

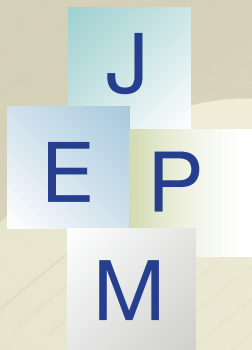
The Journal of Education in Perioperative Medicine

FROM THE CO-EDITORS-IN-CHIEF: SELECTED ABSTRACTS FROM THE SEA 2026 SPRING MEETING

As the co-editors of the *Journal of Education in Perioperative Medicine* (JEPM), we are pleased to introduce this supplemental issue featuring the top abstracts from the Society for Education in Anesthesia (SEA) 2026 Spring Meeting, held April 24–26 in St. Louis, Missouri. Themed “Beyond the Anesthesia Machine: Finding Your Professional Purpose,” this year’s meeting highlighted work spanning both rigorous educational research and innovative curriculum design. Abstracts were peer reviewed by the SEA Research Committee, with the top three selected in each of two categories, educational research and innovative curriculum. The selected abstracts include studies examining workforce diversity in anesthesiology career pathways, motion-tracking to accelerate POCUS skill acquisition, and the role of virtual reality in procedural training, alongside curricula addressing pain education, faculty development, and gastric POCUS implementation.

The Philip Liu Award for Innovation in Anesthesia Education recognized two abstracts included in this supplement: **Karin H. Vangura, MD, PhD, DABA**, for Best Innovation in Curriculum Abstract (*Simulation-Based Gastric POCUS Training for Faculty: Enhancing Preoperative Safety in Patients on GLP-1 Receptor Agonists*) and **Max Y. Lu, BS**, for Best Education Research Abstract (*Association of Demographic Characteristics with Evolution of Interest in Anesthesiology During Medical School*).

This supplement marks the first in what we intend to be an ongoing tradition of JEPM publishing top abstracts from the SEA Spring Meeting, recognizing the work of our community while extending the reach of these ideas beyond the conference.



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SUPPLEMENT

Peer-Led Teaching Workshops for Anesthesiology Clinician-Educators: A Model for Impactful Faculty Development

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INTRODUCTION

Academic anesthesiology faculty receive minimal formal teaching instruction despite substantial educational responsibilities, creating disparities in educational effectiveness that may impact trainee development and patient outcomes. Existing faculty development programs often lack specialty-specific focus and fail to address the unique challenges of academic anesthesiology practice, including irregular schedules, production pressures, and high-acuity clinical demands. We developed a peer-led workshop series, grounded in Darling-Hammond's Seven Features of Effective Professional Learning, that aimed to address this critical gap for anesthesiology clinician-educators at all career stages.

CURRICULUM DETAILS

We conducted a total of 15 virtual workshops at a large academic medical center over a period of 4 years. Following annual needs assessments, volunteer faculty formed teams to develop workshops on high-priority topics (e.g., feedback delivery, bedside teaching, assessment strategies, or simulation debriefing). Each team received a theory-

based planning guide and mentorship from senior education leaders while developing their individual workshops over 3-6 months. Workshops were then delivered via Zoom video-conferencing at day's end to maximize attendance, emphasizing active learning and practical application. We evaluated workshop effectiveness using Kirkpatrick Model-based surveys measuring satisfaction, engagement, applicability, confidence, and pre-post knowledge/skill ratings among attendees on 5-point Likert scales. We also gathered qualitative feedback to assess faculty perceptions of the workshops and intended practice changes.

RESULTS

Seventy-one survey responses (including 201 paired pre-post ratings) demonstrated high levels of satisfaction (mean 4.54, SD 0.60), engagement (4.46, SD 0.77), and perceived applicability (4.59, SD 0.52). Self-reported knowledge and skill improved significantly from pre-workshop (3.46, SD 1.14) to post-workshop (4.58, SD 0.64), yielding a mean improvement of 1.12 ($Z = -9.89$, $p < 0.001$) with a large effect size (rank-biserial $r = -0.940$). Participants expressed high confidence

in applying content (4.50, SD 0.58). Workshops received overwhelmingly positive feedback, which also reflected a strong desire for instruction in learner-centered teaching methodologies.

DISCUSSION

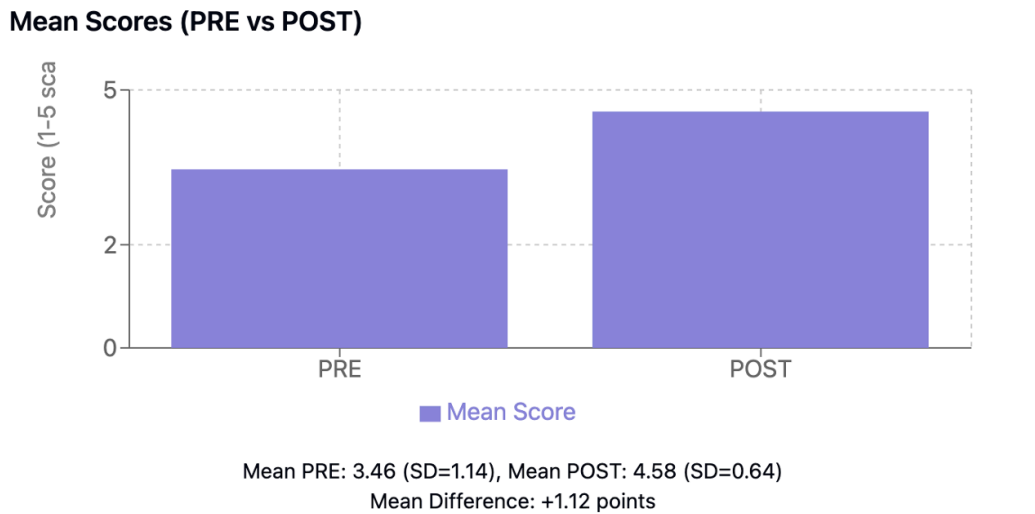
A peer-led workshop series yielded substantial improvements in self-reported clinician-educator confidence and skill. The format was efficient and cost-effective, requiring no external funding, invited speakers, or clinical time away for attendance. The virtual format and peer teaching model addressed specialty-specific barriers while fostering collaborative learning. Participants valued the delivery of practical, immediately applicable content tailored to anesthesiology contexts. A peer-led workshop approach may offer a sustainable solution for departments facing similar faculty development challenges, providing a blueprint for high-quality clinician-educator instruction in anesthesiology. Future directions may focus on building longitudinal reinforcement opportunities and assessing downstream impacts on learner outcomes.

