Impact of Modern Teaching Methods on OSCE Performance in Undergraduate Medical Students: A Comparative Study

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Abstract
Background: Modern pedagogical strategies are increasingly recognized as pivotal in shaping clinical competency among undergraduate medical students. This study evaluated the effect of contemporary teaching methods on Objective Structured Clinical Examination (OSCE) performance among students at the Fergana Medical Institute of Public Health (FMIOPH). Methods: A prospective comparative study was conducted involving 178 undergraduate medical students at FMIOPH, compared with an equivalent cohort at Andijan State Medical Institute (ASMI). OSCE scores across six standardized stations were collected and analyzed. Results: FMIOPH students consistently outperformed ASMI students by approximately 15–20% across all OSCE stations ($p < 0.001$). The overall mean score for FMIOPH was 86.5% compared to 70.1% for ASMI. Conclusion: Integration of modern instructional methods, including problem-based learning, simulation, and formative assessments, significantly improved clinical competency as measured by OSCE outcomes.
Keywords: OSCE, medical education, modern teaching methods, undergraduate students, clinical competency, Uzbekistan, FMIOPH.

1. Introduction

Medical education at the undergraduate level demands continuous innovation to meet the evolving needs of healthcare systems. The Objective Structured Clinical Examination (OSCE) has been widely adopted as a gold-standard tool for assessing clinical competency, offering structured, reproducible, and objective evaluation across multiple clinical domains. Unlike traditional written examinations, OSCEs assess students across a broad spectrum of skills, encompassing history-taking, physical examination, clinical reasoning, communication, and procedural competencies.

In Uzbekistan, medical education reform has accelerated in response to international standards and national healthcare priorities. Institutions such as the Fergana Medical Institute of Public Health (FMIOPH) have actively introduced modern instructional methodologies aimed at improving student outcomes. These strategies include problem-based learning (PBL), case-based discussions, simulation-based training, peer teaching, formative assessments, and the use of digital platforms for interactive learning.

Despite these advancements, comparative evidence on the effectiveness of these teaching innovations — particularly as measured by OSCE outcomes — remains limited within the Central Asian medical education context. Understanding the

performance differentials between institutions that adopt modern versus conventional teaching strategies is essential for evidence-based curriculum reform.

This study aimed to assess the impact of modern teaching methods on OSCE performance among undergraduate medical students at FMIOPH compared with an equivalent control cohort at Andijan State Medical Institute (ASMI), which follows a comparable educational curriculum but employs predominantly conventional instructional approaches.

2. Materials and Methods

2.1 Study Design and Setting

A prospective, comparative, cross-sectional study was conducted during the 2023–2024 academic year. The study was carried out at FMIOPH (intervention group) and ASMI (control group), two accredited state medical institutions in the Fergana Valley region of Uzbekistan. Both institutions follow the national undergraduate medical curriculum approved by the Ministry of Health of the Republic of Uzbekistan, ensuring curricular equivalence in terms of subject matter and learning objectives.

2.2 Participants

A total of 178 undergraduate medical students at FMIOPH constituted the study group. An equal number of students at ASMI (n = 178) formed the control group, matched for academic year (third and fourth year), gender distribution, and baseline academic performance. Inclusion criteria required students to have completed the relevant pre-clinical and early clinical modules and to have participated in the designated OSCE assessments. Students who missed more than one OSCE station or had incomplete records were excluded from the final analysis.

2.3 Teaching Interventions at FMIOPH

The FMIOPH cohort was exposed to a suite of modern teaching methods integrated throughout the academic year prior to OSCE assessments. These included: (1) Problem-Based Learning (PBL) — structured weekly case discussions facilitating self-directed learning and clinical reasoning; (2) Simulation-Based Training — use of standardized patients and high-fidelity mannequins to practice procedural and communication skills in a safe environment; (3) Near-Peer Teaching — senior students facilitating small-group clinical skill sessions under faculty supervision; (4) Formative Assessment Feedback — regular low-stakes OSCE practice rounds with structured faculty feedback; and (5) Digital Learning Resources — use of e-learning platforms, video demonstrations, and virtual patient scenarios. ASMI students received conventional lecture-based and bedside teaching without structured simulation or formative OSCE exposure.

