including mention of professional responsibility to participate in research activities to improve practice and education, as defined in the AANA Code of Ethics, this may have also encouraged participation (AANA, 2019).

Another potential barrier may have been derived from inaccuracy of variable description in the survey, which the researchers sought to overcome by using a validated, but modified, tool. Yet another potential barrier which may have affected the feasibility of the project was undetermined financial impacts of survey services which the researchers overcame with an educational grant funding award (See Appendix E).

Facilitators for this project included key stakeholders, a statistician, AANA members who review and approve poster presentations, AHU faculty who review and approve department grants, the DNAP faculty project chair, the project mentor, and the project reviewer.

Procedures to sustain.

A reminder email was sent via the AANA online survey service during the survey period two weeks after the initial invitation. Participation was also encouraged by communicating the plan to disseminate on a national level at a professional conference of nurse anesthesia educators, as well as to seek peer-reviewed journal publication.

Timeline.

A final study timeline is included at the end of this paper (See Appendix F). Deviations in the timeline occurred primarily due to the IRB process, which ultimately proved beneficial for the launch of the survey.

Section Four: Results

All 663 self-identified AANA members received the survey beginning May 26, 2021. A reminder email was sent June 9, 2021, and the survey closed June 23, 2021. After opt-out, 636 participants either viewed the survey or ignored the invitation completely. The survey was ultimately responded to, either partially or completely, 106 times during the subsequent four weeks of the survey deployment period. Respondents were only required to answer the first question on the survey and were then able to skip questions, should they have chosen. Partial responses totaled 20 with complete responses encompassing the remaining 86 responses. Demographics are described and key findings noted. The results of the survey include the quantitative results of the frequency tool, as well as answers to the qualitative questions which prefaced and concluded the assessment. A brief review of expressed perceived effects of COVID-19 pandemic adaptations will conclude the section.

The inclusion criteria of having taught SRNAs in the didactic setting within the last five years was not met by 17.14% of respondents, leaving 87 respondents able to continue to the survey itself (See Appendix I, Table 1d).

Demographics

Sex.

Didactic NA faculty respondents were found to be 60% female and 40% male (See Appendix I, Table 2d).

Age.

Age range of respondents varied with the greatest representation in the 55-59 years old group (23.38%), followed by the 60+ age group with 18.18%. Both the 35-39 years old and 50-54 years old age groups contained 15.58% of respondents each, followed closely by the 45-49

years old age group with 14.29%. The 40-44 years old group encompassed 11.69% and the 30-34 years old age group contained only 1.3% of all respondents. No respondents reported being younger than 30 years old (See Appendix I, Table 3d).

Faculty rank.

Over half of all respondents listed themselves as Assistant Professors (51.28%). The next closest ranking was that of Associate Professor which was found to be 26.92% of respondents. Following this, respondents either listed themselves as Professor or No Rank 7.69% of the time each. Finally, the rank of Instructor was reported 6.41% of the time by respondents (See Appendix I, Table 4d).

Years of didactic teaching.

More than half of the respondents had been teaching didactically between 6-10 years (28.21%) or 11-15 years (23.08%). 19.23% of respondents had been teaching didactically for 3-5 years, while 12.82% had been teaching didactically for 16-20 years. At opposite ends of the survey spectrum were bookends of 8.97% of respondents having taught didactically for 21+ years and 7.69% of respondents having taught didactically for 0-2 years (See Appendix I, Table 5d).

Average number of students in the classroom.

The average number of students in the classroom responses ranged from 5 to 120, with a mean of 33. Mode was found to be 25 or 30 students in a classroom. Half of all classrooms contained between 20-35 students (50.6%). Only 22.07% of classrooms contained fewer than 20 or more than 40 students each.

Quantitative Findings

The survey tool modifications allowed educators to select frequency of use for each proposed AL strategy within the body of the survey. Frequencies listed were never used in class, used less than 25% of class time, used 25-50% of class time, used 51-75% of class time, and used greater than 75% of class time, with a total of five possible choices. Survey responses demonstrated that NA didactic faculty were implementing AL strategies in a variety of ways. Notably, the two responses eliciting the greatest frequency of usage employed methods of engaging with students via responses to questions. For example, the strategy most used was that of question and answer (Q&A), where students only respond to a question, comment, etc., either voluntarily or by cold calling. The Q&A methodology had a strong showing in each frequency listing, with 30.3% of educators employing this method 51% of class time or more, a combined 68.18% of educators employing this method 50% of class time or less, and only 1.52% reporting never using Q&A in class (See Appendix G, Table 1).

Closely following this methodology was that of computer-based interaction systems (personal response systems) where students participate in lectures by responding to questions or statements via computers/wireless technology. 45.59% of educators indicated they used this strategy less than 25% of class time, however this was the largest single grouping of responses for any assessed teaching strategy or frequency. Another 19.12% of respondents indicated they used this methodology between 25-50% of class time and 11.76% of respondents utilized this methodology more than 51% of class time, indicating its relevance as an AL methodology (See Appendix G, Table 10).

Other AL strategies demonstrating recurring usage by NA didactic faculty respondents included, in descending frequency:

peer teaching - students teaching each other basic and/or intermediate levels of course material or needed skills.

formative quizzes and surveys (background knowledge probe) - ungraded quizzes/surveys to determine comprehension.

cooperative learning/problem-based learning - students work together to learn course knowledge and develop course skills.

cases - scenarios that require students to integrate their skills to solve problems that relate to course material.

application activities - written activity in which students apply one to two principles and concepts to real life situations.

cooperative cases - scenario-based problem-solving activity using small groups to tackle specific questions/issues from a larger list.

Additional findings within the survey demonstrated that only two methodologies were reported being utilized more than 75% of the time by more than 10% of NA didactic educator respondents. Q&A reports demonstrated 12.12% of educators utilizing this category, while the use of cases exhibited 13.24% of respondents employing this methodology within the didactic setting. No other strategy was found to be reported within 4-5% of these findings, indicating their strong showings as AL methodologies in NA didactic education (See Appendix G, Tables 1 & 19).

Qualitative Findings

Qualitative assessment of NA didactic educators use and understanding of AL techniques in the pre-COVID timeframe, as well as COVID-induced adaptations to AL, was accomplished via two open-ended questions. The pre-COVID assessment prefaced the quantitative survey,

with 75 NA didactic educators responding. The overall survey concluded with the COVID-induced adaptation assessment, which was responded to by 64 NA didactic educators. The questioning of NA didactic educator's AL perceptions and post-COVID teaching adaptations elicited both generalized and specific methods from respondents (See Appendix H, Table 1b). Responses to the open-ended survey questions were found to yield answers predominantly one or two sentences in length.

Perceptions of Active Learning.

The statement "Any process that solicits active student involvement during the class session" followed immediately by specific examples was a pattern noted frequently throughout the responses. Responses were found to fall into two categories: nouns versus verbs. Four recurring themes/methods were identified here: student presentations, case studies, flipped classrooms, and discussions, all of which are noun descriptors. Three secondary themes were further identified: participation, interactivity, and engagement, all which speak to varying degrees of student involvement and are verbs suggesting action. Researchers found these themes and the categorization of the differences between them to be noteworthy (See Appendix H, Table 4b).

Recurring Themes.

Student presentations were a method readily identified by NA educators as AL. Many times, these presentations were listed alongside case studies. Case studies and AL were nearly synonymous in the reported NA didactic educational realm. The use of case studies was well reported throughout the responses, appearing as "case reviews"; "case studies"; "case-based studies"; "cases"; "case-based learning"; "case scenarios"; and "case construction." Another method of AL readily identified by the researchers identified was that of the flipped classroom.

Flipped classrooms are accepted to be any form of education in which the instructor assumes a passive role while the student becomes the educator for themselves and/or their peers. Several respondents indicated flipped classrooms to be “when students themselves are doing some of the teaching”; or “when a student is active in generating content and examples of the topic”; and “students teaching the faculty.”

In direct comparison, the last method identified, discussion, involves both the educator and the student. Discussions in the NA didactic setting may center around topics such as foundational principles, healthcare ethics, federal impacts, policies and procedures, or other complex subject matter. Reports utilizing this method predominated the responses with educators saying that they considered AL in the didactic setting to be “time to apply the principles that are being presented in various ways that engage the student in discussion” and “activities that promote student engagement such as...discussion.” One educator stated they “have tried to implement more reading assignments before class and then discussion of the material during lecture” which was reinforced by another stating “participation by students is required for learning activities prior to attending classroom instruction time which reinforces learning and discussion to enhance critical thinking processes” (See Appendix H, Tables 3b & 4b).

Secondary Themes.

Participation is the action of taking part in something. Participation was often described by respondents with phrases such as “students participating in a project”; “participating in the class through presentations”; “participation in teaching”; “participation in the learning process”; “active participation in discussions”; “students to participate in activities and assignments”; or “student participation in classroom activities.” Interactivity is when two or more people or things influence or influence each other. Interactivity was listed by respondents as “videos”; “in

discussions"; "sessions/demonstrations"; "question/answer"; "flipped classrooms"; and when "students...apply and engage in concepts derived from readings, lectures, and other media."

Engagement, as it applies to student education, "*refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education*" (Student Engagement, 2016). Survey respondents stated that AL was "anything that actively engages the learner"; "any activity that seeks to engage the students in the process of learning"; "activities that promote student engagement"; "engagement of students in the learning process"; "engaging students with materials"; and "having students engaged in the learning process."

Active Learning Adaptions.

Within the assessment for adaptations to AL strategies since the advent of social and physical distancing requirements brought about by the COVID pandemic, the researchers found several notable distinctions. NA didactic educator adaptations to AL techniques/implementation yielded four contrasting themes: attempted versus not attempted and transitioned versus already in-place (See Appendix H, Tables 1c & 2c). Three secondary themes regarding modalities were then identified by the researchers: asynchronous, virtual software, and small group/SIM (See Appendix H, Table 3c). Perceived effects of COVID-19 pandemic induced adaptations or implementations on NA didactic education were found to be sparse in the responses, however those included were profound enough to warrant mentioning (See Appendix H, Table 4c).

Recurring Contrasting Themes.

Responses demonstrated that educators had attempted to adapt AL techniques and/or implementation since the COVID-19 pandemic began more often than any other response noted

in the open-ended questioning. By comparison, less than half that amount reported not attempting some manner of adaptation to teaching methodologies. When non-respondents are eliminated, these statistics become even more relevant, nearly doubling in percentages (See Appendix H, Table 1c). Responses also demonstrated that NA didactic educators had to transition their teaching styles more than three times as often as those who already had AL teaching methods in place, which easily transitioned to accommodate for restrictions caused by the COVID-19 pandemic (See Appendix H, Table 2c).

Secondary Themes: Modalities

Asynchronous learning allows students to access class materials during any hour and from a variety of locations. Researchers found repeated reports of asynchronous online classrooms throughout the responses, including "utilized more synchronous and asynchronous learning online"; "we are online for most courses but have several asynchronous courses"; and several responses along the lines of "students can post comments on pre-recorded lectures." Virtual software allows educators to engage with students in an online setting/classroom. The respondents reported use of a variety of virtual software when adapting or implementing AL techniques, including "Zoom and breakout rooms"; "pre-recorded case presentations"; "Poll Everywhere"; "open discussion boards"; "Kahoots"; "using more pre-recorded lectures"; "some SIMs virtually"; and "had students watching more recorded materials."

Small group learning is a methodology that may supplement case lectures, case discussions, or other class formats and typically consists of 3-6 students assisting one another to critically think, master course concepts, as well as apply them to real-life scenarios (HARVARD, 2021). Respondent examples of this methodology included "I now largely rely on...small breakout rooms/small group work"; "senior cohort was assigned to small groups and given topics

of controversy in anesthesia"; and "greater use of scenario-based, application type situations for students to discuss in small teams, then devise a plan of action."

Perceived Effects.

Negative perspective responses included statements such as "online Zoom made it more difficult to garner responses from students in lectures"; "it has diminished active learning"; "I have experienced a significant decrease in student participation that used to occur more naturally in person"; and finally, "I do not believe Zoom classes are conducive to anesthesia education, especially the anesthesia didactic." In sharp contrast to this effect was that of the positive perspective, which included responses such as "with virtual learning, it has become easier to adapt many of the above methods, especially a flipped classroom approach, where the material is recorded ahead of the class date/time, and during the class time, we actively discuss concepts and perhaps materials that are a little more challenging to grasp." Most notable to the researchers was "the pandemic did force me to use other teaching methods that incorporated active learning techniques. Prior to the pandemic I used the traditional lecture approach."

Section Five: Discussion & Implications

Discussion, Applicability to Practice, & Contribution to Professional Growth

The extent of implementation of AL by educators in the NA didactic realm had remained largely unexplored in the literature despite many other forms of GME and GHE having reported positive outcomes with the AL pedagogy. AL is intrinsic to NA education; however, no methods of quantifying or describing its methodologies or usage were readily available. Therefore, this study sought to determine how NA didactic educators in the U.S. understood and had implemented AL strategies in the didactic classroom prior to and since the implementation of physical and social distancing in Spring 2020 using both quantitative and qualitative methods.

Demographic data showed NA didactic faculty were found to be nearly evenly split between sexes, with female educators barely outnumbering males. When age was reviewed, results skewed toward more mature individuals fulfilling educator roles. Most faculty respondents were found to be Assistant Professors or Associate Professors, which followed standard program structure. Years of didactic teaching and average class size demonstrated a standard distribution among respondents.

Quantitative Discussion on Perceptions of Active Learning.

Quantitative discoveries showed that most NA educators were using AL strategies in their classrooms through a variety of means and with varying frequency. Methods most employed included Q&A, computer-based interaction systems, peer teaching, formative quizzes or surveys, cooperative learning/problem-based learning, case scenarios, and cooperative cases, listed in descending order of frequency of use. No single method was found to be used for more than 75% of class time with a frequency greater than 14%. This statistic likely owes to the large volume of information imparted during didactic nurse anesthesia training. Again, likely owing to

the amount of didactic information requiring explanation, most methods were found to be used < 25% of class time or between 25-50% of class time by educators. Case scenarios and Q&A were found to be reported most often by NA educators in usage coinciding more closely with traditional teaching methods and necessitated by the nature of NA practice.

Qualitative findings strongly supported the frequency distributions noted in the ordinal quantitative data, with some variations occurring. When questioned via an open-ended question, NA didactic educators once again exhibited more frequent usage of student presentations (peer teaching), case studies, and discussions (Q&A). Recall that the frequency of self-reported use of the different methods differed within the quantitative data, with Q&A having been found to reported as used most often, followed by cases, then peer teaching. The use of the flipped classroom model was also found to be listed frequently in the open response question prefacing the survey, without specific methodologies noted. This was believed to be derived from common phrasing and not NA educator misunderstanding. In fact, NA didactic educators demonstrated great understanding and perception regarding AL prior to being exposed to the survey tool methodologies.

The secondary themes identified from the opening qualitative assessment speak strongly to the degree of student involvement in the differing AL strategies. Participation, for example, can be either voluntary or involuntary. Compare this to interactivity. Interactive education once again can be of a voluntary or involuntary nature; however interactive education is typically more fun and more effective, leading to greater student engagement, according to the literature. Interactive elements can draw a student into the material, perhaps permitting deeper understanding. Interactivity tends to guide students to greater levels of engagement. Recall that the researchers found that engagement, interactivity, and participation being emphasized

repeatedly by respondents, all of which are cited within the literature as being key to student learning and success. The verbs, the action of involvement in the learning process, appears to be the key! Literary findings indicate that being engaged makes a student more involved in whatever process is being taught versus being simply a passive observer. Perhaps future findings will demonstrate better student engagement correlating with better performance on summative exams?

