

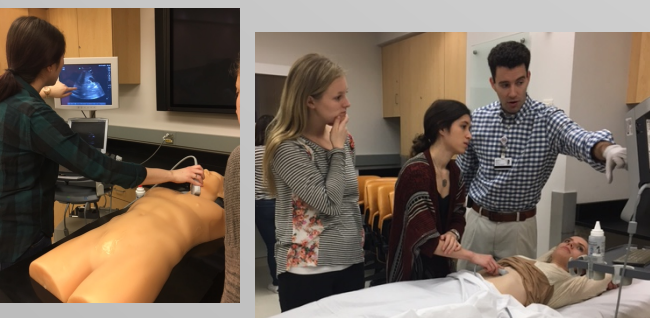
Background

Point-of-care ultrasonography (POCUS) is within the physician assistant (PA) scope of practice and is utilized in many medical specialties for diagnostic and procedural guidance. Medical schools integrate POCUS into their curriculum by blending didactics with hands-on training and evaluate students through written and hands-on assessments. There is a need to identify effective curricular methods to teach and assess POCUS to PA students; however, lack of finances, trained faculty, and time are barriers to PA POCUS curriculum implementation. To address these, this study aims to determine if online training is an effective alternative to hands-on training for resource-limited PA programs to teach POCUS.

Methods

A non-randomized design was used. Didactic PA students from two programs were divided into and "high-resource" (Group A, n=34) and "resource-limited" (Group B, n=36) groups based on available ultrasound resources. A two-part **mastery learning curriculum** of the extended focused assessment with sonography for trauma (eFAST) was comprised of pre-testing, educational intervention, then post-testing until achieving assessment mastery (Figure 1). During Part I, knowledge acquisition, both groups utilized identical PowerPoint presentations, videos, and readings; a twenty-question multiple choice questionnaire (MCQ) was the assessment tool. During Part II, skill acquisition, Group A underwent hands-on learning with experienced faculty, standardized patients (SPs), and task trainers (Images 1&2) while Group B used only online modules with a pillow and deodorant stick to follow along (Images 3&4). Part II assessment was checklist score performance of eFAST on an SP using the same ultrasound probes and tablets. MCQ and checklist mean pre-test, post-test, and mean change in scores were compared via two-tailed t-tests using SPSS software. Confidence was assessed utilizing a Likert scale survey.

Images 1&2. Task trainer and hands-on learning for Group A.



Images 3&4. Online modules and pillow trainer for Group B.

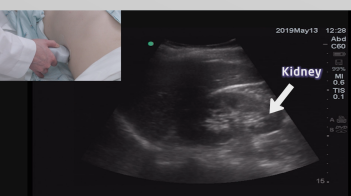
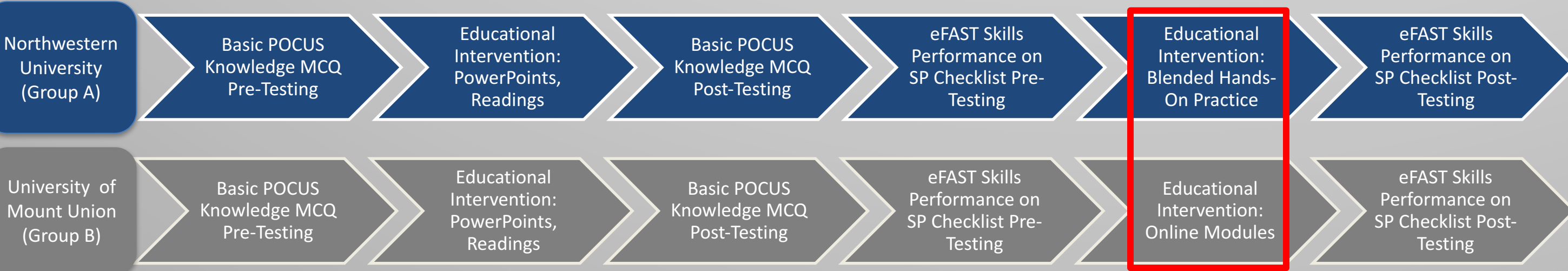


Figure 1. eFAST curriculum overview for both cohorts



Results

All students consented and completed the study (n=70; 100%). Both cohorts had similar demographics and previous ultrasound training. All students achieved mastery (17/20 correct) in Part I post-testing and Part II (31/35 correct) post-testing. There was no statistically significant difference between Group A and B mean checklist post-test scores (33.67, SD 1.12; 33.11, SD 1.49; p=0.08). The change in baseline pre-test to post-test mean checklist scores was significantly different between Groups A and B (9.15, SD 5.64; 13, SD 5.38; p=0.01).

