

Improving the Application Skill of Semmes-Weinstein Monofilament Test with Different Teaching Methods: A Randomized Controlled Trial

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Rationale

- The Semmes-Weinstein Monofilament Test (SWMT) is a widely used clinical tool for assessing tactile sensitivity.
- Variations in its application due to examiner-related factors may affect the accuracy and reliability of results.
- Many students struggle with mastering the technical precision required for standardized assessments.

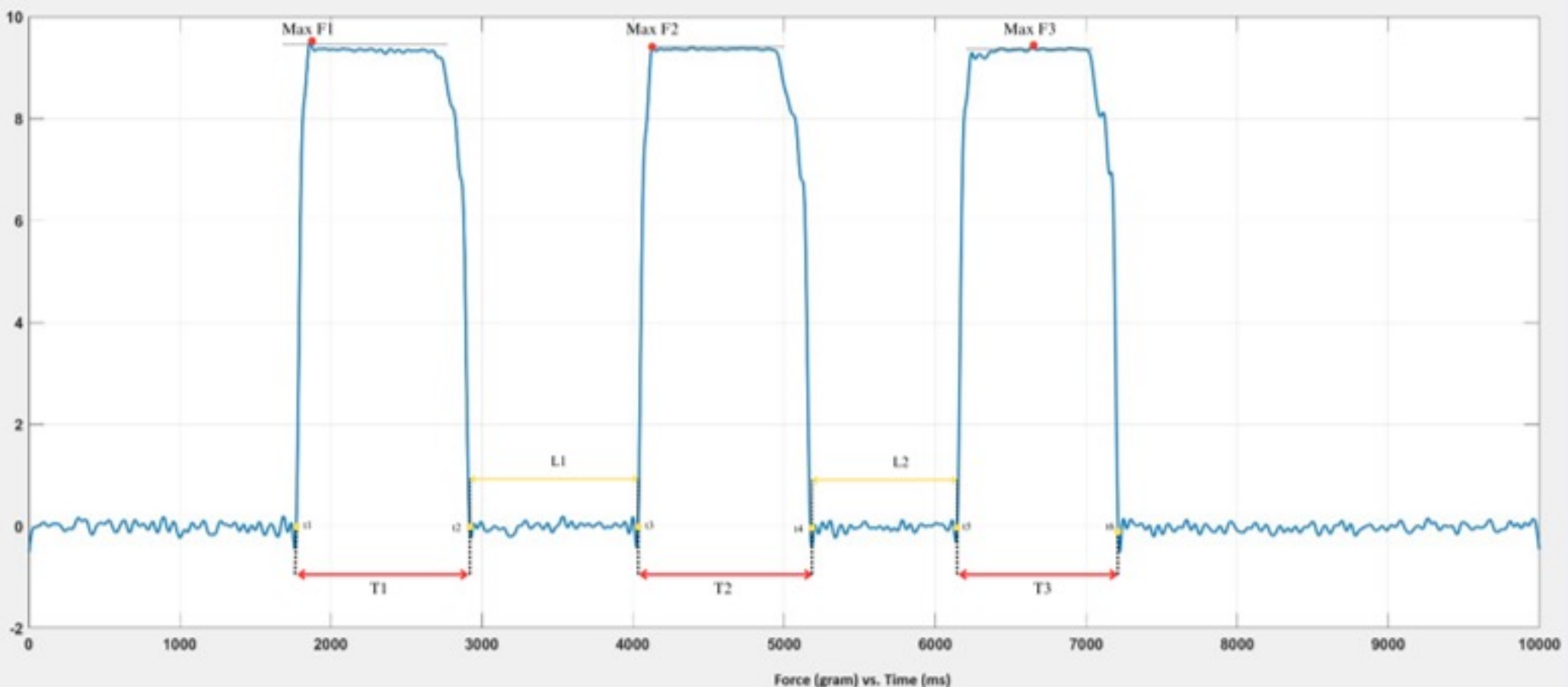
Objective

This study aimed to compare the effectiveness of traditional training and simulation-based training methods in improving the accuracy of SWMT application among occupational therapy students.