Qualitative Discussion on Perceptions of Active Learning Adaptions.

After NA didactic educators had responded to the frequency assessment portion of the survey, they were again asked an open-ended question assessing potential adaptations to AL strategies or the implementation thereof. Findings included many educators attempted some manner of adaptation to include AL strategies in student remote learning, with many of them not having had previous access or remote learning techniques already in place within their personal teaching practice, programs, or universities. Methods utilized were found to center largely on virtual software programs, synchronous versus asynchronous learning, and small group learning. When compared to the opening question of NA didactic educators use and understanding of AL techniques for the pre-COVID timeframe, the COVID-induced adaptations centered largely around technology. Software appeared to become the AL strategy and AL activities seemed to be chosen based upon the available technologies.

Limitations & Conclusions

Limitations.

This study had a few limitations. It assessed only data of a self-reported nature by NA educators who answered portions of the survey retrospectively based upon their own perceptions of frequency of use. More profound results may be obtained by an observational study of NA

didactic settings. Respondents had the ability to determine participation versus random selection which may have introduced or precluded preconceived biases about effectiveness or necessity of AL teaching strategies in NA didactic education.

Conclusion.

This study served the important function of introducing the topic of AL in NA didactic educational settings from an educator's perspective. It included quantification of modalities currently in practice within United States NA programs. This study also qualitatively described an educational paradigm using NA educator responses as they transitioned into a post-COVID teaching environment. Aims of this study were well met by the information received from the nationwide survey. Findings may potentially be used by current and future NA educators to modify didactic curriculums to include increased AL strategies, both virtually and in face-to-face (F2F) formats.

Should more educators begin incorporating one or two of these methodologies, the impacts could be profound. With more and more universities and colleges returning to F2F instructional formats, the transition to enhanced usage of AL strategies is ripe for germination. NA educators who have faced previous barriers, or who were previously used to teaching in a set manner, have now had to adapt styles to fit physical and social distancing requirements the pandemic induced. Simply choosing to return to the "old way" of teaching seems infeasible, especially when SRNAs have now been exposed to a greater expanse of methodologies.

This study demonstrated that with the use of virtual software, synchronous and asynchronous learning can be adapted to many AL strategies. With greater usage of AL methodologies student engagement may be increased, potentially leading to better performance on summative examinations, such as the NCE. Future research should investigate whether

pandemic-induced changes to NA education have resulted in changes to the frequency of AL strategies. Future research should also investigate whether programs reporting enhanced AL usage demonstrate increased NCE pass rates.

Both humanistic learning theory and constructivist theory align with the use of AL strategies in NA didactic education. By focusing on the individual student's engagement through interactive methods, NA didactic educators can combine their past experiences and ideas with new ideas and skills. This would allow for the development of understanding as the student gains new knowledge through intrinsic measures. While the overall quantitative or qualitative assessments do not point to clear "best" methods of implementing AL strategies in NA didactic education, the importance of their inclusion cannot be overlooked as possible means to improve student retention of knowledge and performance. It is the hope and recommendation of the researchers that these findings promote future discussions, exploration, implementation, and innovations in AL for NA education which promote a more engaged learning environment.

Section Six: Dissemination

An application for a poster presentation at the 2022 ADCE conference was submitted in September 2021. Neither poster nor podium presentation was accepted for Spring 2022 ADCE meeting, however an invitation to reapply for 2023 was extended. An application for a poster presentation at the Florida Association of Nurse Anesthesiology (FANA) Sand & Surf Symposium in Spring 2022 was completed and accepted in January 2022. Therefore, dissemination will occur at FANA's Sand & Surf Symposium in February 2022 and at AdventHealth University's DNAP Spring 2022 online research presentations in March 2022. Applications for publication in a nurse anesthesia-related, peer-reviewed journal will be submitted upon completion of the project.

References

Amburgh, J. A., Devlin, J. W., Kirwin, J. L., & Qualters, D. M. (2007). A Tool for Measuring Active Learning in the Classroom. *American Journal of Pharmaceutical Education, 71*(5), 85. doi:10.5688/aj710585

American Association of Nurse Anesthetists (2019, January) *Code of Ethics for the Certified Registered Nurse Anesthetist*. https://www.aana.com/practice/clinical-practice-resources/code-of-ethics-for-the-CRNA

American Association of Nurse Anesthetists (2019) Education of nurse anesthetists in the U.S. Retrieved from https://www.aana.com/membership/become-a-crna/education-of-nurse-anesthetists-in-the-u.s

Anderson, D., & Burns, S. (2013). One-minute paper: Student perception of learning gains. *College Student Journal, 47*(1), 219-227. Retrieved from https://resource.ahu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=92757400&site=ehost-live&scope=site

Badyal, D. K., & Singh, T. (2017). Learning theories: The basics to learn in medical education. *International Journal of Applied and Basic Medical Research, 7*(Suppl 1), S1-S3. http://dx.doi.org/10.4103/ijabmr.IJABMR_385_17

Betihavas, V., Bridgman, H., Kornhaber, R., & Cross, M. (2016). The evidence for 'flipping out': A systematic review of the flipped classroom in nursing education. *Nurse Education Today, 38*, 15–21. https://doi.org/10.1016/j.nedt.2015.12.010

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom. 1991 ASHE-ERIC higher education reports* ERIC Clearinghouse on Higher Education,The George Washington University, One Dupont Circle, Suite 630, Washington, DC 20036-1183. Retrieved from https://files.eric.ed.gov/fulltext/ED336049.pdf

Brame, C. J., & Biel, R. (2015). Test-enhanced learning: The potential for testing to promote greater learning in undergraduate science courses. *CBE Life Sciences Education, 14*(2), 14:es4. http://dx.doi.org/10.1187/cbe.14-11-0208

Brame, C. (2016). Active learning. Retrieved from https://cft.vanderbilt.edu/guides-sub-pages/active-learning/

Burns, S., Mendel, S., Fisher, R., Cooper, K., & Fisher, M. (2013). Critical thinking in nurse anesthesia education: A pilot study. *Journal of Curriculum and Teaching, 2*(1), 83-90. Retrieved from https://files.eric.ed.gov/fulltext/EJ1157689.pdf

Chipas, A. (1995). Do current educational programs address critical thinking in nurse anesthesia? *AANA Journal, 63*(1), 45-49. Retrieved from http://europepmc.org/abstract/MED/7762372

Council on Accreditation-Supporting Quality Assessment and Improvement in Nurse Anesthesia Education. (2020). Retrieved September 05, 2020, from https://www.coacrna.org/

Critz, C. M., & Knight, D. (2013). Using the flipped classroom in graduate nursing education. *Nurse Educator, 38*(5) Retrieved from https://journals.lww.com/nurseeducatoronline/Fulltext/2013/09000/Using_the_Flipped_Classroom_in_Graduate_Nursing.13.aspx

Ellis, D.M. (2016). The role of nurse educator's self-perception and beliefs in the use of learner-centered teaching in the classroom. *Nurse Education in Practice, 16*(1), 66-70. doi.10.1016/j.nepr.2015.08.011

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences - PNAS, 111*(23), 8410-8415. http://dx.doi.org/10.1073/pnas.1319030111

HAVARD Kennedy School. (2021). *Using Small Groups to Engage Students and Deepen Learning in New HKS Classrooms*. hks.harvard.edu. Retrieved November 7, 2021, from https://www.best-university.com/advantages-of-small-group-instruction/.

Hermanns, M., Post, J. L., & Deal, B. (2015). Faculty experience of flipping the classroom: Lessons learned. *Journal of Nursing Education and Practice, 5*(10). http://doi.org/10.5430.jnep.v5n10p79

Hew, K. F., & Lo, C. K. (2018). Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Medical Education, 18*(1), 38-12. http://doi.org/10.1186/s12909-018-1144-z

Institute of Medicine (US) Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine. (2011). *The Future of Nursing: Leading Change, Advancing Health*. National Academies Press (US).

Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. Journal on Excellence in College Teaching, 25(3&4), 85-118.

Kalb, K. A., O'Conner-Von, S. K., Brockway, C., Rierson, C. L., & Sendelbach, S. (2015). Evidence-based teaching practice in nursing education: Faculty perspectives and practices. *Nursing Education Perspectives, 36*(4), 212-219. Retrieved from https://resource.ahu.edu/login?url=https://search-proquest-com.resource.ahu.edu/docview/1700288023?accountid=35793

King, A. M., Gottlieb, M., Mitzman, J., Dulani, T., Schulte, S. J., & Way, D. P. (2019). Flipping the Classroom in Graduate Medical Education: *A Systematic Review. Journal of Graduate Medical Education, 11*(1), 18–29. https://doi.org/10.4300/jgme-d-18-00350.2

Lancaster, J. W., Wong, A., & Roberts, S. J. (2012). *'Tech' versus 'Talk': A comparison study of two different lecture styles within a master of science nurse practitioner course.* http://dx.doi.org/https://doi-org.resource.ahu.edu/10.1016/j.nedt.2011.09.018

Lujan, H. L., & DiCarlo, S. E. (2006). Too much teaching, not enough learning: What is the solution? *Advances in Physiology Education, 30*(1), 17-22. http://dx.doi.org/10.1152/advan.00061.2005

Marchalot, A., Dureuil, B., Veber, B., Fellahi, J., Hanouz, J., Dupont, H., . . . Compère, V. (2018). Effectiveness of a blended learning course and flipped classroom in first year anaesthesia training. *Anaesthesia, Critical Care & Pain Medicine, 37*(5), 411-415. http://doi.org/10.1016/j.accpm.2017.10.008

Martinelli, S. M., Chen, F., DiLorenzo, A. N., Mayer, D. C., Fairbanks, S., Moran, K., . . . Schell, R. M. (2017). Results of a flipped classroom teaching approach in anesthesiology residents. *Journal of Graduate Medical Education, 9*(4), 485-490. http://doi.org/10.4300/JGME-D-17-00128.1

Martinelli, S. M., Chen, F., Mcevoy, M. D., Zvara, D. A., & Schell, R. M. (2018). Utilization of the flipped classroom in anesthesiology graduate medical education: An initial survey of faculty beliefs and practices about active learning. *The Journal of Education in Perioperative Medicine: JEPM, 20*(1), E617.

Merriam-Webster. (n.d.). Implement. In *Merriam-Webster.com dictionary*. Retrieved June 11, 2020, from https://www.merriam-webster.com/dictionary/implement

Michael, J. (2007). Faculty perceptions about barriers to active learning. *College Teaching, 55*(2), 42-47. http://dx.doi.org/10.3200/CTCH.55.2.42-47

Miller, C. J., & Metz, M. J. (2014). A comparison of professional-level faculty and student perceptions of active learning: its current use, effectiveness, and barriers. *Advances in Physiology Education, 38*(3), 246–252. https://doi.org/10.1152/advan.00014.2014

Morton, D. A., & Colbert-Getz, J. M. (2017). Measuring the impact of the flipped anatomy classroom: The importance of categorizing an assessment by bloom's taxonomy. *Anatomical Sciences Education, 10*(2), 170-175. http://doi.org/10.1002/ase.1635

Mudd, S. S., & Silbert-Flagg, J. (2016). Implementing the flipped classroom to enhance nurse practitioner clinical decision-making in the care of the pediatric asthma patient. *Nursing Education Perspectives, 37*(6), 352-353. http://dx.doi.org.resource.ahu.edu/10.1097/01.NEP.0000000000000083

National Institute for Health and Clinical Excellence (Grande-Bretagne). (2007). *How to change practice: Understand, identify and overcome barriers to change.* National Institute for Health and Clinical Excellence. http://www.nice.org.uk/media/AF1/73/HowToGuide ChangPractice.pdf.

National League for Nursing. (2010). *Outcomes and competencies for graduates of practical/vocational, diploma, associate degree, baccalaureate, master's, practice doctorate, and research doctorate programs in nursing.* New York, NY: National League for Nursing.

National Board of Certification and Recertification. (2009) 2009 NCE National Summary Data. Retrieved from https://www.nbcrna.com/docs/default-source/initial-certification/program-administration/2009-nce-national-summary-data.pdf

National Board of Certification and Recertification. (2017) FY 2017 NCE/SEE National Summary Data. Retrieved from https://www.nbcrna.com/docs/default-source/initial-certification/program-administration/2017_nce_see_annual-report.pdf?Status=Temp&sfvrsn=362bc33d_4

National Board of Certification and Recertification. (2018) FY 2018 NCE/SEE National Summary Data. Retrieved from https://www.nbcrna.com/docs/default-source/initial-certification/program-administration/combined-final-nce-see-annual-reportv2da439ac4e34e4c7dbe093f4d1fa3a55b.pdf?sfvrsn=c21686e7_4

National Board of Certification and Recertification. (2019) Annual NCE and SEE Report CY 2019. Retrieved from https://www.nbcrna.com/docs/default-source/initial-certification/program-administration/annual-nce-and-see-report_cy-2019_072920.pdf?sfvrsn=42833088_2

Park, K. H., Park, K. H., & Chae, S. J. (2018). Experiences of medical teachers in flipped learning for medical students: a phenomenological study. *Korean Journal of Medical Education, 30*(2), 91–100. https://doi.org/10.3946/kjme.2018.84

Schwartz, T. A. (2014). Flipping the statistics classroom in nursing education. *Journal of Nursing Education, 53*(4),199-206. http://dx.doi.org.resource.ahu.edu/10.3928/01484834-20140325-02

State Associations. (2020). Retrieved September 05, 2020, from https://www.aana.com/states/state-associations

Student Engagement. (2016, February 18). Retrieved Novemeber 7, 2021, from https://edglossary.org/student-engagement/

Study Tool [E-mail to 1272564993 939746415 R. Giffin]. (2021, March 25).

Torre, D. M., Daley, B. J., Sebastian, J. L., & Elnicki, D. M. (2006). Overview of current learning theories for medical educators. *The American Journal of Medicine, 119*(10), 903. https://doi.org/10.1016/j.amjmed.2006.06.037

Vetter, M. J., & Latimer, B. (2017). Tactics for teaching evidence-based practice: Enhancing active learning strategies with a large class of graduate EBP research in nursing students. *Worldviews on Evidence-Based Nursing, 14*(5), 419-421. http://dx.doi.org/10.1111/wvn.12227

Wittich, C. M., Agrawal, A., Wang, A. T., Halvorsen, A. J., Mandrekar, J. N., Chaudhry, S., … Beckman, T. J. (2018). Flipped Classrooms in Graduate Medical Education. *Academic Medicine, 93*(3), 471–477. https://doi.org/10.1097/acm.0000000000001776

Appendix A: Matrix Tables

Martinelli, S. M., Chen, F., Mcevoy, M. D., Zvara, D. A., & Schell, R. M. (2018). Utilization of the flipped classroom in anesthesiology graduate medical education: An initial survey of faculty beliefs and practices about active learning. *The Journal of Education in Perioperative Medicine: JEPM, 20*(1), E617.

