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Active Learning Methodologies In a High Stakes Graduate Nursing Program

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Abstract

Active learning with student engagement has been demonstrated to improve knowledge retention and improve learning in graduate education. Nurse anesthesia education has traditionally been taught using lecture with slide presentations without considering student centered learning. Much attention has been given to active learning strategies to promote student engagement and content retention, yet little information exists regarding student preferences for in higher level graduate nursing courses. This mixed-methods study aimed to examine student learning preferences for seven different instructional methodologies; traditional lecture, a problem-based learning exercise, reading with workbook assignments, development of cognitive aids, game-based learning, practice questions, and a case study, as well as to which were best to learn by. Students prefer game-based learning, practice questions, and assigned reading with workbooks over lecture and other active learning exercises and reported game-based learning and workbooks from assigned readings as easiest to methods by which to learn.

Keywords

Active learning, Graduate nursing, Teaching and Learning, Student preferences, Anesthesia, Nurse anesthesia

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Active Learning Methodologies in a High Stakes Graduate Nursing Program

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Active learning with student engagement has been demonstrated to improve knowledge retention and improve learning in graduate education. Nurse anesthesia education has traditionally been taught using lecture with slide presentations without considering student centered learning. Much attention has been given to active learning strategies to promote student engagement and content retention, yet little information exists regarding student preferences for in higher level graduate nursing courses. This mixed-methods study aimed to examine student learning preferences for seven different instructional methodologies; traditional lecture, a problem-based learning exercise, reading with workbook assignments, development of cognitive aids, game-based learning, practice questions, and a case study, as well as to which were best to learn by. Students prefer game-based learning, practice questions, and assigned reading with workbooks over lecture and other active learning exercises and reported game-based learning and workbooks from assigned readings as easiest to methods by which to learn.

LITERATURE REVIEW

The highly competitive selection process for admission to a graduate nurse anesthesia residency program typically attracts applicants with strong didactic scores who are high achievers. The resident's self-performance expectations and associated heavy financial, family, and social burdens, place the graduate anesthesia educational program in a high-stakes category. As such, the prudent professor seeks to deliver content and design the learning experience with long-range retention, application, and ultimately, student success. Nurse anesthesia programs traditionally have been lectured-centric. Even with the inclusion of activities in class, the rich didactic content lends itself to student disengagement.

High-stakes nurse anesthesia and medical programs include a vital clinical component built on solid scientific, didactic knowledge. Transitioning the student from the fundamental Bloom's taxonomic level of remembering didactic content to the application and analyzing layers necessary for use in the clinical setting is paramount to anesthesia education. Ultimately, Bloom's application and analysis levels can impact patient safety as they need to be accessed by the provider (Tuma & Nassar, 2021). Voluminous research has been conducted regarding the use of active learning (AL) strategies in multiple medical and nursing settings and has shown to be superior to traditional teaching methods in improving critical thinking (Dehghanzadeh & Jafaraghaee, 2018; Sayyah et al., 2017; Waltz et al., 2014; Ward et al., 2018). Critical thinking is imperative in a graduate professional anesthesia program as it serves as the cornerstone for crisis management in anesthesia delivery. Drawing from learned concepts, the critically thinking anesthetist makes decisions that impact patient care. Therefore, retaining didactic ideas is crucial to the anesthesia resident.

Delivering subject matter in a manner preferred by the resident increases content retention through student engagement and enjoyment (Achen & Lumpkin, 2015; Lim et al., 2019). Faculty continually strive to include innovating teaching strategies to engage students and stimulate critical thinking. In traditional lectures, the faculty may assume that simply teaching the content in a presentation format promotes learning but not consider the student perspective. When the focus is shifted from imparting

information to transferring knowledge from the lecturing expert to the novice student and then engaging them, teaching and learning may be optimized as evidenced by student learning outcomes (Peng et al., 2021).