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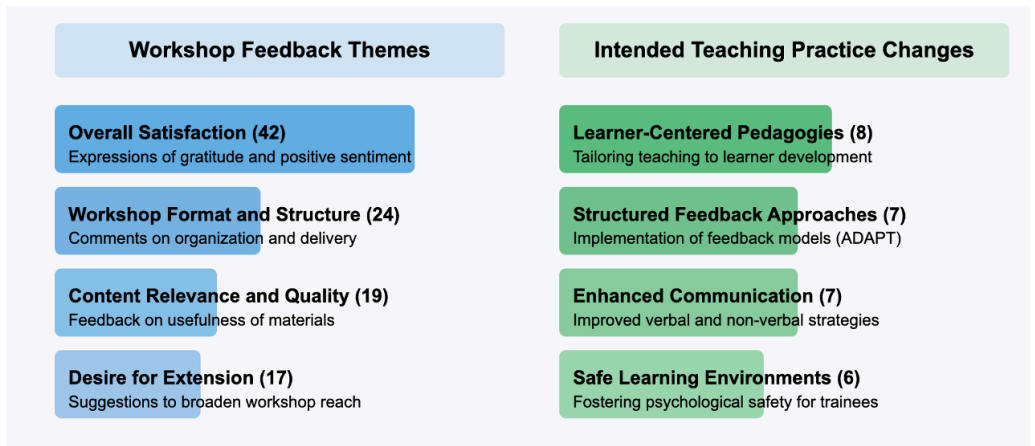
Figures

Figure 1. Change in participants’ mean self-reported skill and knowledge ratings from before to after the survey. Difference achieved significance.



Distribution of survey results for the post procedural survey. Participants in the VR training group felt they knew the correct procedural steps without guidance better than participants in the traditional training group.

Figure 2. Summary of aggregated qualitative feedback and major comments.



Summary of aggregated qualitative feedback and major comments.

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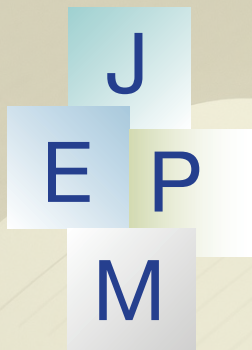
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Table

Table 1. Summary statistics of survey data.

Variable	N	Mean	Median	SD	SE	IQR
<i>Satisfied?</i>	71	4.54	5	0.60	0.07	1 (4-5)
<i>Engaged?</i>	70	4.46	5	0.77	0.09	1 (4-5)
<i>Applicable?</i>	71	4.59	5	0.52	0.06	1 (4-5)
<i>PRE Knowledge</i>	202	3.46	4	1.14	0.08	2 (2-4)
<i>POST Knowledge</i>	201	4.58	5	0.64	0.04	1 (4-5)
<i>Overall Confidence</i>	68	4.50	5	0.58	0.07	1 (4-5)
<i>Change?</i>	9	4.22	4	0.79	0.26	1 (4-5)

Summary statistics of survey data.



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SUPPLEMENT

Association of demographic characteristics with evolution of interest in anesthesiology during medical school

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INTRODUCTION

Physician workforce diversity improves access to care, outcomes, and workforce productivity. Female and LGBTQ+ physicians remain underrepresented in anesthesiology, yet how specialty interest evolves during medical school is unclear. Prior work noted female medical students' lower entry into male-dominated specialties was due to lower initial and cultivated interest, though anesthesiology was not specifically examined. We examined the association of sex and sexual orientation with evolution of interest in anesthesiology during medical school, hypothesizing female students would have lower initial and cultivated, but similar sustained interest to male counterparts, while bisexual, gay, and lesbian students would have lower initial, cultivated, and sustained interest.

METHODS

This retrospective cohort study included US medical students matriculating 2014-2017. Self-reported sex, sexual orientation, and anesthesiology interest at matriculation and graduation were

provided by the American Association of Medical Colleges. Chi-square tests were used to characterize differences in sociodemographic characteristics between groups based on initial interest and anesthesiology interest evolution: never interested (no interest at matriculation nor graduation), cultivated (interest at graduation but not matriculation), sustained (interest at matriculation and graduation), and extinguished interest (interest at matriculation but not graduation). Binomial logistic regression (without adjustment) was used to test associations of sociodemographic characteristics with evolution of interest in anesthesia, including sustained vs extinguished and cultivated vs never interested paths. For regression, bisexual, gay, and lesbian students were grouped as sexual minority students.

RESULTS

Of 39,473 students in the final cohort, 36,704 were never interested in anesthesiology, 1,990 cultivated interest, 294 sustained interest, and 485 had extinguished interest. Female students were less likely than males to have initial

interest (1.5% vs 2.5%, $p < 0.001$), but among females with initial interest in anesthesia, there was no difference in likelihood of sustained interest (OR: 0.87, 95% CI: 0.64-1.17). Females without initial interest were less likely to cultivate interest than males (OR: 0.50 95% CI: 0.45-0.54). Sexual minority students were not significantly less likely to have initial (1.8% vs 2.0%, $p = 0.507$) or sustained interest (OR: 0.79, 95% CI: 0.40-1.47), but had lower cultivated interest (OR: 0.81, 95% CI: 0.66-0.98) than heterosexual peers.