Hew, K. F., & Lo, C. K. (2018). Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Medical Education, 18*(1), 38-12. http://doi.org/10.1186/s12909-018-1144-z

Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
Study 1: Perceived barriers to FC in anesthesiology residency education and perceived techniques most compatible with the educators' style of teaching. **Study 2:** Effect of pre-recorded video before F2F AL style FC vs. traditional classroom then homework on student learning in various types of graduate medical profession education. **Design** **Study 1:** Quantitative descriptive survey **Study 2:** Meta-analysis for 5-year window from 2012-2017	**Study 1:** **Primary outcome:** Knowledge of active learning regarding the flipped classroom. **Secondary outcomes:** Of the educators with "good" or "solid" knowledge of FC, preference, and perceptions of using FC in anesthesia residency education. **Study 2:** **Primary outcome:** Significant effect of FC vs. traditional classroom on student learning. **Secondary outcomes:** Effect greatest when pre-class quizzes at the start of F2F. Learners prefer FC or TC by 70%.	**Study 1:** **Setting:** Survey. Exempt from IRB. **Subjects:** US national List-serve of 136 PD's from the Society of Academic Associations of Anesthesiology and Perioperative Medicine surveyed of which 27 forwarded survey to educator staff. (*n*=244) of those 1437 forwarded faculty members responded in 2016. **Study 2:** **Setting:** Initial 2129 articles of which 28 studies were eligible after exclusions 20 Historical control, four quasi-experiment, four random MERSQI score of 12.5 on an 18-point scale. **Subjects:** FC (*n*= 2295) learners, TC (*n*=2420).	**Study 1:**A survey consisting of 68 questions collected via the REDcap data app. Kruskal-Wallis test examined the association between categorical and ordinal variables. Data were then cleaned, analyzed with SAS 9.4. **Study 2:** PRISMA guidelines of 7 databases. Computed effect sizes using Comprehensive META-ANALYSIS Version 3. All reported *P* values two-tailed. Effect size computed using standardized mean differences (SMDs) from the means and standard deviations of student achievement data, i.e., exam scores. SE used to calculate SD if no SD or mean reported. An additional analysis of 6 subgroup categories to identify variables of variation to effect size.	**Study 1:** Survey response: 16.9%, 48% of the 244 "weak" or no knowledge of AL. 57% had a good or solid understanding of AL. No generational difference found (chi-sq with 3 *df* = 26.60, $p<0.0001$). **Study 2:** Effect in favor of FC (SMD =0.33, 95% CI 0.21-0.46, $p<0.001$). Significant Q statistic ($p<0.001$) indicated the presence of heterogeneity ($I^2 = 75.6\%$). 70% of Learners prefer FC. **Implications** **Study 1:** 89% of faculty want training on FC, preference for institutional workshops, and grand rounds. **Study 2:** Quizzes @ the class start=FC > effect & give opportunity to clarify & modify teaching most need. Learners prefer self-pace, in-class peer interaction, dislike time commitment of pre-vid	**Study1:** **Methodological flaws:** Small sample size/participation was determined by PD's willingness to forward. **Inconsistency:** None noted. **Indirectness:** Discrepancy between knowledge and usage. **Imprecision:** None noted. **Publication bias:** Funded by Vanderbilt University Medical Center- Anesthesiology Dept. **Study 2:** **Methodological flaws:** Ability to stratify and control for moderator variables of effects of AL due to lack of details of F2F in-class activities. **Inconsistency:** None noted. **Indirectness:** Different variables between study design difficult to moderate. **Imprecision:** None noted. **Publication bias:** None noted.

Hermanns, M., Post, J. L., & Deal, B. (2015). Faculty experience of flipping the classroom: Lessons learned. *Journal of Nursing Education and Practice, 5*(10). http://doi.org/10.5430.jnep.v5n10p79

Martinelli, S. M., Chen, F., DiLorenzo, A. N., Mayer, D. C., Fairbanks, S., Moran, K., . . . Schell, R. M. (2017). Results of a flipped classroom teaching approach in anesthesiology residents. *Journal of Graduate Medical Education, 9*(4), 485-490. https://doi.org/10.4300/JGME-D-17-00128.1

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Explore the experience by which faculty adapted to implementation from Traditional classroom lectures to FC with pre-video instruction and AL F2F activities and identify motivators and obstacles. **Study 2:** Determine if FC over traditional lecture classroom-style didactic learning improves knowledge acquisition and retention for 2nd-year anesthesia residents. **Design** **Study 1:** A descriptive phenomenological study. **Study 2:** Prospective controlled multi-site study pre-& post-test, with a 4-month follow up.	**Study 1:** **Primary outcome:** Concerns and benefits of FC conversion. **Secondary outcome:** Positive student response due to active learning. **Study 2:** **Primary outcome:** Residents' knowledge and retention. **Secondary outcome:** Resident attitude about FC learning.	**Study 1:** **Setting:** Southern University undergraduate nursing Med/Surg I and Med/Surg II faculty. **Subjects:** 6 Caucasian women, ages 50-61 years, mean of 55 averaging ten years teaching experience none in FC. **Study 2:** **Setting:** Eight Universities across US. 2 iterations over the course of two years, 2014 and 2015. **Subjects:** 182 PGY-2 anesthesia residents 85% participation FC (n=81) TL (n=56).	**Study 1:** Group interviewed 45 minutes asked open-ended interview questions. Transcribed interview verbatim, data analyzed using Giorgi's phenomenological analytic method looking for common themes describing the meaning and experience of the participants. **Study 2:** *t*-test if no repeated measures (i.e., time reading, age, USMLE score) or chi-square (i.e., sex, flipped class experience). Error terms due to repeated assessments modeled using an unstructured covariance matrix. The McNemar-Bowker test used to track resident preference of FC from the survey. Stats analyzed using SAS ver 9.4. Given the sample difference, effect size must be *d*=50 w/ probability (0.90) to reach stat sig at 0.05 level.	**Study 1:** Stratified into two categories: **Concerns**; technological video, time for students, lack of immediate feedback, prepping of video, and activity. **Benefits;** Ability to do sim, case study, gaming, hands-on, faculty creativity, increased confidence of students **Study 2:** Post-test not sig adjusted mean (AM) = 5%; P = 0.06; *d* = 0.48 Retention sig retention AM 6%; P= 0.14; *d* = 0.56 Attitude 46%→82%for FC **Implications** **Study 1:** Flipping will require the full commitment of faculty and significant time; the reward is engaged student learning. **Study 2:** In anesthesia didactic learning, FC benefits knowledge retention and learners' overall attitude while adding the flexibility of time in accessing remote content.	**Study1:** **Methodological flaws:** Selection bias-no details of the amount of faculty involved or their roles. Small sample size. **Inconsistency:** None noted. **Indirectness:** No clear best to worst concerns to benefit. **Imprecision:** None noted. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** Convenience sampling. **Inconsistency:** Variability in group sizing. **Indirectness:** None noted. **Imprecision:** 88% of FC participants watched 75% of the pre-class video. **Publication bias:** None noted.

Marchalot, A., Dureuil, B., Veber, B., Fellahi, J., Hanouz, J., Dupont, H., . . . Compère, V. (2018). Effectiveness of a blended learning course and flipped classroom in first year anaesthesia training. *Anaesthesia, Critical Care & Pain Medicine, 37*(5), 411-415. http://doi.org/10.1016/j.accpm.2017.10.008

Morton, D. A., & Colbert-Getz, J. M. (2017). Measuring the impact of the flipped anatomy classroom: The importance of categorizing an assessment by Bloom's taxonomy. *Anatomical Sciences Education, 10*(2), 170-175. http://doi.org/10.1002/ase.1635

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Effectiveness of blended learning course over a traditional lecture on the acquisition of theoretical knowledge. **Study 2:** Determine if the disparity in results for learning in previous research on FC could be categorized according to the level of cognition assessed. **Design** **Study 1:** Prospective controlled nonrandomized, observational pilot. **Study 2:** Mixed methods.	**Study 1:** **Primary outcome:** Resident's improved MCQ assessment post-intervention. **Secondary outcome:** Homework time spent preparing for exams. Student satisfaction with e-learning. **Study 2:** **Primary outcome:** Improvement of final exam scores in FC learner compared to LC at analysis cognitive level. **Secondary outcomes:** Learner satisfaction.	**Study 1:** **Setting:** 3 University hospital systems first-year anesthesia & critical care residents in France from 2007-2014. **Subjects:** Non-randomized into two groups by university already attending Intervention group (blended learning) *n*= 54, Control group (traditional lecture) *n*= 95. **Study 2:** **Setting:** University of Utah first-year medical students in a foundation in medicine (FOM) anatomy class with 30 hours of traditional lecture and 68 hrs cadaver lab 2013 to 2014. **Subjects:** 2013 (n=101)53% female 47% male. 2014 (n=102)52% male 48% female.	**Study 1:** Shapiro-Wilk test to test for normal variable distribution of mean ± 95% CI. Univariate analysis with student *t*-test to a $p < 0.05$ considered significant. Data analyzed using Prism 6.01 SAS. **Study 2:** Exam reliability coefficients computed using Kuder Richardson formula >0.80 = validity. Data analyzed with SPSS ver. 21 with alpha 0.05.	**Study 1:** Primary: Blended group mean (232 [95% CI 221-237]), Control group mean (215[95% CI 209-220]) pre-post effect, blended over traditional 32% - 28% = 4% *P=0.05* Secondary: HW-blended 27 hrs to TL 10 hrs. **Study 2:** Knowledge-U=5002 *P*=0.72 No difference. Application-U=4990.0 *P*=0.70 Not significant difference. Analyzing-U=4243.0 *P=0.030, r* = 0.19 Stat significant 3% difference. **Implications** **Study 1:** Blended took more time but resulted in more knowledge and satisfaction- viable anesthesia teaching mode. **Study 2:** Flipped classrooms can have an impact on learning at higher levels of cognition on Bloom's taxonomy but must be assessed on that level to see results in examinations.	**Study1:** **Methodological flaws:** Selection bias-no randomization, Lack of standardized lessons; prepared by individual instructors. No electronic time logging. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** A low number of application and analyzing questions, no tracking if FC watched videos **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted.

Miller, C. J., & Metz, M. J. (2014). A comparison of professional-level faculty and student perceptions of active learning: its current use, effectiveness, and barriers. *Advances in Physiology Education, 38*(3), 246–252. https://doi.org/10.1152/advan.00014.2014

Wittich, C. M., Agrawal, A., Wang, A. T., Halvorsen, A. J., Mandrekar, J. N., Chaudhry, S., … Beckman, T. J. (2018). Flipped Classrooms in Graduate Medical Education. *Academic Medicine, 93*(3), 471–477. https://doi.org/10.1097/acm.0000000000001776

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Compare faculty experience to students' and perceptions of active learning. **Study 2:** Determine the use of flipped classrooms in residency teaching in internal medicine programs. **Design** **Study 1:** Survey. **Study 2:** Survey	**Study 1:** **Primary outcome:** Faculty use of active learning and perceptions of implementation. **Secondary outcome:** Student perceptions of the effectiveness of instructional methods. **Study 2:** **Primary outcome:** Internal medicine residency programs use of flipped classroom learning. **Secondary outcome:** Internal medicine program director perceptions of the flipped classroom model.	**Study 1:** **Setting:** University of Louisville Doctor of Dentistry physiology course. **Subjects:** faculty (*n*=9) & students (*n*=116) in first year physiology course. **Study 2:** **Setting:** US-based national internal medicine programs. **Subjects:** Program directors (*n*=368/92.9% of 396 total IM residency programs) via email in August-November 2015, with weekly reminder emails.	**Study 1:** 23-question anonymous survey for faculty (69% response rate), 13-question, anonymous survey to DMD students (97% response rate). Statistical analysis was done using Origin Software, version 8, with significance defined as $P<0.05$ using Mann-Whitney *U*-test. **Study 2:** Response *n*=227(61.7 %) Fischer exact test or Welch *t-test* used to compare variables among respondents & non-responders. ANOVA model assessed the association between PD characteristics & FCPI scores.	**Study 1:** Lecture the most frequently used method; students report higher effectiveness of active learning strategies. **Study 2:** <5% Program directors report using the flipped classroom model very often. ~60% somewhat rarely (or less) use the flipped classroom model. Perception ratings identified two themes. Overall FCPI score=4.04/5. **Implications** **Study 1:** Active learning strategies deemed to be of benefit by both sides. Faculty development program needed to facilitate effective integration of active learning. **Study 2:** Program directors' perception of the flipped classroom model positively associated with implementation.	**Study1:** **Methodological flaws:** Small sample, confidence survey, confounding variable, convenience sample. **Inconsistency:** Varied response rates. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** None noted. **Inconsistency:** Varied response rates. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted.

King, A. M., Gottlieb, M., Mitzman, J., Dulani, T., Schulte, S. J., & Way, D. P. (2019). Flipping the Classroom in Graduate Medical Education: A Systematic Review. *Journal of Graduate Medical Education, 11*(1), 18–29. https://doi.org/10.4300/jgme-d-18-00350.2

Park, K. H., Park, K. H., & Chae, S. J. (2018). Experiences of medical teachers in flipped learning for medical students: a phenomenological study. *Korean Journal of Medical Education, 30*(2), 91–100. https://doi.org/10.3946/kjme.2018.84

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Profile use of flipped classroom in graduate medical education & assess the quality of current research. **Study 2:** Explore the experience of medical teachers in the process of adopting active learning & flipped classrooms. **Design** **Study 1:** Systematic review. **Study 2:** Phenomenological study (qualitative).	**Study 1:** **Primary outcome:** Perceptions of use. **Secondary outcomes:** **a.** Change in opinion. **b.** Change in knowledge or skills. **c.** Change in behavior. **Study 2:** **Primary outcome:** Shared experiences of medical schoolteachers in flipping classrooms. **Secondary outcome:** **a.** Hurdles of flipped learning. **b.** Positive changes from flipped learning. **c.** Challenges of flipped learning.	**Study 1:** **Setting:** Twenty-two quantitative research articles that included research outcomes from major health & social science databases. **Subjects: a** total of 985 learners between 7/2017-7/2018 in graduate medical education accredited programs. **Study 2:** **Setting:** Medical schools & colleges in 2017. **Subjects:** Five medical teachers who had been running FC for over two years.	**Study 1:** A modified Kirkpatrick framework to classify study outcomes according to total impact levels. MERSQI to assess the quality of selected research articles. **Study 2:** Face-to-face recorded semi-structured interviews lasting approx. 60 mins. W/data analysis using Colaizzi's descriptive phenomenological methodology.	**Study 1:** Varied methods exhibited varied results. The resident demonstrated positive attitudes regarding flipped classroom learning. Studies were as rigorous as typical research in residency education. **Study 2:** 160 unique significant statements that generated 17 formulated meanings that were categorized into seven theme clusters & 4 theme categories. **Implications** **Study 1:** Active learning pedagogy is not one-method-fits-all in graduate medical education. **Study 2:** *Evidence should raise concern about continued use of TL as a control in future experiments. *Future focused on which type of active learning is most appropriate and efficient for certain topics or student populations (specializing).	**Study1:** **Methodological flaws:** None noted. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** Small sample size. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted.