Traditional lecture methods involving no other activities is considered a teacher-oriented approach and has received much attention as universities and professors are required to focus on student outcomes. Refocusing teaching to a student-oriented approach allows the transfer of knowledge and by combining it with engaging AL methods, the student environment can be improved, student expectations may be satisfied, and the capacity for student learning can be improved (Armbruster et al., 2009; Peng et al., 2021; Scoufis, 2013). Re-envisioning teaching strategies and altering curricula that are traditionally teacher-centric both contribute to the scholarship of teaching and learning (SOTL) that serve to improve the educational experience for students.

A literature gap exists regarding student preference for teaching methods in higher level nurse anesthesia courses. As faculty work to utilize best AL practices to promote learning, retention, application, and synthesis of content for use in real-life clinical situations and emergencies, the need exists to determine student preference for engagement via teaching methodologies to optimally engage professional adult learners. To address the gap in literature, this article examines different AL teaching strategies to provide a clearer understanding of student preference for seven formats in the last didactic course of a high-stakes graduate nurse anesthesia program and their views on each approach's effectiveness.

CONCEPTUAL GROUNDING (ADULT LEARNING THEORY)

Malcolm Knowles's Adult Learning Theory defined characteristics allowing educators to re-frame teaching methodologies specifically for the adult learner (Loeng, 2018). Knowles (1978) considered that adult learners process information differently from children, and the ability to comprehend and recall information distinctly varies. This concept is termed andragogy. Defining characteristics of andragogy that Knowles conceptualized include readiness to learn, self-motivation, self-direction, utilizing past

knowledge and life experiences, and that the content is relevancy-oriented to learners (Knowles, 1978; Loeng, 2018). Knowles's theory applies to this study as the AL focus in the higher-level didactic course will require knowledge recall, utilization of past experiences, is relevancy-oriented to their career, and all participants are adult learners.

In graduate education, a learner often encounters multiple teaching methodologies and styles simply due to the wide variety of professors. While some courses are delivered using traditional teaching methods such as lectures with notes or PowerPoint® presentations, others prefer AL strategies that promote student engagement. Graduate-level student nurses are typically quite familiar with simulation and practice laboratory assignments for skills such as starting intravenous lines, both of which are active learning strategies.

ACTIVE LEARNING

High-stakes graduate nursing programs require students to have superior critical thinking and problem-solving skills. Literature indicates that traditional methods of education may no longer be sufficient. Researchers have found incorporating AL strategies improves learning, critical thinking, and problem-solving abilities when teaching healthcare professionals and student preferences must be considered (Ackland et al., 2008; Deale, 2019; Freeman et al., 2014; Griffiths & Ursick, 2004).

According to the Association of College and University Educators (ACUE), AL allowed for improved concept application and increased material retention. The use of AL strategies includes a three-phase approach. Phase one, concept exploration, provides the utilization of an exploratory activity. This activity allows the student to consider all aspects of the presented content and determine what the student needs to know while identifying misconceptions. Phase two, concept introduction, builds on what the student needs to know by providing answers to their questions using activities that specifically target issues from concept exploration. Active learning activities for phase two may include brief lectures, peer-to-peer discussion, or simulated activities. The final phase of the AL cycle, concept application, provides an opportunity for students to use and apply knowledge gained during content exploration and introduction (ACUE, 2021, 2022).

In a study conducted to assess student perception of AL, students found value in exploratory activities. Students confirmed that AL strategies positively affected their learning (Lumpkin et al., 2015). Graduate students reported that in-class writing helped improve the retention of material. Students explained that activities that checked for understanding through application positively affected their learning and retention, as did small group and pair discussions.

Additional studies report that not all student perceptions are positive. Although student learning outcomes show improvement with using AL, students often reported liking passive learning better because it required less student involvement. A study that evaluated student resistance to AL reported effective instructor facilitation might alter the student's perception of AL (Park et al., 2021). The researchers also found that students participating in AL activities that require increased engagement may view learning as more complex. Authors asserted that college students mistakenly link stress-free activities with learning while connecting the work necessary with AL engagement as quite the opposite.

Given that AL strategies engage students and promote retention of information, layering content throughout the curriculum can be advantageous (AUTHOR CITATION). Layering or scaffolding of information has been widely used throughout many student populations and improves the quality of learning (Doo et al., 2020).