DISCUSSION

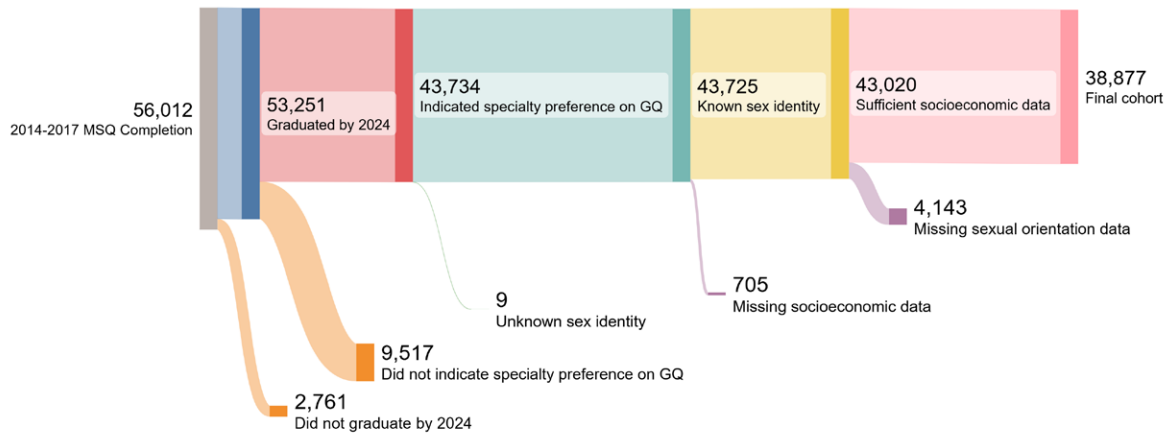
Female anesthesiologists' underrepresentation is driven, in part, by both low initial and cultivated interest during medical school. Sexual minority students were less likely to cultivate interest, and although not statistically significant, their lower odds of initial and sustained interest suggest possible barriers warranting further investigation. These findings highlight points during training where targeted engagement efforts could promote diversity within anesthesiology.

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Figure

Figure 1. Sankey Diagram for Inclusion in Cohort



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Tables

Table 1. Characteristics of Study Cohort (unadjusted)

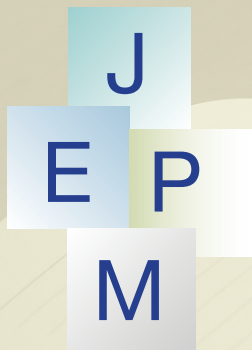
	All students (N=39,473)	Never Interested (N=36,704)	Cultivated Interest (N=1,990)	Sustained Interest (N=294)	Extinguished Interest (N=485)	P
Sex						<0.001
Male	18,645 (47.2%)	16,925 (42.9%)	1,258 (3.2%)	180 (0.5%)	282 (0.7%)	
Female	20,828 (52.8%)	19,779 (50.1%)	732 (1.9%)	114 (0.3%)	203 (0.5%)	
Sexual Orientation						0.005
Heterosexual or straight	36,940 (93.6%)	34,327 (87.0%)	1,879 (4.8%)	279 (0.7%)	455 (1.2%)	
Bisexual	1,184 (3.0%)	1,136 (2.9%)	34 (0.1%)	5 (0.0%)	9 (0.0%)	
Gay or lesbian	1,349 (3.4%)	1,241 (3.1%)	77 (0.2%)	10 (0.0%)	21 (0.1%)	
Sexual Minority						0.329
Yes	2,533 (6.4%)	2,377 (6.0%)	111 (0.3%)	15 (0.0%)	30 (0.1%)	
No	36,940 (93.6%)	34,327 (87.0%)	1,879 (4.8%)	279 (0.7%)	455 (1.2%)	

Breakdown of overall cohort characteristics and interest paths by sex and sexual orientation. Chi-square tests were used to assess associations between student characteristics and interest paths. Percentages may appear as 0.0% and may not sum to 100% due to rounding.

Table 2. Association of Demographic Variables with Career Path in Anesthesiology

	Cultivated Interest vs Never- Interested (ref)	Sustained vs Extinguished (ref)
	OR (95%CI)	OR (95%CI)
Sex		
Female (ref: male)	0.50*** (0.45-0.54)	0.87 (0.64-1.17)
Sexual Orientation		
Sexual Minority (Bisexual, gay, or lesbian) (ref: heterosexual or straight)	0.81* (0.66-0.98)	0.79 (0.40-1.47)
* = $p < 0.05$; *** = $p < 0.001$		

Binomial logistic regression examining associations of sex and sexual orientation with anesthesiology career paths: cultivated (vs never interested) and sustained (vs extinguished). Male and heterosexual students served as the reference groups.



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SUPPLEMENT

Virtual Reality (VR) Training for Anesthesiologists in Invasive Procedures (VR TAIP) - a Single Center Randomized Controlled Trial

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INTRODUCTION

Central venous catheter (CVC) placement is a common but technically demanding procedure associated with risks such as infection, pneumothorax, and bleeding. Simulation-based training can improve performance, but manikin training is often variable and resource-dependent. Virtual reality (VR) offers a standardized, immersive environment for skill development, and combining VR with manikin-based training may provide complementary benefits. This study evaluated whether a blended VR-manikin curriculum enhances anesthesiology residents' performance in internal jugular CVC (IJ-CVC) placement compared to manikin training alone.

METHODS

We conducted a single-center randomized trial of 26 first-year anesthesiology residents assigned to manikin training (n=14) or VR plus manikin training (n=12). Both groups received two sessions before the elective cardiac rotation. Clinical performance during the first IJ-CVC placement in the cardiac rotation was video-recorded and

assessed by blinded experts. The primary outcome was total performance score; the secondary outcomes included post-training satisfaction, self-efficacy, and cost effectiveness. Data were analyzed using generalized linear models for continuous outcomes and Mann-Whitney U or Fisher's exact tests for categorical variables. Significance was set at $p < 0.05$.