Betihavas, V., Bridgman, H., Kornhaber, R., & Cross, M. (2016). The evidence for 'flipping out': A systematic review of the flipped classroom in nursing education. Nurse Education Today, 38, 15–21. https://doi.org/10.1016/j.nedt.2015.12.010

Chipas, A. (1995). Do current educational programs address critical thinking in nurse anesthesia? *AANA Journal, 63*(1), 45-49. Retrieved from http://europepmc.org/abstract/MED/7762372

Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
Study 1: Examine how flipped classrooms have been applied to higher level nursing education & outcomes associated with this style of teaching. **Study 2:** To determine the effect of using adult education principles on student satisfaction. **Design** **Study 1:** Systematic review **Study 2:** Quasi-experimental descriptive survey.	**Study 1:** **Primary outcome:** Academic performance. **Secondary outcome:** Student satisfaction **Study 2:** **Primary outcome:** **a.** Determine Student's perception of the program's teaching style. **b.** Student's personal learning style preference. **c.** Student satisfaction **Secondary outcome:** **a.** Faculty member's perception of the program's teaching style. **b.** Faculty member's personal teaching style preference.	**Study 1:** **Setting:** Systematic Review **Subjects:** 5 articles: nursing & active learning; total of 934 participants in one semester of schooling; 4 UME nursing programs & 1 GME nursing program. **Study 2:** **Setting:** 32 nurse anesthesia schools surveyed, both students and faculty in US **Subjects:** n = 197 NA students n = 128 NA faculty	**Study 1:** 2 studies used satisfaction scores only, 1 study used examination scores only, two studies used examination scores and satisfaction scores to compare or evaluate learning. **Study 2:** Likert-type scale 1-5 strongly disagree to strongly agree. Lower score pedagogical, higher score andragogical. **Student surveyed:** **a.** 25 questions to access student's perception of the program's teaching style. **b.** 25 questions to assess personal learning style preference. **c.** 10 questions to assess satisfaction. **Faculty surveyed:** **a.** 25 questions to test perception of the program's teaching style. **b.** 25 questions to assess his or her personal teaching style preference.	**Study 1:** Academic performances were = or better. Student satisfaction w/ active learning = mixed results, primarily positive compared to traditional lecture-style learning. **Study 2: a.** Pedagogical rating: (faculty = 58.5, students = 48.4, t = 7.5). **b.** Faculty prefer lecture 56% time, then group discussion, clinical, lab least preferred **c.** Students preferred group discussion, individual discussion, lecture, assigned reading least. **d.** higher levels of teaching preparation = LCT used >limited knowledge of learning theory. **Implications** **Study 1:** A.L. improves exam scores, student satisfaction w/learning style but initially requires more prep time by faculty. **Study 2:** Group studies/case work most pref., never self-study. Want better ed. teachers. Adult learning considerations.	**Study1:** **Methodological flaws:** small sample size **Inconsistency:** none **Indirectness:** none **Imprecision:** none **Publication bias:** none **Study 2:** **Methodological flaws:** none **Inconsistency:** none **Indirectness:** none **Imprecision:** *Did not mention stats on faculty beliefs of teaching style **Publication bias:** none

Michael, J. (2007). Faculty perceptions about barriers to active learning. *College Teaching, 55*(2), 42-47. http://dx.doi.org/10.3200/CTCH.55.2.42-47

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences - PNAS, 111*(23), 8410-8415. http://dx.doi.org/10.1073/pnas.1319030111

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Identify faculty perceptions regarding active learning & implementation barriers. **Study 2:** Compare the effect size on student performance in undergraduate STEM courses under traditional lecture vs active learning.	**Study 1:** **Primary outcome:** Faculty beliefs. **Secondary outcome:** Barriers to implementation. **Study 2:** **Primary outcome:** Effect of AL compared to TL and exam score performance, concept inventories. **Secondary outcome:** Failure rates, measured as the percentage of students receiving a D or F grade or withdrawing from the course (DFW rate).	**Study 1:** **Setting:** Niagara University in March 2004 **Subjects:** n = 29 educator workshop participants n = 7 science instructors n = 22 humanitarian, social science, & education faculty. **Study 2:** **Setting:** Meta-Analysis literature search of seven online databases using search terms, mining reviews and snowballing. **Subjects:** 225 studies published and unpublished in the literature with active learning interventions of two types, RCT's and quasi-random designs with blinded to treatment at time of class registration.	**Study 1:** Original responses from participants reviewed together to identify common themes. No instrument other than open ended questions. **Study 2:** Computed all effect sizes and conducted the meta-analysis in the comprehensive Meta-Analysis software package. All reported *P* values are two-tailed unless noted. *Effect sizes calculated as weighted standardized mean difference as Hedges' g for exam scores, and the log-odds for data on failure rates. For readability, log odds were converted to odds ratio, risk ratio, or relative risk. Funnel plots were assessed to look for publication bias.	**Study 1:** Original responses from participants reviewed together to identify common themes. 160 unique significant statements which generated 17 formulated meanings that were categorized into 7 theme clusters & 4 theme categories. **Study 2:** Exam grade increase w/AL;SDs (n = 158 studies) Z = 9.781, *P* << 0.001 in favor of AL; odds ratio/failing w/ AL=1.95 (n = 67) Z = 10.4, P<< 0.001 studies under TL; Avg exam score up 6% w/AL; TL=1.5xtimes fail > AL.	**Study1:** **Methodological flaws:** **S**mall convenience sample **Inconsistency:** None noted **Indirectness:** None noted **Imprecision:** Student perceptions discussed w/out student participation. **Publication bias:** Workshop where survey administered sponsored by a university. **Study 2:** **Methodological flaws:** none **Inconsistency:** none **Indirectness:** none **Imprecision:** none **Publication bias:** none
Design **Study 1:** Mixed methods survey. **Study 2:** Meta-analysis of 225 studies that measure exam scores or failure rates.				**Implications** **Study 1:** Main beliefs =student/teacher characteristic/pedagogical issues that affect learn'g.. *Faculty disagree what A.L. is & how to implement A.L., all wanted to teach well. **Study 2:** Concern about continued use of TL control control in future experiments.	

Kalb, K. A., O'Conner-Von, S. K., Brockway, C., Rierson, C. L., & Sendelbach, S. (2015). Evidence-based teaching practice in nursing education: Faculty perspectives and practices. *Nursing Education Perspectives, 36*(4), 212-219. Retrieved from https://resource.ahu.edu/login?url=https://search-proquest-com.resource.ahu.edu/docview/1700288023?accountid=35793

Vetter, M. J., & Latimer, B. (2017). Tactics for teaching evidence-based practice: Enhancing active learning strategies with a large class of graduate EBP research in nursing students. *Worldviews on Evidence-Based Nursing, 14*(5), 419-421. http://dx.doi.org/10.1111/wvn.12227

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Describe nursing faculty. perspectives and practices about evidence-based teaching practice (EBTP). **Study 2:** To explore student perceptions about the effectiveness of FC	**Study 1:** **Primary outcome:** Faculty perspectives on use of EBTP in nursing education. **Secondary outcome:** **a.** How faculty uses evidence-based sources. **b.** Identify factors that influence their ability to use EBTP. **Study 2:** **Primary outcome:** -Student perception of effectiveness of learning activity and if online. **Secondary outcome:** None	**Study 1:** **Setting:** *Email to 1586 Nurse administrators in US accredited nursing programs in US then encouraged to forward to teaching faculty. **Subjects:** *n = 551 usable survey responses *n = 503 woman 91% *n = 225 51-60 yr old *n = 457 (83%) had teaching responsibilities. **Study 2:** **Setting:** Enrolled in a qualitative research course. **Subjects:** n = 99 graduate nursing students.	**Study 1:** Likert scale items Ranked from 1 = strongly disagree to 4 = Strongly agree on faculty perspectives about EBTP. -10 Likert items- how faculty use evidence in teaching, including sources of evidence. -10 Likert scale items on factors that influence the ability of faculty to use EBTP. -3 open ended questions about sources, factors that influence, and comments and recommendations. **Study 2:** Pre-class work used groups of 5 to 6 students to facilitate learning activities instead of didactic lecture. -Links to YouTube videos provided (content = 60 minutes of students' time). -Class presentation used. -Case studies used. -Critical Incident Questionnaire format with open ended questions	**Study 1:** Faculty=positive EBTP views; Felt strongest about importance for faculty to use EBTP in nursing education *M* = 3.82; Highest ranked to revise course *M* = 3.49; Lowest support for availability of sufficient evidence for change *M* = 3.05; Lowest rank: to select evaluation methods *M* = 3.17; Range of other results supporting use of EBTP; Heterogeneity represented not statistical significance for either test scores or failure rates. **Study 2:** 58/99 rate of response; 91% =agreed pre-work helpful; 85%= presentation helpful; 83% agreed group review was helpful. -93% agreed in-class discussion was helpful.	**Study1:** **Methodological flaws:** none **Inconsistency:** none **Indirectness:** none **Imprecision:** none **Publication bias:** none **Study 2:** **Methodological flaws:** none **Inconsistency:** none **Indirectness:** none **Imprecision:** none **Publication bias:** none
Design **Study 1:** Mixed methods: 33 item Survey- 30 Likert and 3 open ended ?s **Study 2:** Mixed methods.				**Implications** **Study 1: a.** educators familiar w/EBP but unaware of EBTP or the need to use. **b.** Culture of EBTP important @ university. **Study 2:** Demonstrates activities = helpful when implementing the FC; gives tips for implement	

Critz, C. M., & Knight, D. (2013). Using the flipped classroom in graduate nursing education. Nurse Educator, 38(5) Retrieved from https://journals.lww.com/nurseeducatoronline/Fulltext/2013/09000/Using_the_Flipped_Classroom_in_Graduate_Nursing.13.aspx

Lancaster, J. W., Wong, A., & Roberts, S. J. (2012). 'Tech' versus 'Talk': A comparison study of two different lecture styles within a master of science nurse practitioner course DOI: https://doi-org.resource.ahu.edu/10.1016/j.nedt.2011.09.018

Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
Study 1: Test an FC model to boost student engagement and satisfaction. **Study 2:** Assess critical thinking ability for nurse anesthesia students at 2 points in NA program curriculum.	**Study 1:** **Primary outcome:** Increased student engagement perceived by faculty in FC compared with traditional classroom. **Secondary outcome:** Overall improvement was seen in testing scores. **Study 2:** **Primary outcome:** Average overall class score was 96.6% in FC classroom compared with 92.7% overall score in traditional classroom.	**Study 1:** **Setting:** Focused on graduate students in an FNP program (pediatrics course). **Subjects:** Sample size: *n*=20 **Study 2:** **Setting:** Pharmacotherapeutics course **Subjects:** *n* = 23 students in traditional lecture (control) and 29 students in blended section (case).	**Study 1:** 10-item Survey (5 question Likert style; 5 question open-ended). Survey assessed student satisfaction with FC. Followed students for 2 semesters Survey administered at the end of 2 semesters. **Study 2:** 3 noncumulative course examinations. Participation scores for class activities. End of semester course feedback. Analysis: t- test to determine statistical difference between study outcomes	**Study 1:** Pre-class -recorded lectures (20-40 min max), case studies, EBP articles, textbook readings, quiz. - In-class -intensive case studies, role-playing, group problem-solving exercises, differential diagnosis activities, student lectures presentations. 60% students material covered was worthwhile, 40% very worth-while. Current EBP articles and short recorded lectures most helpful. **Study 2:**Scores significantly higher for blended group on the 1st and 3rd exam but not the 2nd. Overall unadjusted scores for participation did not vary significantly Blended learners expressed a higher agreement that the in-class activities and discussions were valuable, as were the classroom technology.	**Study1:** **Methodological flaws:** Small Faculty and student sample size **Inconsistency:** None noted. **Indirectness:** Limited detail about statistical methods/survey questions. Possibly unvalidated and unreliable tool. **Imprecision:** May be underpowered. No statistical analysis of confidence intervals presented. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** Retrospective design **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted.
Design **Study 1:** Cross-sectional descriptive survey **Study 2:** Retrospective case-control quantitative study with additional qualitative feedback.				**Implications** **Study 1:** Specific toward graduate nursing. Suggest that recorded lectures be no more than 30 minutes FC is encouraged in graduate nursing. FC allows for better ID of students strengths and weaknesses. More research needed in graduate nursing to know appropriate classes for FC. **Study 2:** Blended section performed better than TL on 2 of 3 exams. Authors speculate higher-order activities, better retention, comprehension. Students noted the utility of online lectures as a contributor to learning satisfaction.	

Anderson, D., & Burns, S. (2013). One-minute paper: Student perception of learning gains. College Student Journal, 47(1), 219-227. Retrieved from https://resource.ahu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=92757400&site=ehost-live&scope=site

Burns, S., Mendel, S., Fisher, R., Cooper, K., & Fisher, M. (2013). Critical thinking in nurse anesthesia education: A pilot study. Journal of Curriculum and Teaching, 2(1), 83-90. Retrieved from https://files.eric.ed.gov/fulltext/EJ1157689.pdf

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Determine nurse anesthesia students' perceptions of learning gains when using one-minute paper. **Study 2:** Assess critical thinking ability for nurse anesthesia students at 2 points in NA program curriculum. **Design** **Study 1:** Quantitative descriptive survey **Study 2:** Quantitative comparative pilot study. Convenience sample of 2 cohorts.	**Study 1:** **Primary outcome:** Reported learning gains of Traditional lecture over One-minute paper. **Secondary outcome:** Younger students report less learning gains from group participation. **2: Study** **Primary outcome:** If critical thinking improved over the course of 12 months of didactic training. **Secondary outcome:** Relationship between years of practice as ICU nurse and overall HRST score.	**Study 1: Setting:** At Midwestern University nurse anesthesia program. **Subjects:** n = 28 NA students. n = 46 PT students. **Study 2: Setting:** -Focused on graduate students in an FNP program (pediatrics course). **Subjects:** -Sample size: N=20 Pre-Class Activities: -Recorded lecture video -EBP articles -Text readings -Online quiz In-class Activities: -Case Studies -Role-Playing -Group work -Differential diagnosis -Problem-solving -Prescribing	**Study 1:** Survey using survey monkey. SALG student assessment of learning gains tool. Analyzed using and ranked with the Wilcoxon Sign Rank test by performing a chi-square test. **Study 2:** 33 question Health Sciences Reasoning Test (HSRT) along with demographic data conducted at beginning and end of first didactic year. -Mann-Whitney U test. -t-test. -Data was analyzed with PASW statistics 18 (SPSS).	**Study 1:** NA students reported ↓ learning gains from one-minute paper participation compared to TL T=9.21, p<.01, r = -.40, and listening to class discussions, T=7.5, p<.01, r =-.37. 77% report gains of 1-minute paper at connecting key ideas knowledge. 74% gains in 1MP in applying learning to other situations. **Study 2:** No stat sig between yrs ICU and critical thinking (p = 0.590). Both groups pre-post scored highest on inductive reasoning and lowest in inference. No stat sig in critical thinking at two curricular points. **Implications** **Study 1:** The graduate learner may prefer TL style. Survey flawed in clarity of which method of teaching showed learning gains. **Study 2:** NA programs faculty need to develop teaching strategies that promote critical thinking.	**Study 1:** **Methodological flaws:** Small sample size. Survey tool was unclear about the eval of lecture or one-minute lecture paper. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** Two different cohorts. Small sample size of convenience. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted

Mudd, S. S., & Silbert-Flagg, J. (2016). Implementing the flipped classroom to enhance nurse practitioner clinical decision-making in the care of the pediatric asthma patient. Nursing Education Perspectives, 37(6), 352-353. http://dx.doi.org.resource.ahu.edu/10.1097/01.NEP.0000000000000083

Schwartz, T. A. (2014). Flipping the statistics classroom in nursing education. Journal of Nursing Education, 53(4), 199-206. DOI: http://dx.doi.org.resource.ahu.edu/10.3928/01484834-20140325-02

Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
Study 1: Describe the implementation of the FC in an introductory pediatric diagnosis course for FNP and pediatric NP students. **Study 2:** Assess student satisfaction with FC in Ph.d nursing. **Design** **Study 1:** Mixed methods **Study 2:** Mixed methods	**Study 1:** **Primary outcome:** Student perception of the value of the FC method. **Secondary outcome:** Student perception of the FC's ability to improve learning. Scores from pre-class assessment to post-class. **Study 2:** **Primary outcome:** To determine student perception and satisfaction of an FC **Secondary outcome:** To determine if knowledge increases with FC.	**Study 1: Setting:** Pediatric diagnostics course. **Subjects:** *n*= 31 PNP and FNP students **Study 2:** **Setting:** Nursing PHD Statistics class meets weekly for 3 hours **Subjects:** n = 12 PhD Students over the course of 2 classes	**Study 1:** Specific details regarding data collection were not included (format, anonymity, etc.). No mention of validity of tool or statistical analysis used or what type of data was used. Pre-class start survey was given to students, as well as a post-class student survey. **Study 2:** Convenience sampling. An anonymous questionnaire was given to students after the 3rd week of class and then again during the last month of class. Students also given randomly assigned pre- and posttest quizzes.	**Study 1:** 80% students surveyed agreed or strongly agreed classroom content helped w/ course objectives, helped use info in new ways. Students commented on amount of work, increased time. Students sometimes did not come having completed online material. **Study 2:** Perception of class positive, class was helpful. Quiz scores improved from 1st to 2nd **Implications** **Study 1:** Comments on evaluation forms indicated that students found the FC to be more work than a normal week; incidentally, the required materials were the same as those USED in prior traditional lectures; authors postulated that the FC methodology pushed students to engage more fully in the material; creates a sense of accountability for students to prepare for class. Very little structure or rigor in design. **Study 2:** Uses both qualitative and quantitative data to show FC ups satisfaction and knowledge of students.	**Study1:** **Methodological flaws:** -Small sample size. Poor design with no mention of valid tool or methods to analyze data. Low reliability. No method to quantify the qualitative data. No mean analysis or comparison of nominal data. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** No mention of confidence interval or power of study. **Publication bias:** None noted. **Study 2:** **Methodological flaws:** None noted. **Inconsistency:** None noted. **Indirectness:** None noted. **Imprecision:** None noted. **Publication bias:** None noted.