SCAFFOLDING

Scaffolding in education provides structure and support for students as they transition from teacher-led instruction to autonomous mastery of new concepts and skills (Field, 2016). Using a scaffolding design, the professor is a facilitator while the student becomes progressively responsible for their learning. Scaffolding formats are frequently designed using Bloom's taxonomy. According to Bloom (1956), lower-order learning concepts include remembering, understanding, and applying, culminating in the highest order of creation (Adams, 2015). Both bottom-up and top-down designs effectively achieve learning outcomes (Maffei et al., 2022). Examples of bottom-up instructional activities include traditional lectures, skeleton notes, worksheet assignments, and game-based AL. Examples of top-down instructional activities include problem-based learning, case-based learning, and concept maps. Educators often guide students through mastery of individual lower-order tasks advancing to application in a problem-based project or scenario. However, in advanced nursing education, the student usually has a background of undergraduate science education and healthcare experience that provides a baseline of knowledge. Using prior education and experiences may allow the instructor to utilize the top-down option of scaffolding, beginning with the problem-based project or scenario (Maffei et al., 2022). In either design, the instructor conveys learning outcomes and models the pathway for meeting the desired result. Progressing towards mastery, the students often work in groups to complete an assignment or project. In addition to aligning tasks with curriculum goals and outcomes, researchers agree that routinely monitoring student feedback, guiding student reflection, and making fluid adjustments are critical actions for the success of scaffolding educational instruction (Center, 2005; Field, 2016; Maffei et al., 2022).

Due to progressive responsibility, students reported an enhanced understanding of content and an increased motivation to read to engage in group projects and discussions meaningfully. Students also reported an enhanced problem-solving attitudes from the scaffolding methodology, with many rating problem-based learning exercises as the most effective AL methodology (Demetriadis et al., 2008).

ACTIVE LEARNING STRATEGIES IN STUDY

Problem-based learning (PBL) has long been utilized in medical and nursing education. Question-driven PBL can be used for both in-class and self-paced learning and presented using a realistic case scenario, medical or nursing condition, or any other components that offer a problem requiring a resolution. Proactive student engagement, synthesis of information, evaluation and planning, and faculty direction are components of PBL that contribute to active learning (Cho et al., 2021). A comparison study of PBL and lecture-based learning found academic performance was positively impacted by PBL methods (Faisal et al., 2016). If using a scaffolding concept for teaching, it is logical that foundational informa-

tion be offered using a lecture/presentation/note-taking approach, and subsequent assignments are conducted using AL techniques.

Assigned reading with a detailed workbook assignment is another method similar to PBL strategies utilized to engage students. Evidence reports that workbooks are beneficial and perceived as favorable learning methods for graduate students, although very little literature exists (Christensen & Lynch, 2020; Cleary & Freeman, 2005). The AL process of investigating content to complete a workbook developed for understanding and retention of complex graduate anesthesia concepts may benefit the student by serving as a method to integrate multiple aspects for knowledge scaffolding.

The use of concept maps as a means to learn was investigated by Schroeder et al. (2018) in a meta-analysis. A review of seventy-three studies demonstrated a statistically significant difference when students constructed the concept map themselves. This cognitive aid development, engaging with the content to process and map out the various sub-topics and major concepts required reflection, questioning, and evaluation, all desired scaffolding components.

Various interactive games have been utilized in medical and nursing curricula to engage students and increase learning enjoyment. Game-based learning (GBL) has demonstrated benefits to medical students and improved the learning environment (Dakroub et al., 2022). Additionally, the use of GBL may enhance critical thinking skills by using games requiring decision-making for designed complex, serious situations where limited information is offered (Mao et al., 2022).

Practice questions are frequently used in coursework to allow student self-assessment. According to Fensai et al. (2014), practice test questions can enhance student exam performance by accessing previously learned content and engaging the student with the material. Differing types of questions may be utilized. However, higher-level question types such as a case or PBL situations have been shown to use lower-level processes such as recall, then inferentially process and apply that information to the scenarios (Fenesi et al., 2014).