RESULTS

Overall clinical performance was comparable between groups (manikin: $86.49 \pm 10.34\%$ vs. VR: $83.88 \pm 8.07\%$, $p=0.486$), as were hands-on interventions by supervising physicians ($p=0.900$). Self-efficacy and training satisfaction did not differ significantly. VR trainees more often felt they "knew the procedural steps without guidance" ($p=0.037$), whereas manikin training rated higher for "needle tracking" ($p=0.00023$) and "motor skills" ($p=0.0036$). No differences were observed for realism ($p=0.541$), comfort with performing a CVC on a patient ($p=0.460$), or overall satisfaction ($p=0.678$). Additionally, VR training was more cost-efficient (\$131/session vs. \$184.50/session), with scalability advantages due to lower recurring equipment and personnel costs.

DISCUSSION

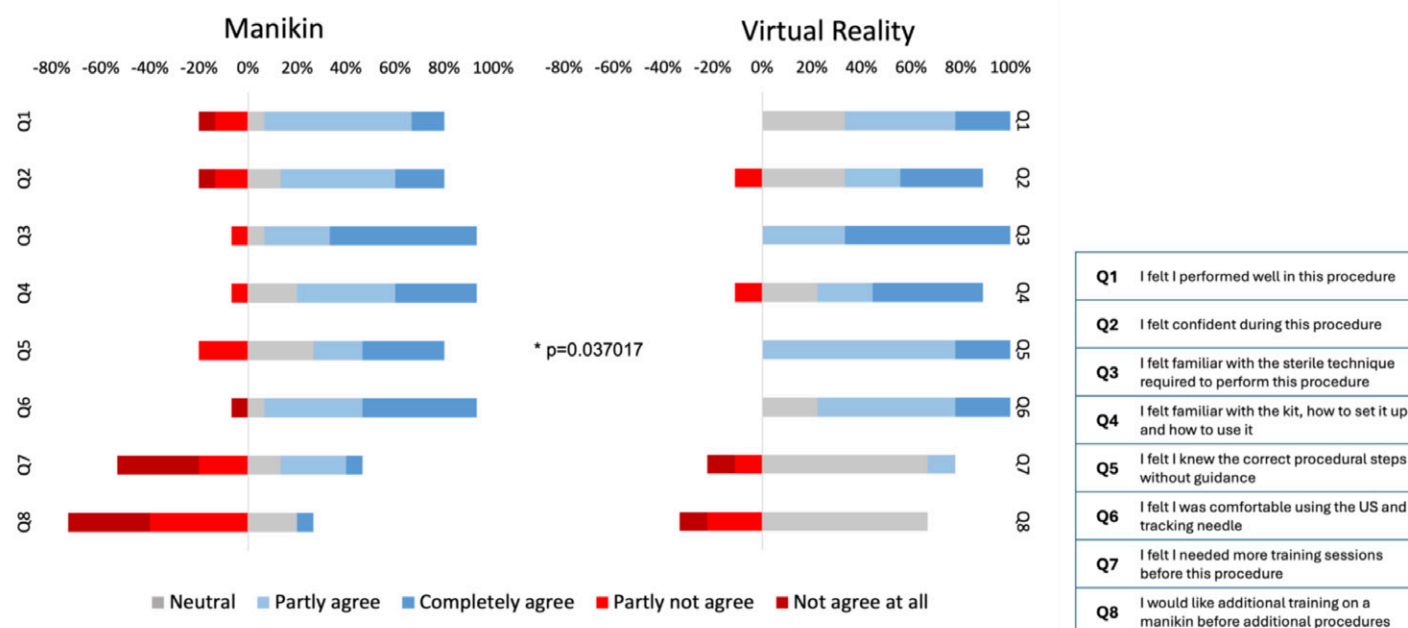
VR plus manikin training yielded comparable overall clinical performance, procedural confidence, and satisfaction to manikin training alone for IJ-CVC placement. Step-specific differences suggest that VR emphasizes structured procedural flow, while manikin training better supports tactile and post-procedural tasks. Participants valued VR's guided practice, although motor fidelity and needle tracking were perceived as limitations. Cost analysis demonstrated VR training is more scalable and cost-efficient, reducing faculty supervision needs. These findings support VR as a viable adjunct in a blended CVC training curriculum, complementing traditional manikin-based methods. Future work should evaluate long-term retention, multi-modal integration, and improvements in VR motor realism. Additionally, VR may serve as an effective refresher tool for clinicians with prior procedural experience, given lower satisfaction with fine motor skill development in novice users.