Appendix B: Recruitment materials

No recruitment materials utilized to procure survey respondents. Population provided by AANA's anonymous list of registered faculty members. AANA website detailing use of survey services and key contacts within AANA were the primary resource for acquiring survey respondents. A link to their website is included here: https://www.aana.com/advocacy/research/research-services-and-assistance

Appendix C: Letter of Invitation

Dear Educators,

Hello, my name is Caala Sweet, and I am a second-year student registered nurse anesthetist (SRNA) at AdventHealth University in Orlando, Florida. My scholarly project partner, Rice Giffin, is also a second year SRNA, and we are researching active learning implementation in SRNA didactic education. We request a few minutes of your valuable time to take a brief survey which will help to establish a baseline assessment of frequency and manner of active learning implementation in SRNA didactic education. We have made the survey straightforward and allowed for areas of open responses. We request that you assist us in understanding how this evidence-based method of instruction is being implemented within SRNA didactic educational settings.

It is our shared goal to provide feedback to SRNA educators, which may prove useful in implementing active learning methods in didactic settings. We hope to help move the profession forward, as required by AANA's Code of Ethics, by promoting activities to improve education of the healthcare workforce, specifically SRNAs. If you are an anesthesia program director, please consider taking our survey, as well as forwarding it to other faculty members who may also be AANA members that teach SRNAs in the didactic setting. We are looking to elicit feedback from as many didactic educators who are also AANA members as possible. We appreciate your time, attention, and support of this research project.

Caala Sweet, SRNA
Rice Giffin, SRNA
AdventHealth University
Orlando, FL

Appendix D: Survey/Questionnaire

Active Learning in Nurse Anesthesia Didactic Education Survey

Faculty sex: ___Male ___Female
Age range: ___25-29 ___30-34 ___35-39 ___40-44 ___45-49 ___50-54 ___55-59 ___60+
Faculty position: ___Assistant ___Associate ___Full Professor
Years of didactic teaching: ___0-2 ___3-5 ___6-10 ___11-15 ___16-20 ___21+
Average number of students in the classroom:_____
As a nurse anesthesia faculty member, what do you consider active learning in the didactic classroom setting to be?_____
_____
_____
_____
_____
_____

In the grid below please read each active learning descriptor and select one option for each coded activity regarding your personal use of that method in your didactic classroom settings when teaching student registered nurse anesthetist.

Activity Description	**Never used in class**	**<25% of class time**	**25-50% of class time**	**51-75% of class time**	**>75% of class time**
Question & Answer: Students only respond to a question, comment, etc..either **voluntarily** or by **cold-calling.**					
One-minute paper/focused learning/ one sentence summary: Short writing tasks designed to allow students to focus attention on a single important term, name or concept from a particular lessons/ session.					
Think /Pair/Share: Short, individual written response to a prompt Ford slash question, ***then*** instructed to share and discuss briefly with partner, ***then*** asked to share with larger group.					
Brain Dump/Free Write: Short write in which students write down everything they know about an announced topic.					
Muddiest point: At some point during or after an in-class presentation, students write a quick response to the prompt. "What was the muddiest point in _____?"					
Misconception/preconception check: Simple technique for gathering information on want students perceived they already know.					
Application activity: Written activity in which students apply one to two principles and concepts to real life situations.					
Student generated questions: Students create questions for quizzes or exams that are crafted to capture central elements of the course.					
Formative quizzes/surveys *(Background Knowledge Probe):* Ungraded quizzes/surveys to determine comprehension.					

Computer-based Interaction Systems *(Personal Response System):* Students participate in the lecture by responding to questions or statements via computers/wireless technology.					
Self/Peer Formative Assessment: Activities that require students to assess performance against applicable criteria; extend to offer specific suggestions for improvement					
Small group presentation/discussions: Presentations/ discussions of course material-led by students.					
Role playing/Simulation/Games: Students and/or faculty performing specific roles for demonstration purposes. Simulations/games include guiding principles, specific rules and structured relationships.					
Categorizing Grid/Pro-Con Grid: Students are presented with two to three important categories (superordinate concepts) along with scrambled subordinate terms, images, equations or other items that belong in one or another of the superordinate categories.					
Defining Feature Matrix/Memory Matrix: Students categorized concepts presented according to the presence or absence of defining features.					
Debates: Small or large group structured exploration of central concepts, data, beliefs, values.					
Peer teaching: Students teaching each other basic and/or intermediate levels of course material or needed skills.					
Concept Maps: drawings or diagrams that show the mental connections that students made between a major concept presented and other concepts they have learned.					
Cases: Scenarios that require students to integrate their skills to solve problems that relate to course material.					
Cooperative Cases: Scenario-based problem-solving activity using small groups to tackle specific question/ issues from a larger list.					
Jigsaw: Team-based: each member becomes subject matter expert in 1 of 4 areas selected from course material. Each member teaches the subject matter.					
Cooperative Learning/Problem-based learning: Students work together to learn course knowledge and to develop course skills.					

How have you as a nurse anesthesia didactic faculty member adapted your active learning techniques and/or implementation since the advent of social distancing requirements brought upon by the COVID-19 pandemic, beginning Spring 2020?

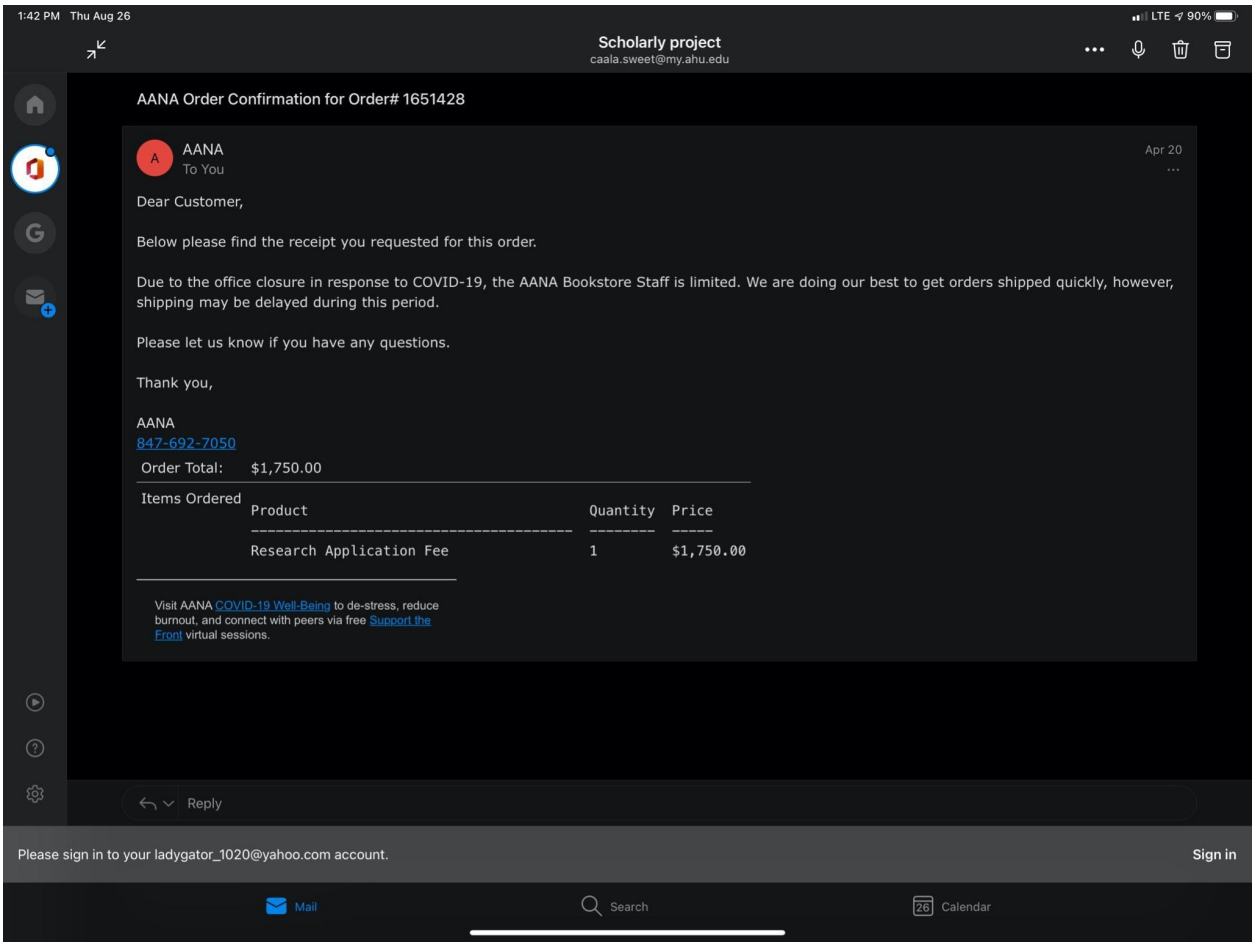
_____

_____

Appendix E: Budget

A. AANA online survey service $1750.

B. Verification of cost is included below.



Appendix F: Timeline

Doctor of Nurse Anesthesia Practice

DNAP Project Timeline Recommended Checklist
(Revised April 2020 and Subject to Change as Necessary)

Task	Recommended Target Trimester	Date Completed
1. Determine topic for DNAP Project	**4th and 5th Trimester Summer/Fall 2020**	
1.1 Assignment of DNAP Scholarly Project Chair and the identification of one or two areas of focus		May 9, 2020
1.2 Review the AHU Scholarly Repository to ensure your project of interest has not previously been completed.		May 2020
1.3 Review relevant literature and evaluate feasibility		April-June 2020
1.4 Discuss and refine best idea with 2021 cohort and DNAP faculty		May 15 & 22, 2020
1.5 Develop and Complete Scholarly Project Initial Presentation		June 2020
2. Identify scholarly project site for DNAP Project	**4th and 5th Trimester Summer/Fall 2020**	
2.1 Discuss site options with DNAP Scholarly Project Chair		May 14, 2020
2.2 Consult with key site personnel for the Analysis and Comparison of Key Players Assignment and gain preliminary approval from DNAP Scholarly Project Chair to continue with the proposed project		June 19, 24 & 25, 2020
2.3 Once assignment three has been graded, and faculty member and key player preliminary approval have been obtained: A. ***Complete the Study Site Director Approval Letter Template*** (Under Academics > University Research > Guides and Forms) and have it signed by an authorized representative from the		June 26, 2020 n/a

project site. This form must be completed if the scholarly project is to be conducted on students or at sites other than within the NAP (Ex. Nursing department, AdventHealth, USAP Anesthesia Group). B. Once signed, please submit the signed Study Site Director Approval Letter, via e-mail to the DNAP department chair (Dr. Devasher) to obtain approval. When completed submit to Canvas C. Submit to Canvas contact information for someone at the project site familiar with your proposed project. Preferably the individual signing the study site director's approval letter. D. Submit Study Site Director Approval Letter, when completed, to CANVAS DROPBOX **Note: This form must also be submitted with the IRB/SRC application**		n/a n/a June 26, 2020
3. Form DNAP Scholarly Project Committee (SPC)	**4th and 5th Trimester Summer/Fall 2020**	
3.1 Review requirements for SPC composition In the Student Scholarly Project Guidelines		May 21, 2020
3.2 Identify committee members, consider alternatives, select members in consultation with your assigned Scholarly Project Chair and obtain their approval.		May 18, 2020
3.3 Obtain approval from the NAP Program Administrator for proposed project mentor(s) and reviewer		May 28, 2020
3.4 Complete ***DNAP Scholarly Project Committee form*** by obtaining project chair, mentor and project reviewer signatures		July 8, 2020
3.5 Submit completed form, scholarly project chair approval e-mail and department chair approval e-mail thread to CANVAS DROPBOX		July 8, 2020
4. Develop DNAP Scholarly Project Proposal Paper	**4th and 5th Trimester Fall 2020**	

4.1 Prepare draft of DNAP scholarly project proposal paper		July 17, 2020
4.2 Revise the draft until a score of 95% has been obtained and the student has been notified of their eligibility for SRC/IRB submission A. **Note: You may be required to submit multiple drafts and/or attend appointment(s) with the AHU writing center prior to obtaining approval** B. Determine instrumentation and obtain permission for use or complete face validation process. Note: Some revisions to the second PICOT statement may be required. C. Consult with statistician (Leana.Araujo@ahu.edu) to refine proposed analysis. D. Complete informed consent. E. **Obtain written verification of your Project Mentors' approval** of your proposal by having him/her sign the ***NAP Scholarly Project Proposal Approval Form*** prior to submission to the Scholarly Project Chair. F. Your Scholarly Project Chair will then submit the form to the NAP department chair (program administrator) for approval and signature		October 9, 2020 August 2020 July 10, 2020 August 2020 Sept. 18, 2020 (rvsd April '21) Nov. 20, 2020 Nov. 23, 2020
4.3 Submit the completed and signed NAP Scholarly Project Concept/Plan Approval Form to CANVAS DROPBOX		November 2020
5. Obtain AHU Institutional Review Board Approval	**5th and 6th Trimester Fall 2020-Spring 2021**	
5.1 Once the student group has received a 95% or greater on the Scholarly Project paper and have been notified of their eligibility for SRC/IRB submission,		

the ***Working Document for Web-Based Research Project Submission form*** and the ***Department Chair Certification Letter*** must be completed. A. A Scholarly Project Chair will then be assigned. B. A thumb drive containing multiple required documents (See DNAP 793 Syllabus for list) should be prepared and submitted to the Scholarly Project Chair C. The chair will review the documents, sign the ***DNAP Scholarly Project Proposal Approval Form*** and will submit it to the Department Chair for his/her signature. It will then be returned once completed and uploaded to CANVAS by the students. D. In the application to SRC/IRB application, The Scholarly Project Chair will be designated as the Principal Investigator. Students will be designated as Co-Investigators		Summer 2020 November 23, 2020 November 23, 2020 November 23, 2020
5.2 Once the working document is completed submit to the Scholarly Project Chair for review and approval.		November 23, 2020
5.3 The Scholarly Project Chair will then complete and submit the IRB/SRC Web-based Scholarly Project Application A. The Research Office will notify the investigators about the summary of the SRC review within 13 working days B. Following the SRC review, the Research Office will be responsible to submit the study proposal to **IRB** and will notify the investigators about the summary of the IRB review within **18 working days** C. The total time to complete the "AHU Web-based Research Project Submission Process" with Scientific Review Committee (SRC) and Institutional Review Board (IRB) approvals **is approximately 36 working days** D. IMPORTANT: this timeline is frequently exceeded. Please submit projects as soon as possible to prevent a delay in the scholarly		November 24, 2020 December 14, 2021 initial submission

project completion date and subsequent graduation		
5.4 The student **MUST SUBMIT** the **AHU IRB NOTICE** of Exemption (at minimum) or Approval (if required) **TO** the designated **DROPBOX** in Canvas **BEFORE** proceeding with any aspect of project **IMPLEMENTATION**		April 15, 2021
6. Implement the DNAP Project Plan	**6th and 7th Trimester Spring and Summer 2021**	
6.1 Create database and data dictionary in Excel for project data entry and analysis. **Obtain the Scholarly Project Chair's approval for data dictionary via e-mail**		February 2021
6.2 Implement your Project Proposal's plan per the SRC/IRB approved methodology		May 26, 2021
7. Develop final manuscript for professional dissemination	**8th and 9th Trimester Fall 2021-Spring 2022**	
7.1 Write results/findings, conclusion/limitations, and application to CRNA practice sections		November 2021
7.2 Revise the wording in all prior sections of your proposal to now utilize past tense as appropriate		November 2021
7.3 Complete your final Scholarly Project paper per the posted rubric		TBD
7.4 Submit the completed Scholarly Project final draft to your Project Mentors and Scholarly Project Chair for their review, recommendations for revision and editing. A. Obtain verification of your Project Mentor and Project Reviewer's approval of the Scholarly Project Final Manuscript by having him/her sign the ***NAP Scholarly Project Final Manuscript Approval Form.*** 1. Include all project components such as informed consent form, questionnaire/survey, powerpoint presentation if applicable, analysis charts, etc. in the final manuscript after the reference section. Each component should be labeled as a separate appendix.		March 11, 2022