A case study is one strategy in team-based learning (TBL). According to Michaelsen and Sweet (2011), this method allows professors to cover the majority of content for a particular subject while allowing the participants to utilize their peer's knowledge to grow their understanding of the material. Vicarious learning and many benefits of group work include peer accountability, decision making, and problem-solving skill development (Michaelsen & Sweet, 2011). In this study, specific case scenarios required high-level thinking for patients with multiple significant medical co-morbidities presenting unique anesthesia challenges.

Traditional lectures with PowerPoint® presentations were also used for course content delivery for previous cohorts. Although there is argument that lectures still play a valuable role in higher education, the evidence for AL effectiveness is overwhelming (Dietrich & Evans, 2022). While students often prefer lecture, faculty perceive student engagement as low for passive lecture-based learning (Tsang & Harris, 2016).

CURRENT STUDY

Given that knowledge retention or lack thereof can impact patient safety, this study attempts to discern which active learning methods students prefer and some insight as to which is perceived as

the easiest to learn by. The following research questions drive the study:

1. **What are the student preferences of the seven presented teaching methodologies?**
2. **What method is the easiest to learn by?**

While there are many teaching methods and AL strategies, the seven selected for this study best fit the content within the course. Insights provided by this study guide formatting and activities for future cohorts in the program and contributes to student preference knowledge in higher level, high-stakes programs. It may help to guide development and curricular changes for future courses.

METHODOLOGY

Research Design

Student preference for content delivery and learning methods vary, and research has demonstrated that this may impact engagement and enjoyment (Grijpma et al., 2022; Onyura et al., 2016). However, very little research regarding student preference for content delivery methods in a high-stakes healthcare program is available and generalizable to nurse anesthesia residents. This study aimed to examine student learning preferences and engagement for seven different instructional methodologies; traditional lecture, a problem-based learning exercise, reading with workbook assignments, development of cognitive aids, game-based learning (GBL), practice questions, and a whole class case study. From this study, the authors desire to offer preferred teaching methods to facilitate knowledge acquisition and retention in a high-stakes graduate nurse anesthesia program. Teaching methodologies for analysis were selected by best fit and applicability to the content presented in the course.

Using a single case study, qualitative survey design, a student preference questionnaire was administered regarding the seven teaching methodologies during the 7th semester after the final didactic course of a nine-semester, three-year high stakes nurse anesthesia education program. The aim was to determine the student preferences for knowledge attainment when AL techniques and one traditional delivery method, lecture with a slide presentation, were utilized. Active learning techniques included a problem-based learning exercise, required reading with workbook assignments, development of a cognitive aid, and game-based learning.

Participants

After Institution Review Board (IRB) approval, a cohort ($N = 19$) of students who had completed their final didactic course, Advanced Principles of Anesthesia II, were queried regarding seven different teaching methodologies for course content delivery. The graduate student cohort consisted of licensed intensive care registered nurses having an average of 3.6 years of real-world intensive care clinical experience. The cohort had an average of 2146 hours of clinical anesthesia time at the end of their seventh semester in a nine-semester program. All were high-performing adult learners between the ages of 27 and 38 (29.88 mean). Participants were provided informed consent and informed of the voluntary, anonymous nature of the questionnaire, and an email link was sent to the cohort.

Instrument

The author developed survey, consisting of seven Likert scale ratings and two open-ended questions, was administered via an anonymous survey platform, Qualtrics®. Response rate was 89.5% ($N=17/19$). Survey questions included rating the seven methodologies on a scale from one to seven, with one being not preferred to seven being most preferred. Students were asked to rate each method based on overall preference, learning, time consumption, and ease of learning. Two open-ended questions included queries regarding ease of learning, challenges, and difficulties encountered related to each method.