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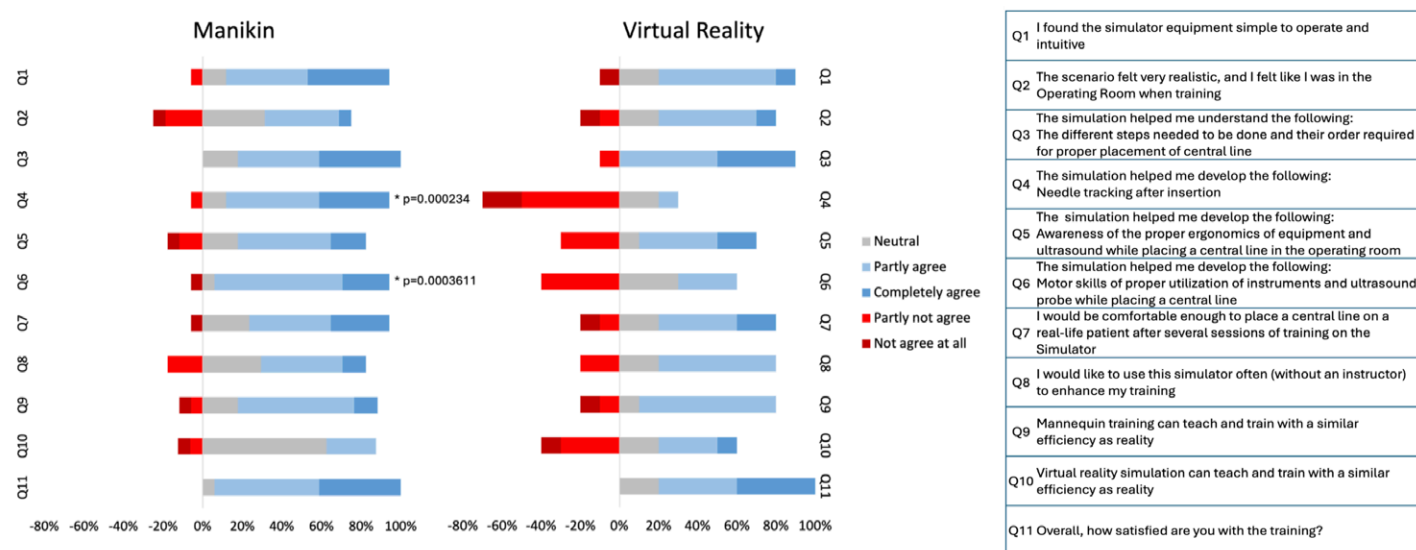
Figures

Figure 1. Post procedural survey

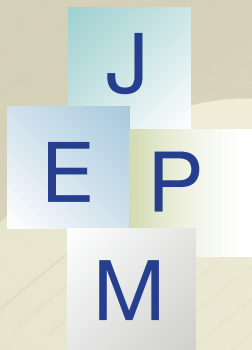


Distribution of survey results for the post procedural survey. Participants in the VR training group felt they knew the correct procedural steps without guidance better than participants in the traditional training group.

Figure 2. post training survey results



Distribution of survey results for the post training survey. Participants in the VR training group had more difficulty with needle tip tracking and motor skills than participants in the traditional training group.



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SUPPLEMENT

Optimizing POCUS Training: Hand Motion-Tracking Accelerates Procedural Efficiency

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INTRODUCTION

Traditional expert feedback for point-of-care ultrasound (POCUS) training is effective but variable and difficult to scale. Hand motion-tracking metrics (rotational and translational movements) have been shown to discriminate operator experience and describe procedural learning curves. Segmentation of procedures enables step-level analysis and may eventually support targeted, individualized feedback. We hypothesized that supplementing expert coaching with individualized motion-tracking feedback would accelerate skill acquisition and bring novice learners closer to expert performance.

METHODS

In this randomized controlled educational study, Wayne State medical students were assigned to either (1) expert feedback alone or (2) expert feedback plus individualized hand motion-tracking

feedback. Participants completed two 2-hour training sessions on consecutive days with a competency exam after the sessions. Motion capture (Polhemus Liberty, 240 Hz) recorded path length, rotational sum, accelerations, and completion time. Segmentation analyses were performed to characterize subtask-level performance. Expert performance benchmarks were established for each metric to enable comparison with learners.

RESULTS

Students receiving motion-tracking feedback demonstrated significant improvement in translational efficiency from Day 1 to Day 2 ($p=0.0006$), whereas controls did not ($p=0.39$). Compared with experts, controls remained significantly worse at Day 2 ($p=0.0238$), while intervention learners were no longer statistically different from experts ($p=0.10$), indicating that the intervention closed the performance gap. Similar trends

were observed in rotational efficiency, accelerations, and task completion time, with intervention participants showing faster, more efficient performance gains than controls. Segmentation analyses identified ultrasound views that improved most across training, suggesting future potential for targeted, real-time remediation.

DISCUSSION

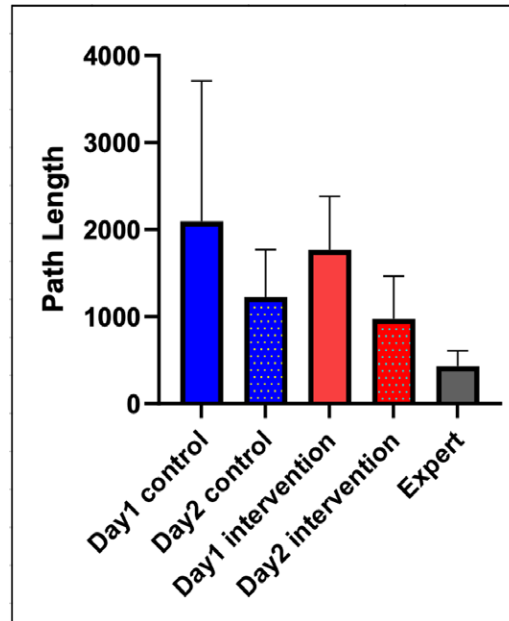
Integrating motion-tracking with expert coaching enhances efficiency, accelerates learning, and promotes expert-level performance in medical student POCUS training. This approach enables targeted, deliberate practice and may improve scalability of ultrasound education. Future work will include validation with resident (PGY) comparators and broader implementation across procedural domains.

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Figures

Figure 1. Mean path length during POCUS reflects procedural efficiency across groups



Mean $\pm$ SD path length across groups. Lower values indicate greater efficiency. Error bars show SD. *p*-values from Mann-Whitney tests: Day 1 control vs intervention $p = >0.9999$; intervention Day 1→Day 2 $p = 0.0006$; control Day 1→Day 2 $p = 0.39$; Day 2 control vs intervention $p = 0.3023$; control Day 2 vs expert $p = 0.0238$; intervention Day 2 vs expert $p = 0.10$.