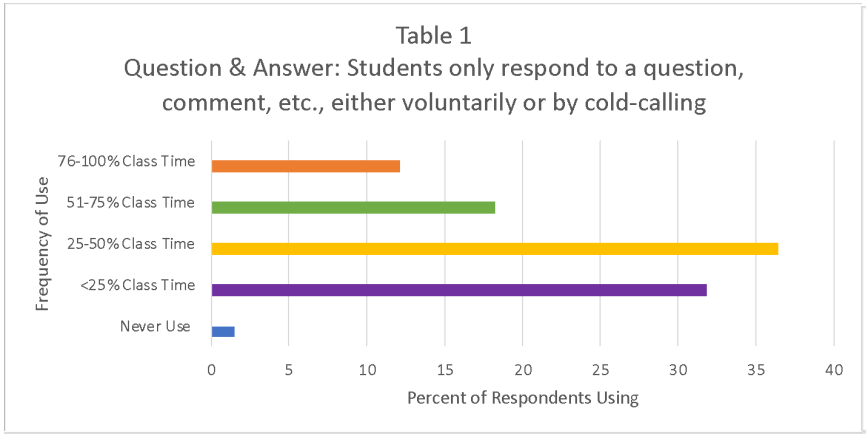
B. Submit the NAP Scholarly Project Final Manuscript Approval Form (signed by mentor and reviewer), to the Scholarly Project Chair for his/her approval. C. If further revisions are not required, the Scholarly Project Chair will submit the NAP Scholarly Project Final Manuscript Approval Form to the NAP Department Chair (Program Administrator) for approval and signature.		April 1, 2022 April 1, 2022
7.5 Submit the completed and signed NAP Scholarly Project Concept/Plan Approval Form to CANVAS DROPBOX		April 1, 2022
7.6 Prepare a research status report and submit via e-mail to the Scholarly Project Chair. This should be a comprehensive report communicating information on the findings and dissemination, changes, and issues.		April 1, 2022
8. Develop and revise poster presentation	**8th and 9th Trimester Fall 2021-Spring 2022**	
8.1 **Develop an electronic PowerPoint version of your proposed poster** about your project, using the Scholarly Project Poster Guidelines. This PowerPoint slide must be submitted for review and feedback.		November 2021
8.2 **The AHU logo** A. The student must obtain the electronic version of the logo from the AHU Marketing department's website portal. B. The student must also email the electronic version of the poster with the logo to the AHU Marketing department (eric.cadiente@ahu.edu) *(& cc the email to the Scholarly Project Chair*), to obtain approval from Marketing for the appropriate use of the logo. Once approved please do not alter the shape or placement of the logo without follow up approval.		November 2021

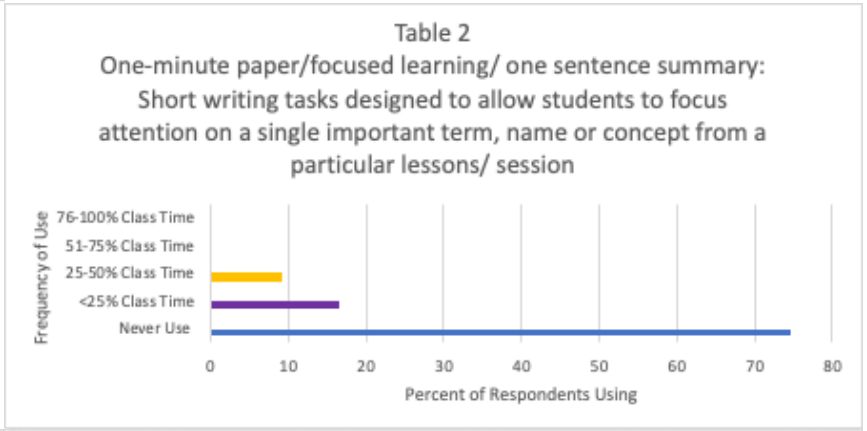
C. The AHU logo must be placed in the upper left-hand corner and the STTI logo placed in the upper right-hand corner		
8.3 **Submit** the **FINAL (NOT Draft) electronic PowerPoint** slide of your Poster to your Scholarly Project Chair via AHU email and to DROPBOX. **A.** After the Scholarly Project Chair has given their approval for the electronic version of the final poster, it is the student's responsibility to **have the poster printed professionally, in compliance with the Scholarly Project Poster Guidelines** B. Final posters will be presented at the **AHU NAP Scholarship/Poster Presentation Day, which is tentatively planned for 4/4/2022 from 1-3pm (Monday afternoon)**.		February 18, 2022
9. Submit final electronic copy of completed documents to library archive	**9th Trimester Spring 2022**	
9.1 Submit a complete electronic copy (including all appendices) of the final approved documents to the AHU library **(**Neal.Smith@ahu.edu**).**		April 1, 2022
10. Prepare for and complete professional Dissemination	**8th and 9th Trimester Fall 2021-Spring 2022**	
10.1 Prepare a faculty – approved manuscript for submission to a professional journal		After graduation
10.2 In addition to professional journal submission, the following are considered appropriate methods of dissemination: A. Submission of abstracts for oral presentation and poster presentations at professional meetings B. Executive summaries (as part of a business plan) C. Professional web page D. Guest editorials, news releases in print or on public radio/television		Spring 2022 Summer 2021 January 28, 2022 N/A N/A
10.3 Revise article or other appropriate method of dissemination as needed based on committee and other feedback		February 7, 2022

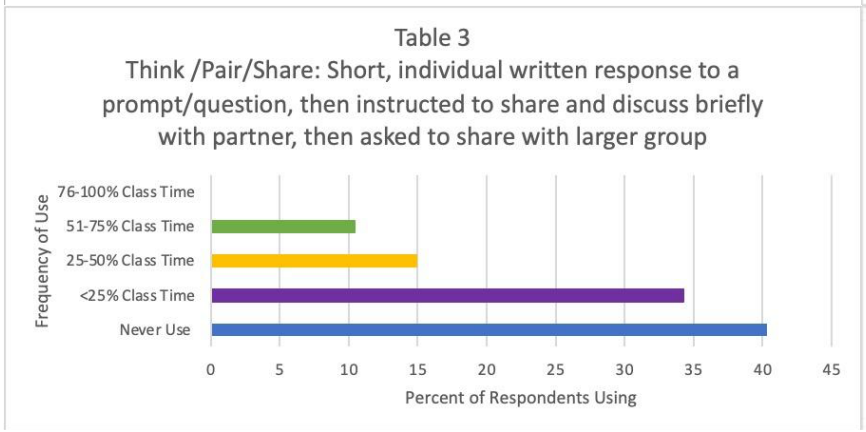
10.4 Obtain official submission/completion documentation and submit to DNAP Scholarly Project Chair and to Canvas DROPBOX		April 1, 2022
11. Prepare for Final Oral Presentation	**9th Trimester Spring 2022**	
11.1 Review guidelines and course schedule for conduct of presentation sessions A. Project Presentation (within DNAP 893) – Select AHU community members invited B. Clinical Site/Project site presentation		March 25, 2022 N/A
11.2 Obtain and complete the DNAP Final Project Presentation form with committee signatures and submit to DNAP Scholarly Project Chair		April 1, 2022
12. Complete final requirements for Scholarly Project Completion	**9th Trimester Spring 2022**	
12.1 Submit to CANVAS completed Scholarly Project documentation (All documents in one PDF) A. Completed Project Final presentation (date and time completed only) B. ***DNAP Project Final Presentation form*** completed C. DNAP Project Hours Log D. E-copy of final manuscript E. Proof of journal submission or official completion document for project dissemination F. Student Data Declaration – where is your project data stored, when it will be destroyed and who will be responsible for it (i.e. at the clinical site or at AHU per IRB documents) G. IRB disposition-Students must close their projects with IRB after proof of submission or official completion documents are obtained		April 15, 2022

Appendix G: Quantitative Survey Results Graphics

Table 1-23: Frequency of use for each active learning technique







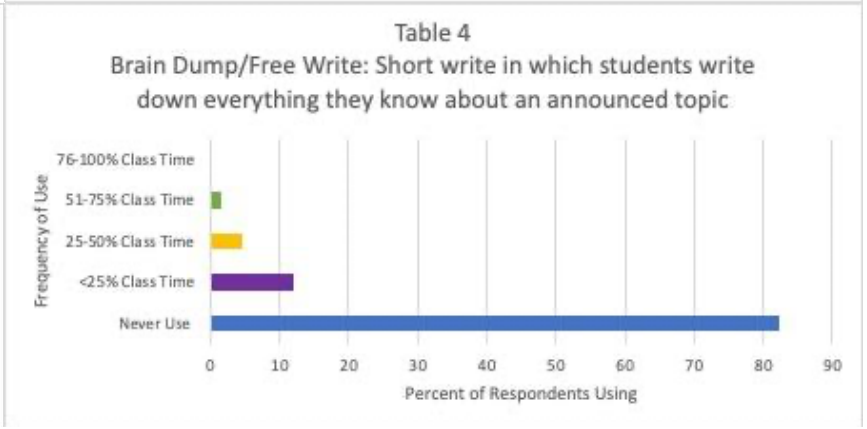


Table 5

Muddiest point: At some point during or after an in-class presentation, students write a quick response to the prompt. "What was the muddiest point in _____?"

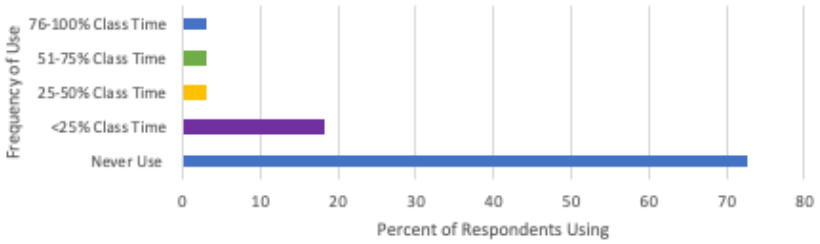


Table 6

Misconception/preconception check: Simple technique for gathering information on what students perceived they already know

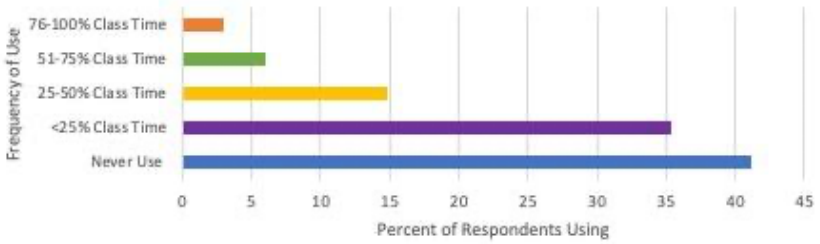


Table 7

Application activity: Written activity in which students apply one to two principles and concepts to real life situations

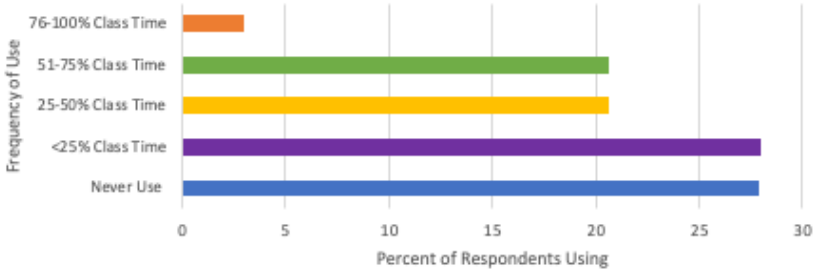


Table 8

Student generated questions: Students create questions for quizzes or exams that are crafted to capture central elements of the course

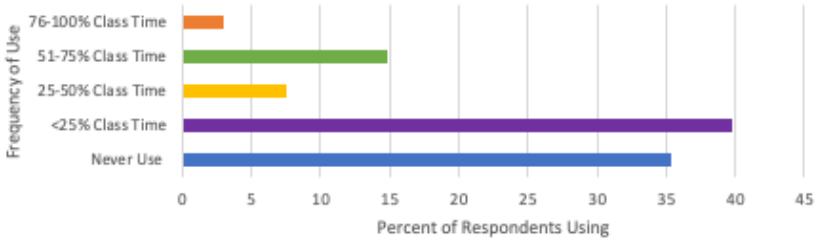


Table 9

Formative quizzes/surveys (Background Knowledge Probe): Ungraded quizzes/surveys to determine comprehension

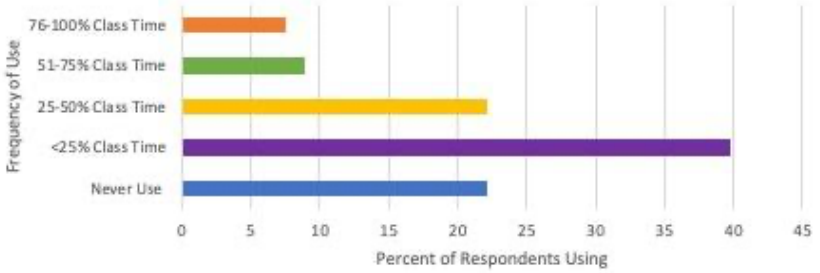


Table 10

Computer-based Interaction Systems (Personal Response System): Students participate in the lecture by responding to questions or statements via computers/wireless technology.