Data Analysis

The quantitative data were entered into SPSS (version 27.0) for analysis. Descriptive statistics for participant age and gender were utilized to explore the characteristics of the respondents and student preferences pertaining to the seven teaching methodologies. A quantitative coding of qualitative data was completed to determine which teaching methodology students preferred using a Likert seven-point scale. Cronbach's alpha was used for determining internal consistency (0.678). A non-author coder was utilized. Being that the age range was narrow (27 – 38), coding for age group was accomplished by 0 representing ages ranging from 27 to 29, and 1 being assigned to 30 and higher. Pearson's R coefficient analysis was completed for existing correlation between teaching methodology preferences. Correlation was considered significant at the 0.01 level. Analysis of Variance (ANOVA) procedures were completed to determine if there was significance of preference for teaching methods by gender and age groups.

For qualitative data, a thematic analysis process was utilized. Initial codes were developed for emerging concepts in the data.

Key themes were then identified, refined, expanded, and derived with each iterative reading. Seven resulting themes emerged and were coded to the open-ended questions. Engagement was combined with enjoyment as the comments were interwoven. The resultant themes were engagement, independence, learning, depth of study, organization, and time. Data were grouped by themes revisited for appropriateness and reviewed to verify the findings' quality, authenticity, and trustworthiness.

The study components addressed the questions: What are the student preferences of the seven presented teaching methodologies? Which method is easiest to learn by? Overall and individual results for each method are reported.

FINDINGS

The overall response rate was 89.5% ($N = 17$). Mean age was 29.88 ($SD = 3.389$). Within the respondents, 8 students were male and 9, female. The first portion of the survey included the Likert scale questions. Likert scale coded data revealed significant correlations between student preference for GBL and workbook completion after assigned readings ($p = 0.47, r = 0.489$) and those that preferred GBL and whole class case studies ($p = 0.019, r = 0.561$). Preference for whole class case studies (26.3%) and workbook completion after assigned reading (47.4%) also correlated ($p = 0.020, r = 0.559$). A correlation between cognitive aid activity and GBL existed ($p = 0.18, r = .567$) as shown in Table 1. Practice questions were reported as the most favored method (68.4%) and one of the least time-consuming (0.58%), while GBL and workbook completion were reported as favorable (31.6%, 47.4 %, respectively) and less time-consuming (0.58, 10.5). No significant differences in preference were found between the other teaching methodologies. Most students reported the cognitive aid project,