Figure 2. Rotational efficiency (lower = better)

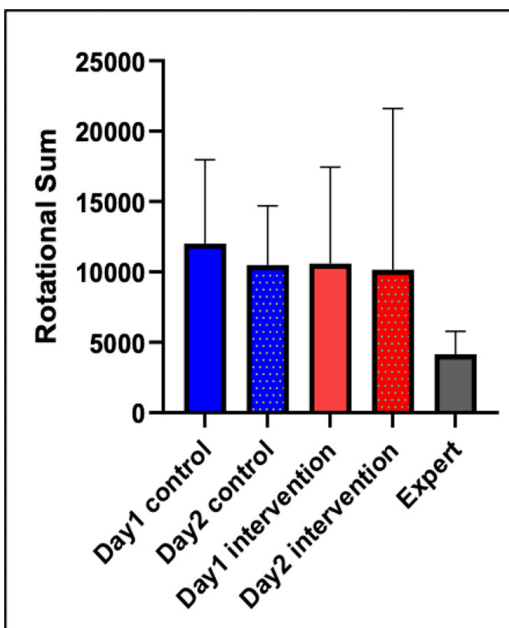
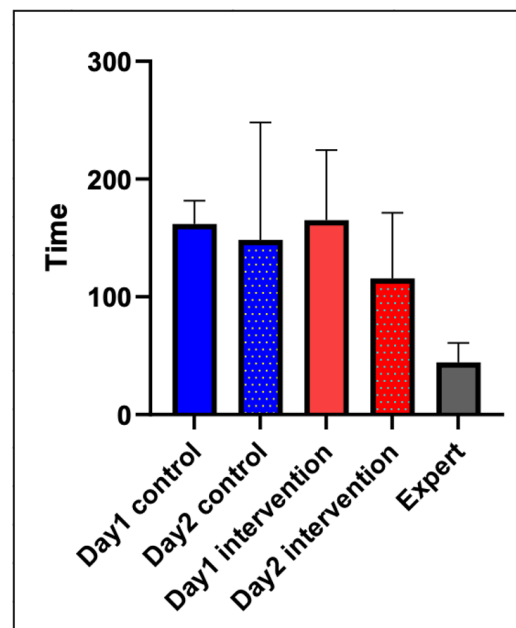
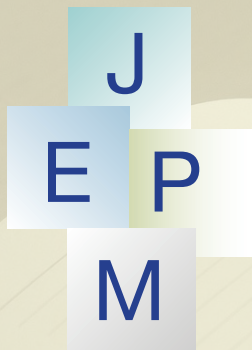


Figure 3. Completion time (seconds)





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SUPPLEMENT

Incorporating Formal Didactics on Pain Management into the Undergraduate Medical Education Curriculum

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INTRODUCTION

Acute and chronic pain affect millions of people worldwide and is one of the most common reasons for physician visits across all specialties. While enhancing pain education for practicing physicians has been a priority, enhancing the pain management curriculum in undergraduate medical education has been identified as a need as only 3% of U.S. medical schools have any time dedicated to pain education.^{1,2}

CURRICULUM DETAILS

The anesthesiology department, through a faculty attending with subspecialized training in chronic pain medicine, developed formal didactics on pain management for the undergraduate medical education curriculum to build foundational knowledge for assessing and treating pain. Students were given didactic material to review, including a recorded virtual lecture on the physiology of pain, conducting a basic pain assessment, and pharmacologic and non-pharmacologic treatment modalities. The following day, students attended a facilitator supervised

team-based learning clinical exercise. All facilitators were faculty members of the anesthesiology department with expertise in acute and/or chronic pain management. During which, students followed a patient with chronic pain requiring increased opioids for management. The case initially emphasized the evaluation, diagnosis and adjustment of therapy. As it progressed, acute, postoperative and cancer pain were discussed. Key points included patient-centered care, thorough assessment, the importance of recognizing and treating psychological aspects of pain, multimodal pain treatment, the appropriate utilization of opioids, and the importance of recognizing implicit biases in patient outcomes.

RESULTS

To evaluate the impact of these efforts, students completed pre- and post- surveys with binary and Linkert scale questions about their comfort level in assessing and managing pain. Both pre- and post-surveys were completed by 197 medical students, all of whom had completed at least one clinical clerkship. The Linkert

surveys showed significant increases in student comfort level when measuring pain, taking a pain history, and managing patients with a history of substance abuse or opioid tolerance with the average score rising from 3.16, 3.24 and 2.37 to 4.01, 4.09 and 3.55 respectively, ($P < 0.001$, Figure 1). Additionally, it can be seen in Figure 2 that post-curriculum, most students felt confidence in their ability to help patients experiencing pain.

DISCUSSION

These figures indicate that the curriculum had significantly increased student confidence in addressing pain concerns. Future directions for this project would include developing follow up assessments to measure knowledge retained from the curriculum, and determining the impact on clinical practice.

References

1. Virtual Mentor. 2013;15(5):421-427. doi: 10.1001/virtualmentor.2013.15.5.medu1-1305
2. AMA J Ethics. 2020;22(8):E709-717. doi: 10.1001/amajethics.2020.709.

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Figure

Figure 1. The average responses to 6 key Linkert-scale questions before and after the curriculum were compared. The asterisk signifies $P < .001$.