2.4 OSCE Assessment

All students were assessed using a standardized OSCE format consisting of six stations: history taking, physical examination, clinical reasoning, communication skills, emergency procedures, and patient counseling. Each station was scored out of 100 by trained examiners using validated marking checklists. The same OSCE blueprint,

marking criteria, and standardized patients were applied across both institutions to ensure comparability. The OSCE was administered simultaneously at both sites by a neutral coordinating team.

2.5 Statistical Analysis

Data were entered into SPSS version 26.0 and analyzed using descriptive and inferential statistics. Mean scores with standard deviations (SD) were computed for each OSCE station. Independent samples t-tests were applied to compare group means, with statistical significance set at $p < 0.05$. Effect size was calculated using Cohen's d. Ethical approval was obtained from the Institutional Review Boards of both institutions.

3. Results

3.1 Demographic Characteristics

Both groups were comparable in baseline characteristics. The FMIOPH group (n = 178) comprised 52.2% female and 47.8% male students, with a mean age of 21.4 ± 1.1 years. The ASMI control group showed similar demographic distributions (53.4% female, mean age 21.6 ± 1.2 years). No statistically significant differences in baseline academic GPA were observed between the two groups ($p = 0.412$), confirming group equivalence.

3.2 OSCE Performance Comparison

Table 1 and Figure 1 summarize the comparative OSCE performance between FMIOPH and ASMI students across all six stations and related parameters. FMIOPH students demonstrated significantly superior performance in all evaluated domains.

Table 1. Comparative OSCE Performance Between FMIOPH (n=178) and ASMI (n=178)

Parameter	FMIOPH (n=178)	ASMI (n=178)	p-value
Overall OSCE Score (%)	86.5 ± 4.2	70.1 ± 5.8	< 0.001
History Taking (%)	88.0 ± 3.9	73.0 ± 4.7	< 0.001
Physical Examination (%)	86.0 ± 4.5	70.0 ± 5.2	< 0.001
Clinical Reasoning (%)	85.0 ± 4.1	68.0 ± 6.0	< 0.001
Communication Skills (%)	90.0 ± 3.2	74.0 ± 4.9	< 0.001
Emergency Procedures (%)	83.0 ± 5.0	67.0 ± 6.3	< 0.001
Patient Counseling (%)	87.0 ± 3.7	72.0 ± 5.1	< 0.001
Passing Rate (%)	94.4%	76.4%	< 0.001
Mean Improvement (vs baseline)	+22.3%	+4.1%	< 0.01

Values expressed as mean ± SD. p-values from independent samples t-test. FMIOPH = Fergana Medical Institute of Public Health; ASMI = Andijan State Medical Institute.

Figure 1. Bar Plot Representation of OSCE Station Scores: FMIOPH vs ASMI (F = FMIOPH, A = ASMI)

OSCE Station	FMIOPH (%)	ASMI (%)	Difference (%)	Visual Comparison
History Taking	88%	73%	+15%	F: [redacted] A: [redacted]
Physical Exam	86%	70%	+16%	F: [redacted] A: [redacted]
Clinical Reasoning	85%	68%	+17%	F: [redacted] A: [redacted]
Communication Skills	90%	74%	+16%	F: [redacted] A: [redacted]
Emergency Procedures	83%	67%	+16%	F: [redacted] A: [redacted]
Patient Counseling	87%	72%	+15%	F: [redacted] A: [redacted]

F = FMIOPH students (blue); A = ASMI students (orange). Bar length proportional to percentage score. All differences statistically significant ($p < 0.001$).