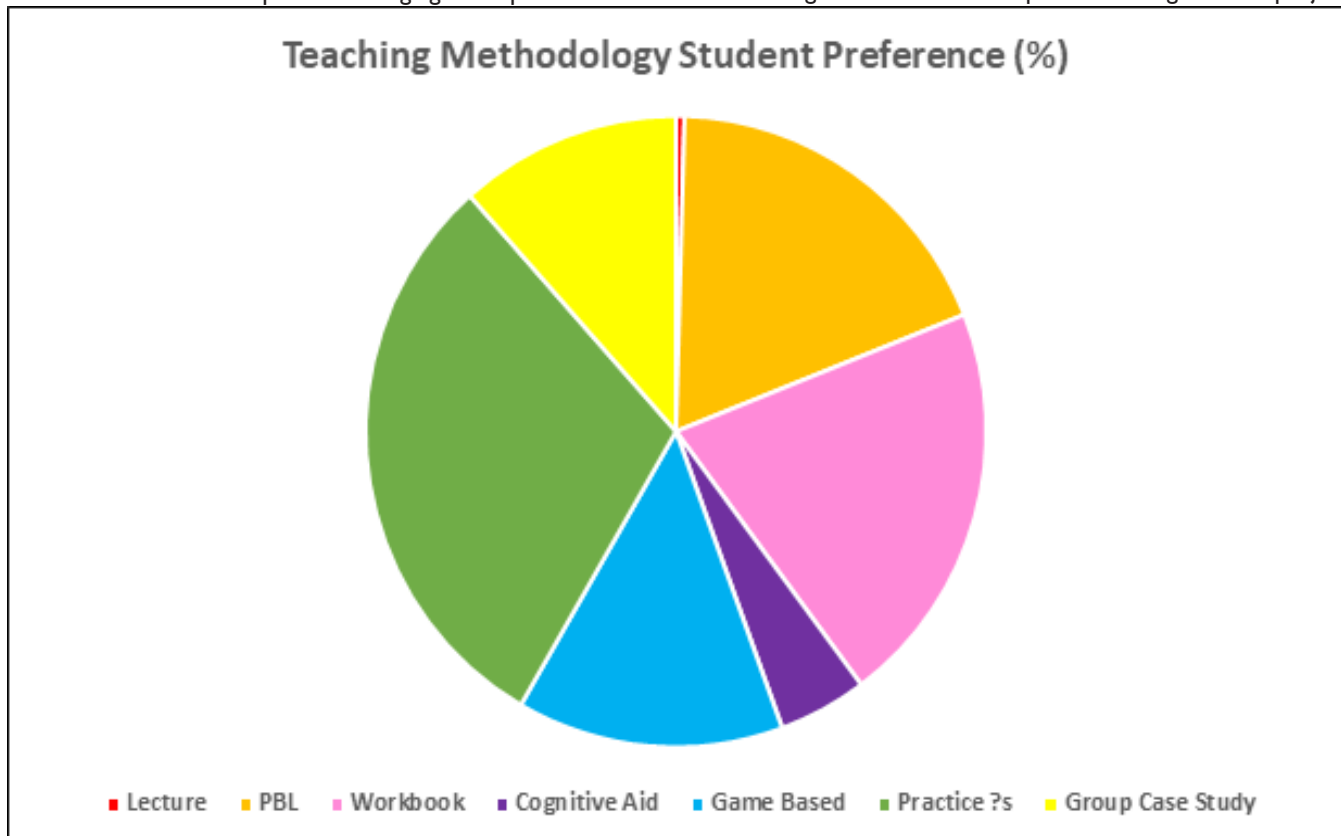


Figure 1. Student preference for active learning teaching methodologies

Table 1. Student preference correlation between active learning teaching methodologies

		Correlations						
		LECTURE	PBL	Workbook	Cognitive aid	Game Based	Practice Questions	Whole class case study
LECTURE	Pearson Correlation	1	.236	.073	.114	-.170	-.316	.279
	Sig. (2-tailed)		.362	.779	.664	.514	.216	.279
	N	17	17	17	17	17	17	17
PBL	Pearson Correlation	.236	1	.148	.209	-.099	.466	.098
	Sig. (2-tailed)	.362		.571	.422	.705	.059	.708
	N	17	17	17	17	17	17	17
Workbook	Pearson Correlation	.073	.148	1	.247	.488*	.183	.559*
	Sig. (2-tailed)	.779	.571		.340	.047	.481	.020
	N	17	17	17	17	17	17	17
Cognitive aid	Pearson Correlation	.114	.209	.247	1	.567*	.176	.446
	Sig. (2-tailed)	.664	.422	.340		.018	.499	.073
	N	17	17	17	17	17	17	17
Game Based	Pearson Correlation	-.170	-.099	.488*	.567*	1	.271	.561*
	Sig. (2-tailed)	.514	.705	.047	.018		.293	.019
	N	17	17	17	17	17	17	17
Practice Questions	Pearson Correlation	-.316	.466	.183	.176	.271	1	.475
	Sig. (2-tailed)	.216	.059	.481	.499	.293		.054
	N	17	17	17	17	17	17	17
Whole class case study	Pearson Correlation	.279	.098	.559*	.446	.561*	.475	1
	Sig. (2-tailed)	.279	.708	.020	.073	.019	.054	
	N	17	17	17	17	17	17	17

*. Correlation is significant at the 0.05 level (2-tailed).

the concept map, to be the most difficult to learn from (29.4%), and 74.4% considered it the least preferred method. Lectures were reported as the easiest to learn from (29.4%) and preferred by <1% of the cohort respondents. When students responded to the question asking them to rank the method with the amount of learning they feel they accomplished, correlations were present between PBL and case study ($r = .475, p = 0.20$) and the workbook with assigned reading ($r = .559, p = .020$). Both PBL and case study approached significance ($p = 0.59, p = 0.54$) respectively, as seen in Table 2.