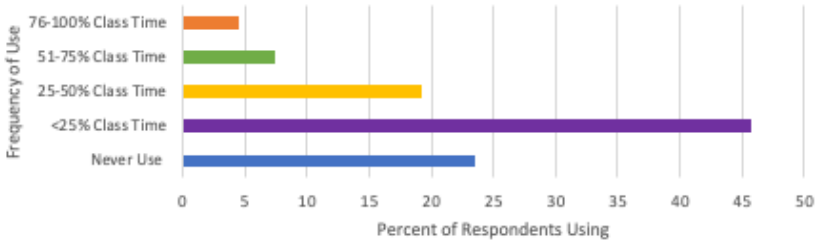


Table 11

Self/Peer Formative Assessment: Activities that require students to assess performance against applicable criteria; extend to offer specific suggestions for improvement

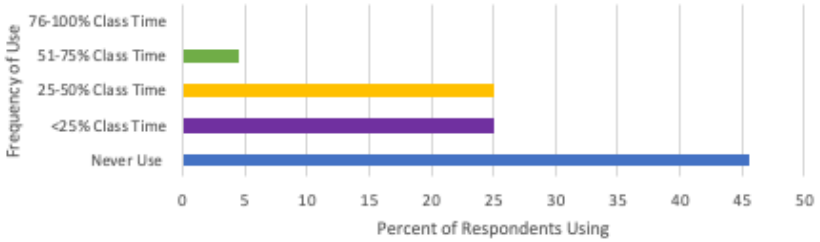


Table 12

Small group presentation/discussions: Presentations/ discussions of course material-led by students

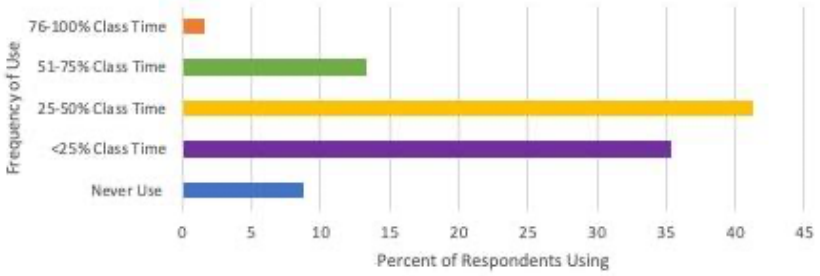


Table 13

Role playing/Simulation/Games: Students and/or faculty performing specific roles for demonstration purposes. Simulations/games include guiding principles, specific rules and structured relationships

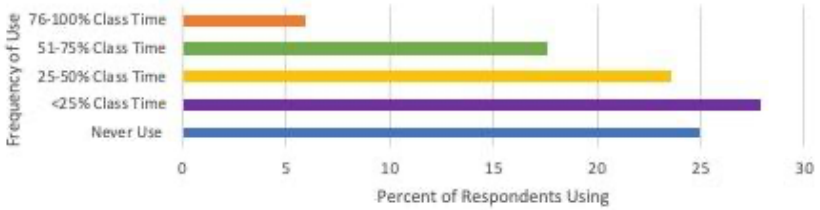


Table 14

Categorizing Grid/Pro-Con Grid: Students are presented with two to three important categories (superordinate concepts) along with a scrambled subordinate terms, images, equations or other items that belong in one or another of the superordinate ca

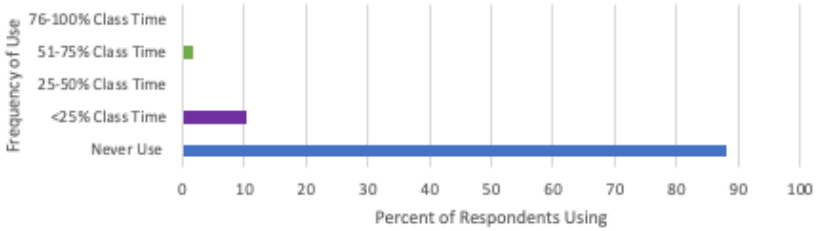


Table 15

Defining Feature Matrix/Memory Matrix: Students categorized concepts presented according to the presence or absence of defining features

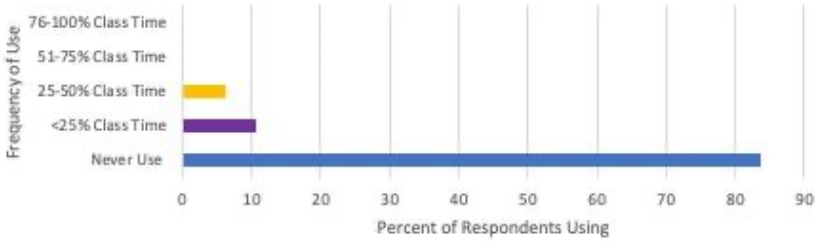


Table 16

Debates: Small or large group structured exploration of central concepts, data, beliefs, values

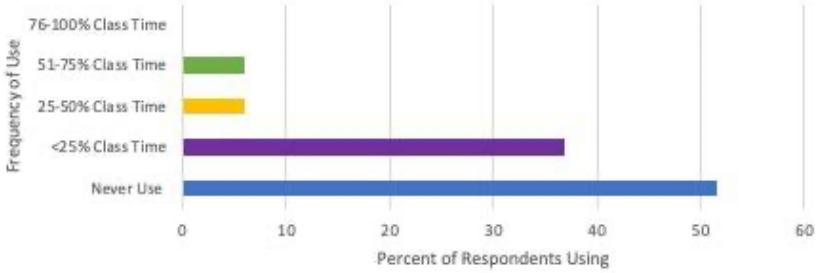


Table 17

Peer teaching: Students teaching each other basic and/or intermediate levels of course material or needed skills

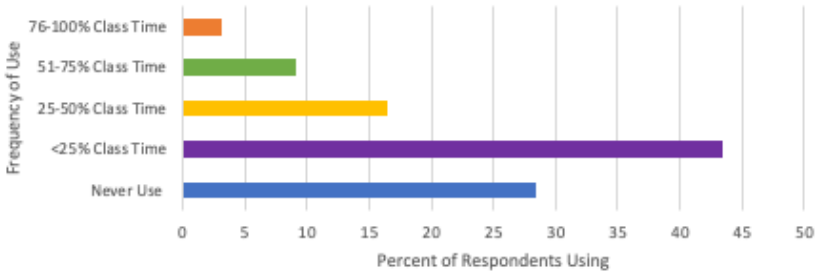


Table 18

Concept Maps: Drawings or diagrams that show the mental connections that students made between a major concept presented and other concepts they have learned

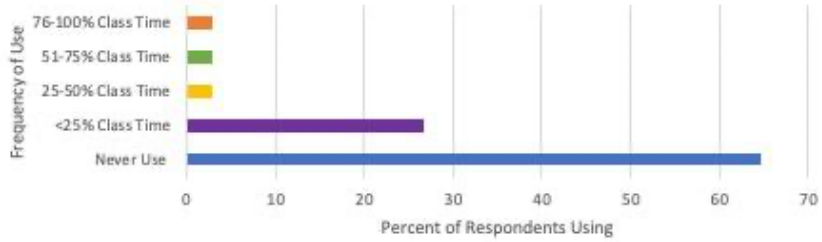


Table 19

Cases: Scenarios that require students to integrate their skills to solve problems that relate to course material

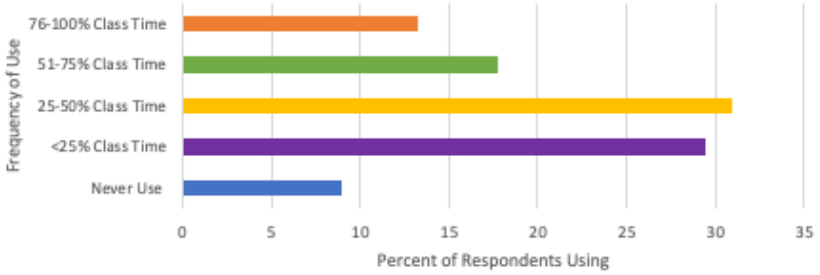


Table 20

Cooperative Cases: Scenario-based problem-solving activity using small groups to tackle specific question/ issues from a larger list

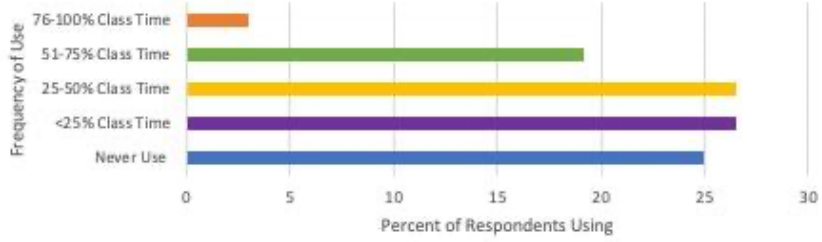


Table 21

Jigsaw: Team-based: each member becomes subject matter expert in 1 of 4 areas selected from course material. Each member teaches the subject matter

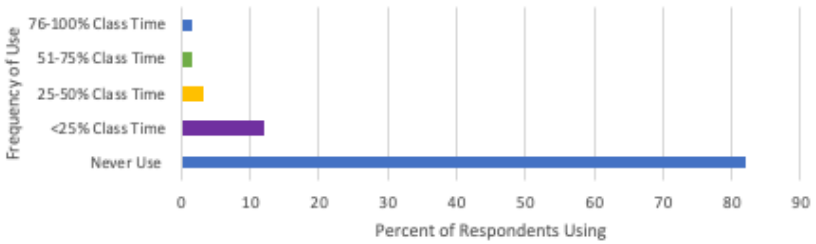


Table 22

Cooperative Learning/Problem-based learning: Students work together to learn course knowledge and to develop course skills

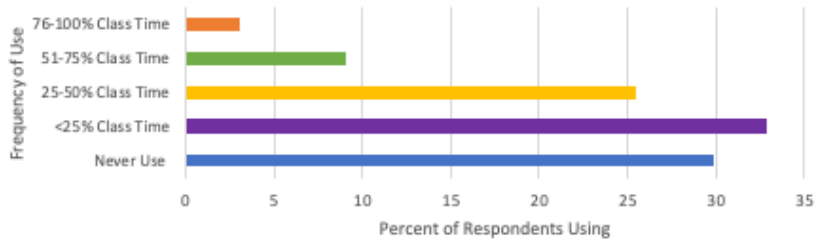
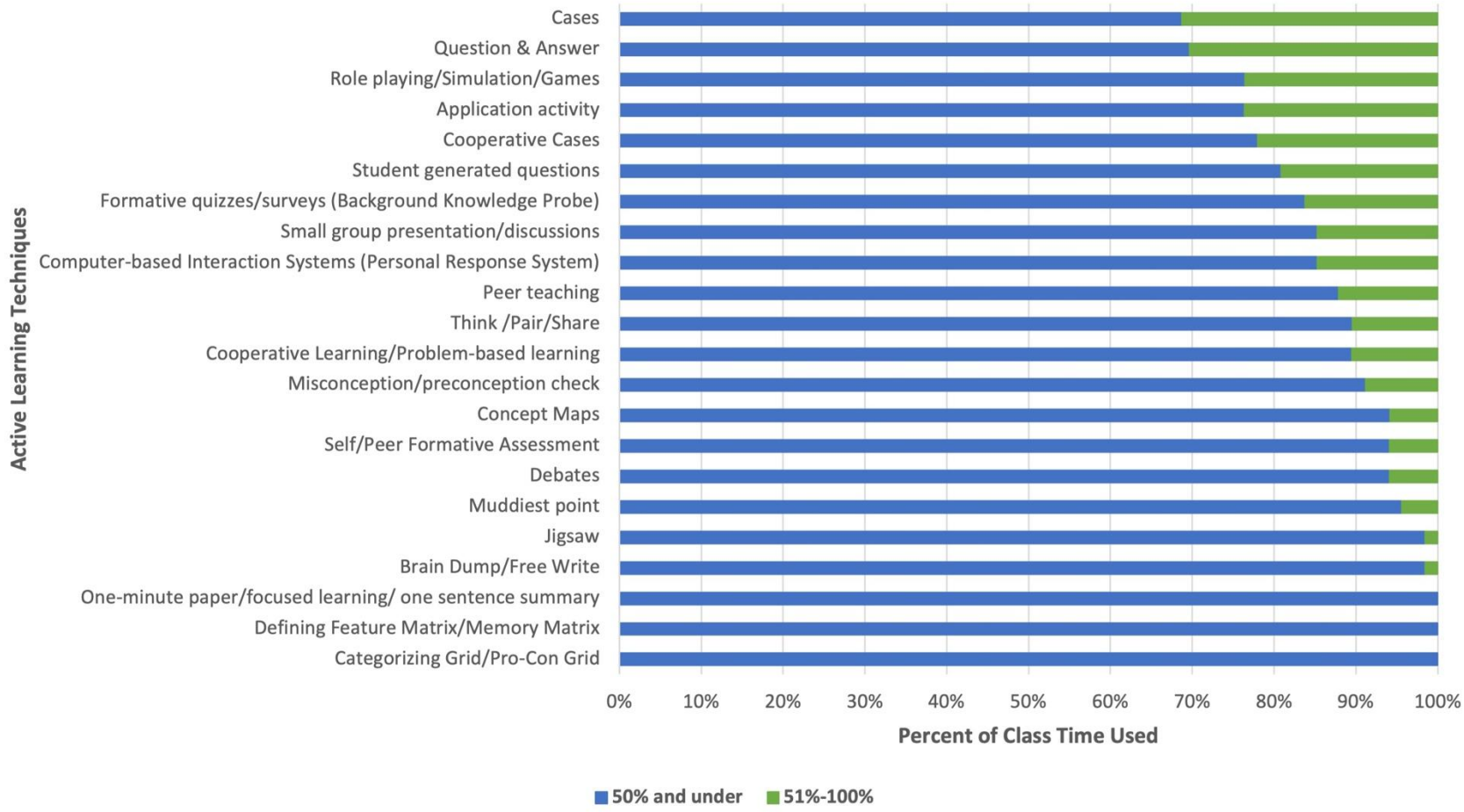
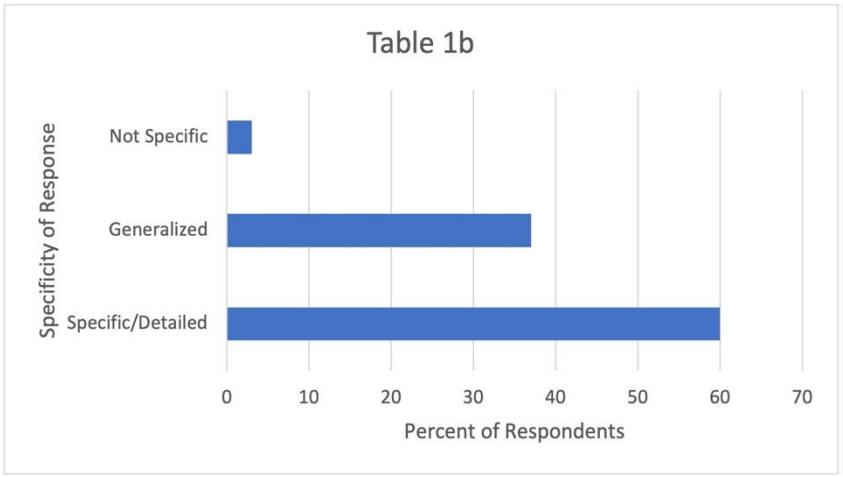


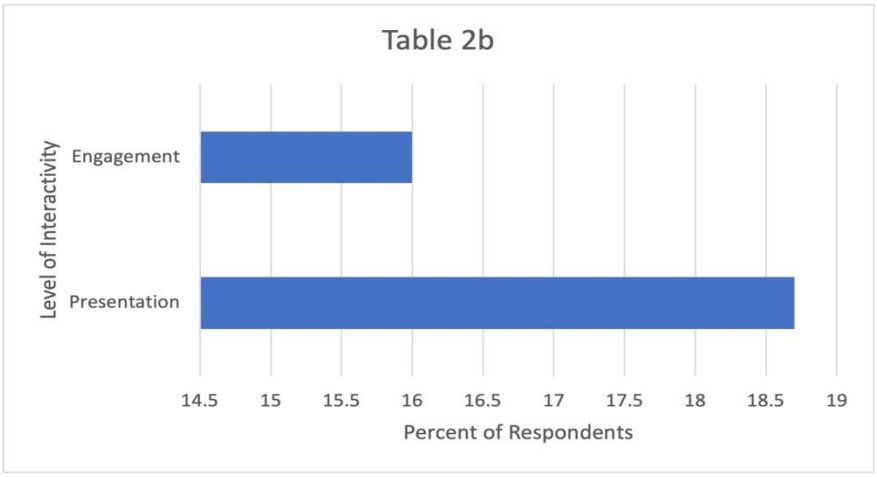
Table 23: Active Learning Techniques Frequency of Use