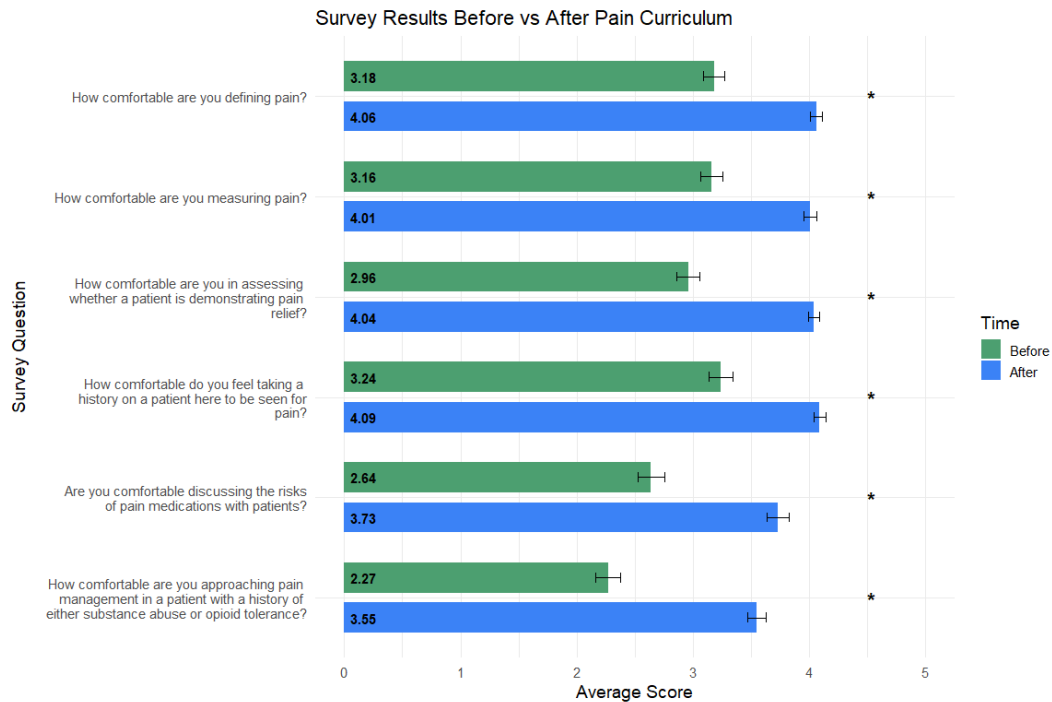
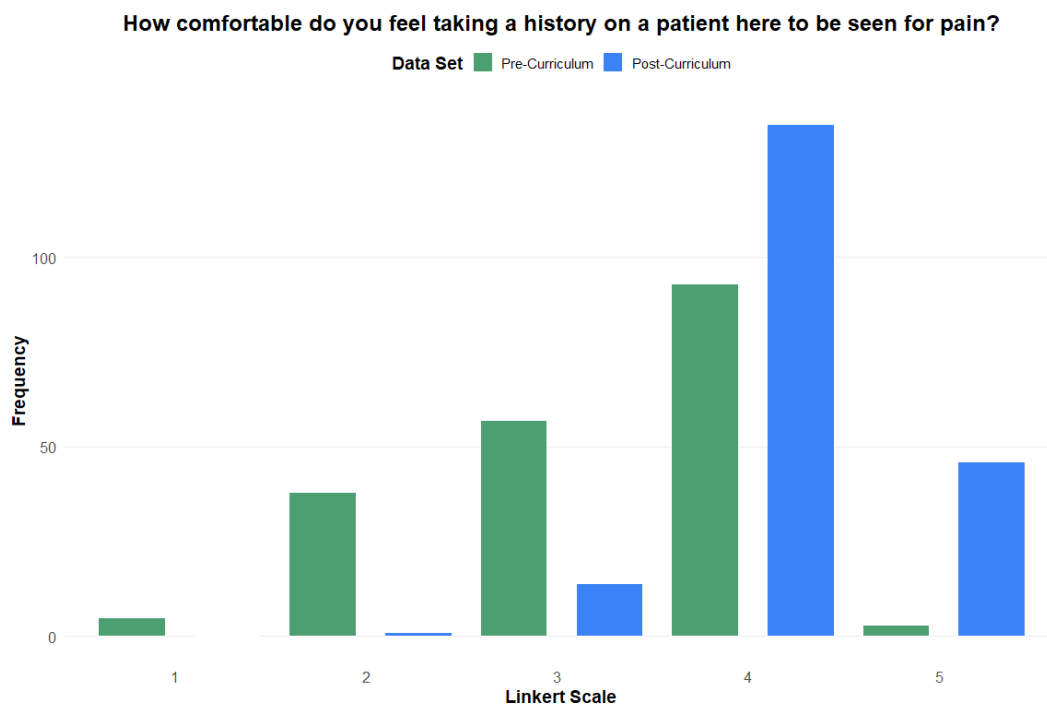


Figure 2A. Linkert scale survey response distribution before and after the curriculum.