No significant differences were reported between age groups for active learning teaching methods when compared using analysis of variance (ANOVA) to compare group means. Preference for GBL approached statistical significance (0.57) between groups, by gender as seen in Table 3. No statistical difference was found in preference for methodology and age groups.

Most of the qualitative feedback centered around negative comments related to lectures. Regarding engagement during lectures, comments included “staying engaged and focused on the lecture is difficult,” “paying attention is hard,” “I grow tired and lose focus,” and “I struggle to stay focused and need more breaks.” No positive comments for lectures were reported. Positive feedback for GBL, whole class case study, and practice questions included “very fun,” “fun,” “fun group work,” “competitive groups were fun,” “easy to learn from and fun,” “nice, fun,” and “easy to learn and enjoyable.” No negative comments regarding GBL were reported, while two comments regarding independence were reported identifying that lecture allowed more independent study, which was preferable ($N=2$). Depth of learning was identified as a theme related to the “difficulty” in finding answers or

content. The lecture was the only methodology with no depth of learning comments. Difficulty in learning was reported only with the cognitive aid (concept map). Comments included “although this method makes sense to some, others find it difficult to follow,” and “it helped me draw conclusions, but the end product was hard to revisit.” Disorganization was reported as a primary reason the students did not prefer the concept map method. The qualitative data supported the reported Likert scale data in that GBL, and practice questions had the most positive comments regarding engagement and learning (53%).

DISCUSSION

The results from the study provided faculty and program administration with enlightening information on student preference in higher-level, later stage graduate anesthesia courses. Given that students frequently prefer engaging methods to learn from, indirectly, the study allowed us to glimpse engagement via teaching methodology preferences. Student preference for AL activities over traditional lecture-based presentations was evident from the results. As our program desires to increase AL methods in our curriculum, the results helped faculty identify key strategies preferred by the students to guide course content delivery. In a program that utilizes high-fidelity patient simulation in the first year of the program and then shifts primarily to lecture in the higher-level courses, the results helped the faculty plan and set goals for future coursework. Student engagement in any class is desirable yet not easily achievable without proper faculty vision. The resultant goals of including GBL, workbooks with reading assignments, and practice questions in all higher-level courses serve to provide more and student preferred engagement

Table 2. Correlations between active learning methodologies for student learning

		Correlations				
		Learned most Practice ?s	LearnedMost PBL	Learned most Case study	Learned most Workbook	Learned most Game
Learned most Practice ?s	Pearson Correlation	1	.037	.436	.257	.182
	Sig. (2-tailed)		.889	.080	.320	.485
	N	17	17	17	17	17
LearnedMost PBL	Pearson Correlation	.037	1	.311	.773**	.224
	Sig. (2-tailed)	.889		.225	.000	.387
	N	17	17	17	17	17
Learned most Case study	Pearson Correlation	.436	.311	1	.321	.867**
	Sig. (2-tailed)	.080	.225		.209	.000
	N	17	17	17	17	17
Learned most Workbook	Pearson Correlation	.257	.773**	.321	1	.258
	Sig. (2-tailed)	.320	.000	.209		.317
	N	17	17	17	17	17
Learned most Game	Pearson Correlation	.182	.224	.867**	.258	1
	Sig. (2-tailed)	.485	.387	.000	.317	
	N	17	17	17	17	17

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3. Student preference for active learning teaching methodologies by gender

		ANOVA				
		Sum of Squares	df	Mean Square	F	Sig.
LECTURE	Between Groups	8.170	1	8.170	2.857	.112
	Within Groups	42.889	15	2.859		
	Total	51.059	16			
PBL	Between Groups	.837	1	.837	.297	.594
	Within Groups	42.222	15	2.815		
	Total	43.059	16			
Workbook	Between Groups	1.729	1	1.729	1.410	.253
	Within Groups	18.389	15	1.226		
	Total	20.118	16			
Cognitive aid	Between Groups	.432	1	.432	.127	.727
	Within Groups	51.097	15	3.406		
	Total	51.529	16			
Game Based	Between Groups	10.993	1	10.993	4.240	.057
	Within Groups	38.889	15	2.593		
	Total	49.882	16			
Practice Questions	Between Groups	1.001	1	1.001	.606	.448
	Within Groups	24.764	15	1.651		
	Total	25.765	16			
Whole class case study	Between Groups	4.844	1	4.844	1.450	.247
	Within Groups	50.097	15	3.340		
	Total	54.941	16			

opportunities. This study has been valuable to the faculty from a programmatic perspective and can potentially be highly valuable to engagement from the student perspective.