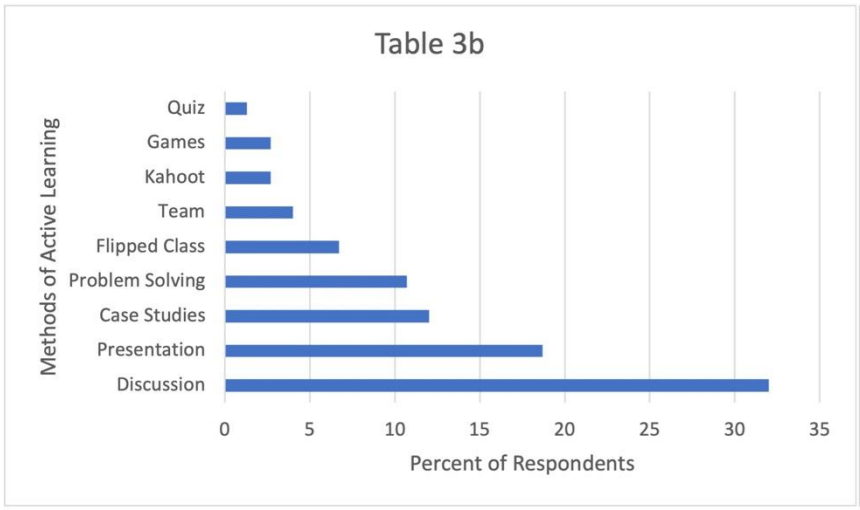


Appendix H: Qualitative Response Represented Graphics

Table 1b - 4b: Themes from responses by educators about their understanding of Active learning







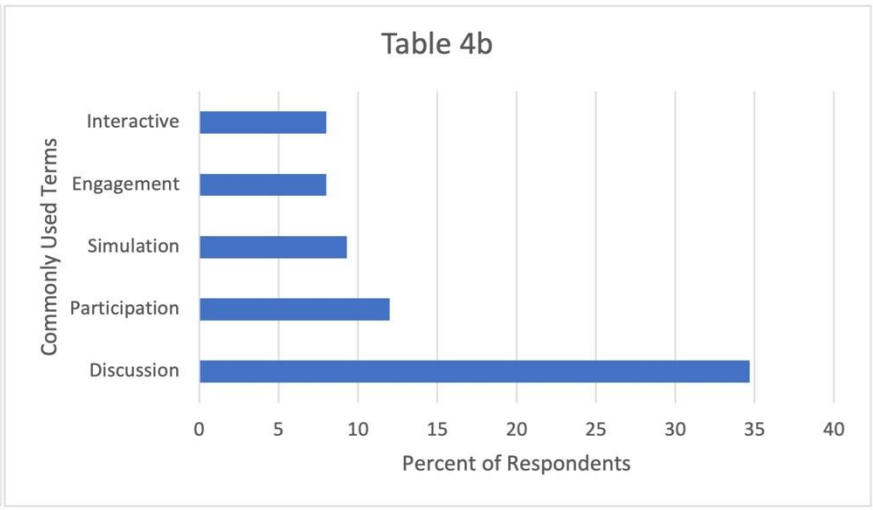
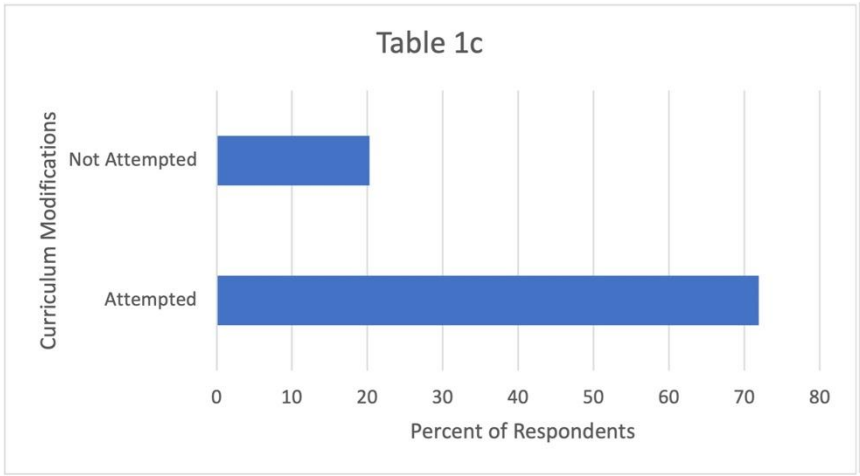
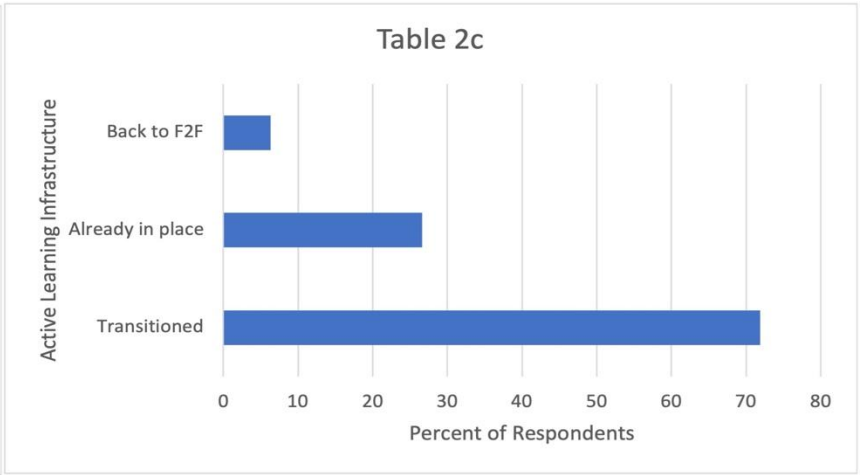
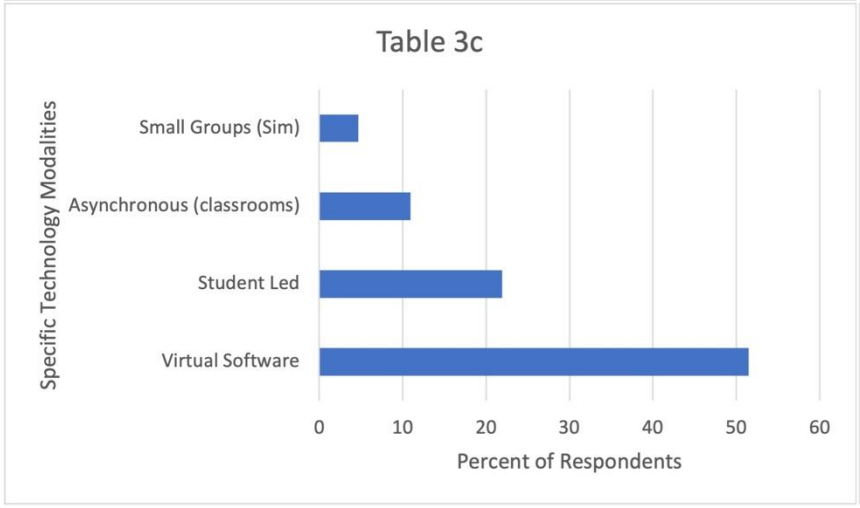
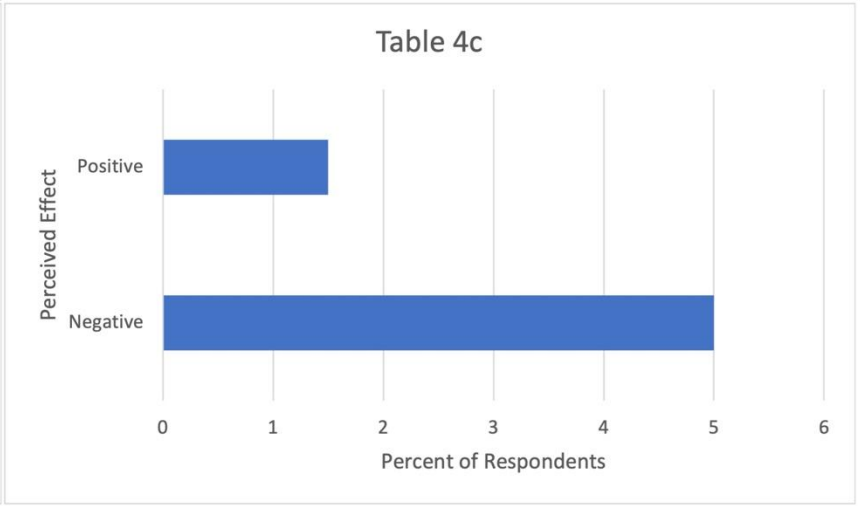


Table 1c - 4c: Themes from responses by educators about their teaching adaptations to COVID-19

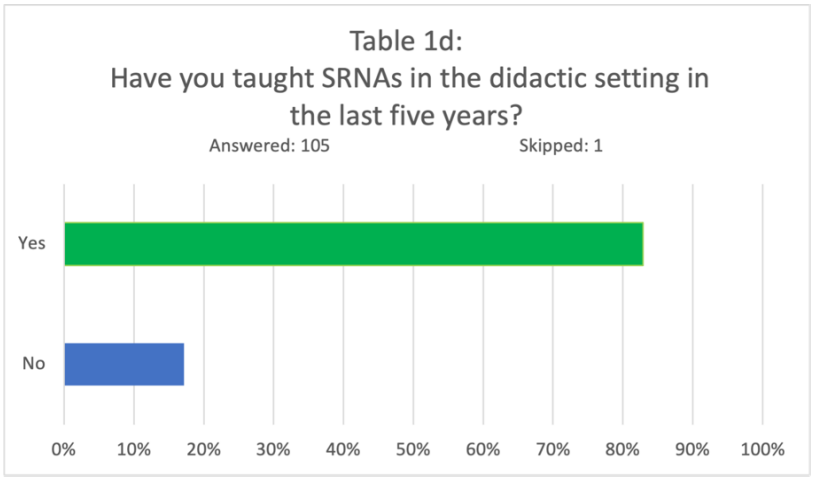


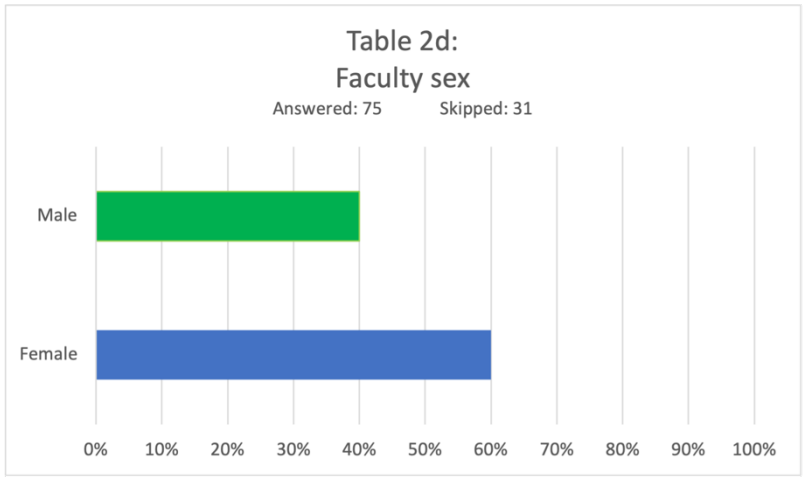


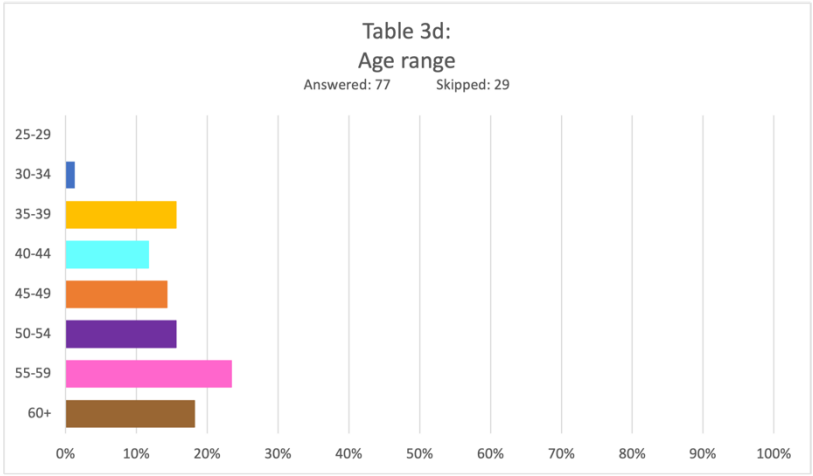


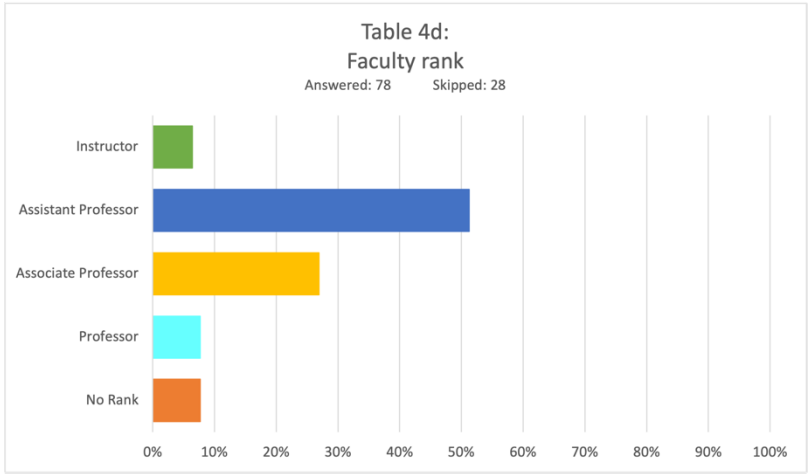


Appendix I: Demographic Data Graphics









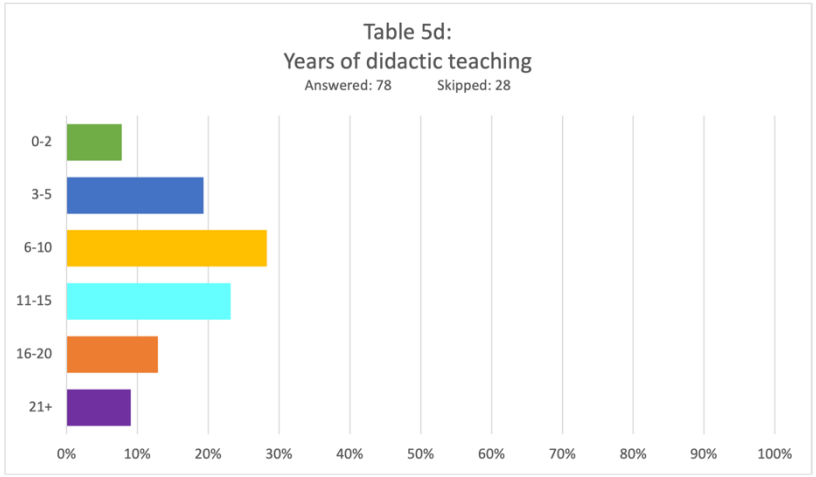


Table 5d:
Years of didactic teaching
Answered: 78 Skipped: 28
0-2
3-5
6-10
11-15
16-20
21+
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%