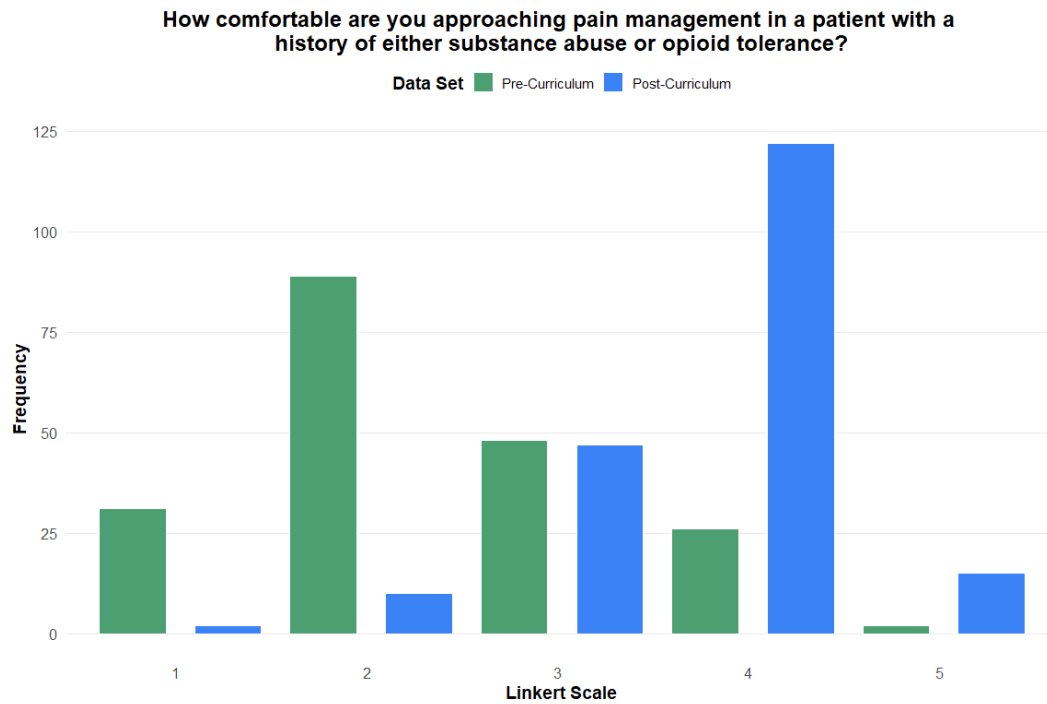


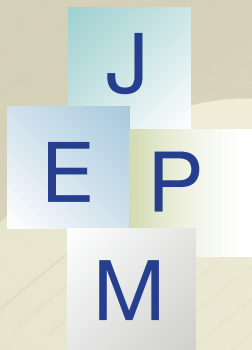
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Figures

Figure 2B. Linkert scale survey response distribution before and after the curriculum.





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SUPPLEMENT

Simulation-Based Gastric POCUS Training for Faculty: Enhancing Preoperative Safety in Patients on GLP-1 Receptor Agonists

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INTRODUCTION

In response to the 2023 ASA guidance on aspiration risk in patients using GLP-1 receptor agonists, an interdisciplinary simulation-based curriculum was developed at an academic institution. Designed for anesthesiology and emergency medicine departments, the training focused on gastric point-of-care ultrasound (POCUS) to enhance perioperative risk assessment and clinical decision-making through hands-on scanning and case-based learning.

CURRICULUM DETAILS

The curriculum emphasized gastric POCUS as a tool for evaluating aspiration risk in surgical patients on GLP-1 receptor agonists. Instructional strategies included a structured didactic session with a PowerPoint presentation, followed by hands-on scanning and case-based simulation. Content covered gastric anatomy, ultrasound technique, interpretation of gastric content, and ASA guidance. Clinical scenarios reinforced informed consent and perioperative

planning. Developed collaboratively by faculty from anesthesiology and emergency medicine, the curriculum was led by Dr. Karin Vangura, MD, formally trained in gastric ultrasound. Emergency medicine faculty with point-of-care ultrasound expertise served as simulation instructors. Live volunteers were used for scanning practice to simulate realistic patient encounters. Participants completed a 10-question pre-test and a similar post-test to assess knowledge acquisition and retention. Questions focused on ultrasound technique and clinical application. Trainees included 5 staff anesthesiologists, 12 anesthesia residents and 8 CRNAs. Evaluation methods included score comparison, self-assessment surveys, and identification of perceived barriers to implementation.

RESULTS

Twenty-five individuals participated. Twenty-five individuals participated in the study, including 5 staff anesthesiologists, 8 certified registered nurse anesthetists (CRNAs), and 14 anesthesia residents.

No emergency medicine residents were recorded among the respondents. Pre-test scores ($M = 5.66$, $SD = 2.11$) increased to post-test scores ($M = 7.66$, $SD = 1.47$), reflecting a mean improvement of 2.00 points. A paired t-test confirmed statistical significance ($t(28) = 6.22$, $p < 0.0001$). The mean difference was 2.00 points (95% CI: 1.34–2.66), with a large effect size (Cohen's $d = 1.15$).

DISCUSSION

The curriculum addressed a clear gap in awareness and application of gastric POCUS, especially in managing patients on GLP-1 RAs. The interdisciplinary format promoted collaboration and consistent safety practices across departments. Future directions include expanding access, integrating training into residency programs, developing additional instructors, and enhancing simulation fidelity. Longitudinal evaluation will assess retention and clinical impact. This model supports scalable, guideline-driven education to improve perioperative safety.

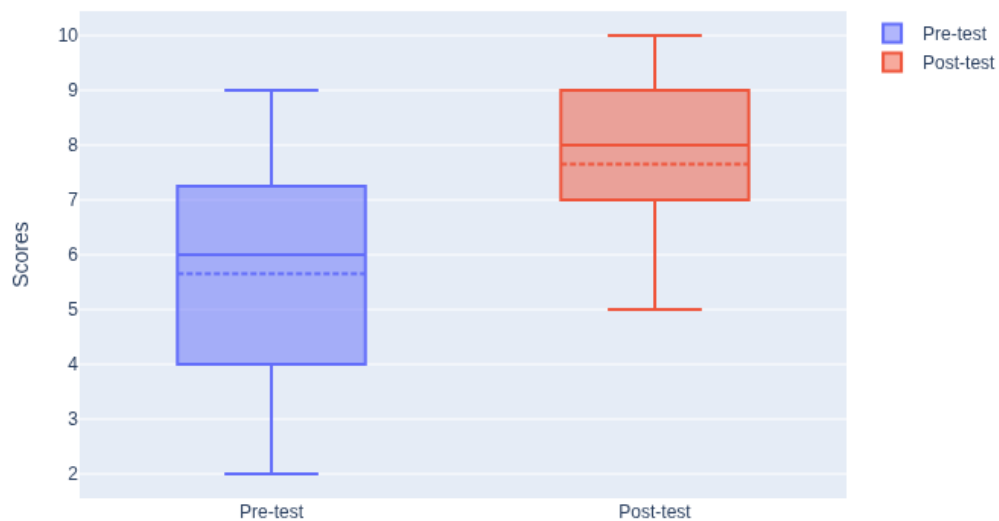
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Figure

Score Improvement Analysis via Box Plot: Pre-test vs. Post-test Performance

Pre-test vs Post-test Scores



Score Improvement Illustrated via Box Plot: Pre-test vs. Post-test