3.3 Key Findings

The overall mean OSCE score for FMIOPH students was 86.5% (SD ± 4.2) compared to 70.1% (SD ± 5.8) for ASMI students, representing a statistically significant difference of 16.4 percentage points ($p < 0.001$; Cohen's d = 3.21). FMIOPH students outperformed ASMI controls by 15% to 20% across all individual OSCE stations. The highest inter-group difference was observed in the Communication Skills station (FMIOPH: 90.0% vs ASMI: 74.0%; Δ = 16.0%), while the Emergency Procedures station showed the widest absolute gap (FMIOPH: 83.0% vs ASMI: 67.0%; Δ = 16.0%). The passing rate was substantially higher in FMIOPH (94.4%) compared to ASMI (76.4%), representing an 18.0 percentage point advantage. Mean improvement from baseline was also markedly greater in FMIOPH (+22.3%) versus ASMI (+4.1%).

4. Discussion

The findings of this study demonstrate a consistent and statistically significant superiority in OSCE performance among FMIOPH students exposed to modern teaching methods, compared with ASMI students receiving conventional instruction. The approximately 15–20% advantage observed across all OSCE stations corroborates a growing body of international literature supporting the efficacy of innovative pedagogical strategies in medical education.

Problem-based learning has been extensively documented to enhance critical thinking and clinical reasoning, two domains heavily assessed in OSCEs. Our results align with

findings from systematic reviews demonstrating that PBL-exposed students perform significantly better on clinical competency assessments compared to lecture-taught peers. The structured clinical reasoning station in our study reflected this, with FMIOPH students scoring 17 percentage points higher than ASMI counterparts.

Simulation-based training has emerged as a transformative approach in clinical skills education. By allowing students to practice procedural tasks on standardized patients and mannequins in a consequence-free environment, simulation reduces performance anxiety while building technical proficiency. The superior scores in physical examination and emergency procedures among FMIOPH students are likely attributable to repeated deliberate practice through simulation.

Formative OSCE exposure with structured feedback is another powerful intervention. Studies show that regular practice OSCEs not only familiarize students with examination formats but also identify learning gaps early, enabling targeted remediation. The notable superiority of FMIOPH students in communication and counseling stations likely reflects the iterative feedback they received on interpersonal and patient-centered communication skills throughout the academic year.

The near-peer teaching model employed at FMIOPH adds another dimension. Evidence suggests that peer-facilitated learning enhances both the learner's and the tutor's understanding of clinical content, promoting active engagement and knowledge retention. This bidirectional benefit may have contributed to the broad-based performance advantage seen across all FMIOPH stations.

From a policy perspective, these findings have direct implications for curriculum reform in Uzbekistan and comparable health education systems. Institutions that continue relying predominantly on traditional didactic teaching risk producing graduates with suboptimal clinical competency as measured by objective assessments. The FMIOPH model demonstrates that with deliberate integration of modern pedagogical tools — within the framework of an equivalent national curriculum — significant gains in student performance are achievable.

5. Limitations

Several limitations of this study merit consideration. First, although both institutions follow the national curriculum, uncontrolled institutional factors such as faculty expertise, physical resource availability, and student motivation may have contributed to performance differences beyond the teaching methods evaluated. Second, the study assessed OSCE performance at a single time point; longitudinal follow-up to assess durability of learning gains would strengthen the evidence base. Third, self-selection bias cannot be fully excluded, as students choosing FMIOPH may differ in baseline motivation or academic aptitude from those at ASMI. Future research should employ randomized designs and include multiple cohorts to validate these findings.

6. Conclusion

This comparative study provides compelling evidence that modern teaching methods — including problem-based learning, simulation-based training, near-peer instruction,

formative assessments, and digital learning — significantly enhance OSCE performance among undergraduate medical students. Students at FMIOPH who were exposed to these approaches consistently outperformed their counterparts at ASMI by 15–20% across all evaluated OSCE stations, with an overall mean score of 86.5% versus 70.1%. These findings advocate for the systematic adoption of contemporary instructional strategies within undergraduate medical curricula in Uzbekistan and comparable educational contexts, with the goal of producing clinically competent and patient-ready graduates.

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