Table 1. Part I knowledge acquisition pre-test, mastery post-test, and pre-test to post-test improvement means for hands-on learning Northwestern University cohort (Group A) versus online learning University of Mount Union cohort (Group B).

Basic Knowledge Multiple Choice Examination Scores	PRE-TEST Out of 20 points Mean (SD)	MASTERY POST-TEST Out of 20 points Mean (SD)	PRE-TEST to POST-TEST IMPROVEMENT Mean (SD)
Northwestern University (n=34)	12.21 (2.20)	19.24 (0.78)	7.03 (2.40)
University of Mount Union (n=36)	10.78 (2.38)	18.53 (0.60)	7.75 (2.31)
p-value	p= 0.01	p< 0.01	p= 0.19

Table 2. Part II skill acquisition pre-test, mastery post-test, and pre-test to post-test improvement means for hands-on learning Northwestern University cohort (Group A) versus online learning University of Mount Union cohort (Group B).

eFAST Skills Checklist Scores	PRE-TEST Out of 35 points Mean (SD)	MASTERY POST-TEST Out of 35 points Mean (SD)	PRE-TEST to POST-TEST IMPROVEMENT Mean
Northwestern University (n=34)	24.53 (5.63)	33.67 (1.12)	9.15 (5.64)
University of Mount Union (n=36)	20.11 (5.37)	33.11 (1.49)	13 (5.38)
p-value	p< 0.01	p= 0.08	p= 0.01

All students who completed surveys from both cohorts reported feeling confident to perform the eFAST with guidance from a preceptor after curriculum completion; survey response rates were 70.6% (24/34) for Group A and 77.8% (28/36) for Group B (Table 3).

Table 3. Pre-Test and Post-Test confidence survey Likert scale results for Group A (Northwestern University) & Group B (University of Mount Union).

Statement	Northwestern University (Group A)		University of Mount Union (Group B)	
	Pre-Test # agree-strongly agree (%) (n=34)	Post-Test # agree-strongly agree (%) (n=24)	Pre-Test # agree-strongly agree (%) (n=36)	Post-Test # agree-strongly agree (%) (n=28)
I feel confident to <u>observe</u> an eFAST examination being performed on a patient by a preceptor, understanding verbiage, landmarks, and components of the examination	31 (88.57%)	24 (100%)	24 (66.67%)	28 (100%)
I feel confident to <u>perform</u> an eFAST examination on a patient <u>with</u> guidance from a preceptor	16 (47.06%)	24 (100%)	15 (41.67%)	28 (100%)
I feel confident to <u>perform</u> an eFAST examination on a patient <u>independently</u>	3 (8.82%)	23 (95.83%)	0 (0%)	14 (50%)
I feel confident to <u>observe</u> additional POCUS examinations being performed on a patient by a preceptor, understanding verbiage and landmarks	25 (73.53%)	24 (100%)	23 (63.89%)	27 (96%)
I feel confident to <u>try</u> a new POCUS examination on a patient while being <u>taught</u> by a preceptor	21 (61.76%)	24 (100%)	21 (58.33%)	27 (96%)

Conclusions

We demonstrated that online modules were an acceptable alternative to teaching PA students eFAST, as all achieved mastery without significant difference in checklist post-test scores. **Online eFAST students are similarly confident (Kirkpatrick Level 1) in observing and performing eFAST with preceptors and competent (Kirkpatrick Level 2) when compared to students who received hands-on POCUS training.** Limitations include small cohorts and inability to assess checklist inter-rater reliability due to resource constraints; however, a validated checklist was used. Future research should evaluate POCUS skill retention, translation to other POCUS applications, and correlation to utilization on clinical rotations and practice.

References

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