LIMITATIONS

Limitations to the study included a small sample size ($N = 19$) from a single cohort in the Southeastern United States. As such, generalizability is very limited. Although there are many common characteristics, including high-performing adult learners, nursing experience, and similar age ranges, to U.S. nurse anesthesia programs, the results cannot be assumed to be transferrable. An additional limitation may lie in student familiarity with AL methods, one in particular. For example, in the concept map creation assignment, a student with limited or no previous experience in map development may struggle as a learning curve is present. Even with previous discussions and an example map provided, the preference for this activity was low. The product may depend upon the instruction's quality regarding the concept map. The study only investigated lecture plus 6 AL methods, whereas there are many more types.

Additionally, a larger population or longitudinal study which included focus groups would likely generate more in-depth discussion and data. A smaller Likert scale of options such as 1 = do not prefer, 2 = neutral, and 3 = prefer would have yielded more precise data. Distinguishment between a score of 6 = highly preferred and 7 = most preferred complicated interpretation. Further investigation that included quantitative measures of learning such as grade improvement comparisons between methodologies would have yielded more robust data yet was outside the scope of the original aim of the study. Despite the limitations, this study met the program's needs to determine student preferences for teaching-learning methodologies, particularly an advanced anesthesia course.

KEY FINDINGS

Students in a final didactic course in a high-stakes nurse anesthesia program prefer specific AL teaching methodologies over traditional lectures with PowerPoint® presentations. Although students reported PBL scenarios as a favored method by which to learn, they also noted that it was one of the most time-consuming and somewhat harder to learn from, indicating that the students do not mind spending the effort to learn when the material or method of instruction is engaging. Conversely, the lecture was considered the least time-consuming yet hardest to learn.

Although not statistically significant ($p = 0.57$), it was interesting that a difference existed in preference for GBL. Future replication studies with larger populations could address this. Correlations between PBL and workbook assignments as well as GBL and case study were significant, and it may likely be due to the fact that the PBL exercise was presented and designed as a preprinted question and essay answer format. Practice questions and PBL demonstrated correlation as did GBL and case study.

CONCLUSION AND FUTURE RESEARCH

Future research topics identified from this study are an in-depth study of rationale for preference when comparing one topic to another and an investigation comparing teaching methodology and student engagement measures effects on quantitative scores. A repeat study with a larger population would also provide a richer insight into student preferences, perceptions, and rationales

for each methodology. It may also be beneficial to understand the faculty perceptions and difficulties in transitioning traditional content-heavy lectures to AL approaches as well as the amount of time and effort required to develop the activities preferred by students.

This study investigated student preferences for different teaching methodologies and their perception of learning from each type studied. Some implications can be inferred as related to high-stakes, nurse anesthesia final didactic courses. First, the student population did prefer AL activities, regardless of type, over traditional lectures with PowerPoint® presentations. This result suggests that the AL activities should continue to be utilized and perhaps increased in number to promote student engagement. For students to engage, the activity needs to be enjoyable and not "fatiguing" based on qualitative feedback from the study. Secondly, although an indirect inference, faculty must respond to student preferences to actively engage students in traditionally lecture-based courses. Historically, many professors simply teach the way they were instructed, and AL was not a part of that style. Instructors need to be willing to educate themselves on AL activities and measures to implement those into their courses. Lastly, students did not mind spending more time learning at higher depth if the teaching methodology was engaging. While this resounds of AL principles and there is supporting evidence in the literature, little exists in support for specific AL methods in content-heavy, later stage graduate nursing and medical courses. Much evidence exists for using simulation, an AL method, in medical and nursing education, yet more is needed to investigate other approaches that may be preferred and more engaging for students.

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