Methods

- A single-blinded, randomized controlled trial was conducted with final-year occupational therapy students (n=52).
- The traditional simulation training group (TST, n=25) or the visual feedback training group (VFT, n=27)
- The TST group practiced SWMT on real individuals, while the VFT group used a high-precision scale that displayed real-time force readings to help them adjust their technique.
- A single size of nylon Semmes-Weinstein Monofilament (5.07, 10g) was used.
- Pre- and post-training performance was assessed by measuring monofilament buckling force and application timing.
- For between-group comparisons, the Mann-Whitney U test was applied. Within-group comparisons were conducted using the Wilcoxon Signed-Rank test.



Max F1, F2, F3: The maximum force of the touches

L1, L2: The time elapsed between the applications

T1, T2, T3: The duration of the participant's application of the monofilament on the sensor

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Results

- TST group mean age: 21.88 ± 2.40 years (24 female, 1 male)
- VFT group mean age: 21.85 ± 2.64 years (24 female, 3 males)
- The visual feedback training significantly improved force control and application timing compared to traditional methods (p<0.05).
- The VFT group demonstrated greater consistency in monofilament application, indicating that visual feedback enhances precision.

Table 1. Comparison of Maximum Buckling Forces (MaxF1, MaxF2, MaxF3) Between the TST and the VFT Before and After Training

	Traditional Simulation Training (TST) (n=25)				Visual Feedback Training (VFT) (n=27)				Difference between group			
	Pre-training (Mean±SD)	Post-training (Mean±SD)	p ^a	Effect size (r)	Pre-training (Mean±SD)	Post-training (Mean±SD)	p ^a	Effect size (r)	Pre-training p ^b	Effect size (r)	Post-training p ^b	Effect size (r)
MaxF1	9.25±0.83	8.98±0.68	0.30	0.20	9.38±0.65	9.36±0.55	0.56	0.11	.301	0.14	0.048*	0.27
MaxF2	9.11±0.76	8.97±0.80	0.30	0.20	9.09±0.98	9.35±0.62	0.66	0.08	.783	0.03	0.022*	0.31
MaxF3	9.05±0.90	8.86±0.71	0.06	0.36	9.22±0.76	9.30±0.56	0.91	0.02	.504	0.09	0.029*	0.30

Table 2. Comparison of Time (T1, T2, T3) and Interval (L1, L2) Variables Between TST and VFT Groups Before and After Training

	Traditional Simulation Training (TST) (n=25)				Visual Feedback Training (VFT) (n=27)				Difference between group			
	Pre-training (Mean±SD)	Post-training (Mean±SD)	p ^a	Effect size (r)	Pre-training (Mean±SD)	Post-training (Mean±SD)	p ^a	Effect size (r)	Pre-training p ^b	Effect size (r)	Post-training p ^b	Effect size (r)
T1	75.44 ± 47.85	76.36 ± 34.83	0.53	0.18	67.33 ± 31.64	95.37 ± 49.00	0.001*	0.72	0.840	0.02	0.23	0.16
T2	68.88 ± 42.70	79.44 ± 37.39	0.05	0.43	64.04 ± 32.25	93.44 ± 48.42	< 0.001*	0.75	0.934	0.01	0.30	0.14
T3	70.76 ± 46.21	82.72 ± 384.24	0.05	0.42	64.04 ± 29.82	93.22 ± 51.60	< 0.001*	0.77	0.971	0.00	0.57	0.07
L1	84.68 ± 32.20	100.36 ± 43.82	0.05	0.42	85.26 ± 39.46	86.93 ± 33.95	0.627	0.31	0.970	0.006	0.24	0.16
L2	81.40 ± 37.22	89.96 ± 30.61	0.03	0.45	86.70 ± 42.23	84.56 ± 33.25	0.681	0.29	0.721	0.05	0.47	0.1

Conclusion

- This study highlights the importance of innovative teaching methods in skill-based occupational therapy education.
- Incorporating visual feedback training for SWMT can enhance students' clinical competency and ensure more standardized and reproducible assessments.

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The authors declare no conflict of interest.

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