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Qualitative Evaluation of a Formative OSCE in a Resource-Limited Pharmacy School: Implications for Global Pharmacy Education

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ABSTRACT

Background: The Objective Structured Clinical Examination (OSCE) is widely adopted internationally for evaluating clinical competencies, yet its use in resource-limited pharmacy education settings is relatively underexplored. This study aimed to provide practical guidance for implementing a formative OSCE in such environments, using an Egyptian pharmacy school as a case in point. **Methods:** A qualitative SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was conducted, drawing on an online questionnaire completed by 424 participants (93.2% response rate) from a pool of 455 eligible students and faculty. The survey asked open-ended questions aligned to the four SWOT domains, and responses were analyzed via content analysis by multiple researchers. **Results:** Twenty-six main codes emerged, categorized under strengths (e.g., intensive patient counseling, experiential learning, boosted self-confidence), weaknesses (e.g., inadequate time management, limited resources, incomplete real-patient interactions), opportunities (e.g., expanded practical training, innovative educational tools), and threats (e.g., overcrowded sessions, insufficient space, pandemic-related disruptions). Collectively, these findings underscored that formative OSCEs can foster crucial clinical skills in pharmacy students, even under stringent resource constraints. However, logistical barriers such as time shortages and limited infrastructure can compromise the full educational potential of OSCEs if not addressed. **Conclusion:** Despite notable challenges, introducing a formative OSCE in a resource-limited Egyptian pharmacy program offered valuable skill development in patient counseling and clinical problem-solving. By proactively mitigating weaknesses (e.g., improving time allotment, resource availability) and external threats (e.g., COVID-19 restrictions, overcrowding), while capitalizing on opportunities for hands-on practice and enhanced curriculum design, institutions can optimize OSCE adoption. These observations, which also pertain to institutions handling large enrollments and limited resources, highlight the need for tailored, context-driven approaches in sustaining OSCE programs. Such guidance helps pharmacy schools globally implement robust, competency-focused assessments that more effectively prepare students for professional roles.

Keywords: OSCE; Pharmacy Education; SWOT Analysis; Formative Assessment; Resource-Limited Setting

INTRODUCTION

In healthcare education, formative assessments are critical for providing feedback that improves student performance without affecting final grades¹. Such a method encourages better ongoing development and mastery of skills². In this vein, the Objective Structured Clinical Examination (OSCE) is one of the leading assessment measures, for many health specialties³, due to its standardized, time-limited environment in which students demonstrate patient contact, diagnosis and clinical decision-making skills^{3,4}. Within training of pharmacy, OSCEs specifically measure a student's ability to apply classroom knowledge into clinical skills, which is a critical step towards the development of future pharmacists⁵.

But despite its well-evidenced benefits, few studies focused on its application in pharmacy curricula within low resource settings. Many low- and middle-income nations, including Egypt, encounter sizable logistical and financial hurdles in higher education. Most literature published on this topic concerns medical or nursing disciplines⁶⁻¹⁰, thus, there is limited findings available on pharmacy. These institutions often have high enrollment numbers, few feasible training sites, and tight budgets, so the implementation of complicated assessment tools like OSCEs is particularly challenging. These challenges mirror realities across many pharmacy schools in developing areas, highlighting the broader relevance of investigating OSCE implementation in these settings.

Egypt represents this dilemma. The pressures of higher education often lead to large enrollments and a constrained faculty workforce, limiting personalized feedback and specialized clinical practice opportunities. Although OSCEs has been introduced in some of Egyptian medical and nursing programs⁶⁻¹⁰, little attention has been paid to the pharmacy setting. Therefore, assessing the planning, implementation and continuous improvement of OSCEs in an Egyptian pharmacy context may benefit worldwide analogous procedures.

As supporting background, the current study performed a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of a formative OSCE at a resource-limited Egyptian pharmacy school. Overall, the primary objectives were to recognize positive outcomes of the OSCE rollout, to identify obstacles or shortfalls in implementation, to demonstrate areas for curricular or infrastructural improvement, and to assess external challenges that could impede effective integration of the OSCE in the long run.

A SWOT lens was selected because it allows institutional stakeholders to categorize feedback into internal factors (strengths and weaknesses) and external factors (opportunities and threats). This methodology offers a user-friendly, action-oriented approach suitable

for an initial evaluation. While advanced frameworks (e.g., the Consolidated Framework for Implementation Research (CFIR)) could provide more formal theoretical perspectives, SWOT remains practical and straightforward for identifying specific, contextualized strategies to enhance OSCE execution.

The Egyptian private pharmacy school in this study enrolls a large, diverse student body, featuring both local and international students. With only modest physical and financial resources, the institution faces familiar constraints: limited laboratory capacity, high student-to-faculty ratios, and reduced access to robust clinical training sites. These conditions make OSCE implementation challenging, as standardizing stations, maintaining realistic simulations, and offering thorough feedback can be difficult. Moreover, the COVID-19 pandemic introduced additional complications, periodically restricting in-person activities and straining already scarce resources.

Accordingly, we explored participant reflections on the inaugural formative OSCE in this setting, with the purpose of understanding how students and faculty experienced the assessment. Their responses underline specific internal strengths, such as bridging theory and practice, and weaknesses, such as inadequate scheduling and resources. External threats include institutional time constraints, and external opportunities involve forming partnerships with local pharmacies or hospitals. We outline these elements to offer a structured overview of the practical impact of an OSCE on the development of clinical skills and to elucidate how the resource constraints determine the success of a hands on pharmacy assessment.

In summary, the study adds to the literature related to OSCE in limited resources settings and serves as a pragmatic reference for pharmacy educators considering implementation or improvement of similar assessment strategies. Since many institutions globally face analogous infrastructural challenges, this Egyptian experience offers transferable lessons. The hope is that by systematically evaluating strengths and weaknesses from stakeholders' viewpoints, other schools can adapt the insights for their specific circumstances, thereby offering effective, simulation-based clinical training even under constrained conditions. Ultimately, these findings underscore that with strategic planning, consistent faculty training, and stakeholder engagement, formative OSCEs can thrive as a high-impact component of pharmacy education, strengthening graduates' readiness for the demanding realities of contemporary clinical practice.

METHODS

Study Design

This qualitative study employed a SWOT framework to examine a formative OSCE at a private

Egyptian pharmacy faculty. SWOT was chosen for its capacity to categorize feedback into internal factors (Strengths, Weaknesses) and external influences (Opportunities, Threats) clearly and pragmatically. Although frameworks like CFIR provide a more theory-driven approach, SWOT's simplicity allowed direct, actionable insights appropriate for an initial evaluation.

Setting

Research took place at a private university's Faculty of Pharmacy, established in 2005. The school enrolls approximately 450 final-year students annually, creating a high student-to-faculty ratio. With limited infrastructure and funding, hands-on clinical training faces spatial and material constraints. Conditions such as overcrowded laboratory areas and reliance on small faculty teams mirror challenges typical of many pharmacy schools in low- and middle-income countries.

OSCE Implementation

The OSCE, introduced as a formative exercise, encompassed three stations focused on distinct clinical competencies (e.g., patient history, medication counseling, pharmacotherapy problem-solving)⁵. Faculty members acted as both standardized patients and assessors, ensuring consistency in evaluation. Approximately five students formed each small group during a session, receiving tailored, formative feedback instead of formal grades. The station scenarios, validated by practicing pharmacists, aimed to mirror real-world clinical expectations.

This pilot OSCE represented the first of its kind in the program. Participating instructors underwent preparatory workshops on OSCE protocols, station checklists, standardized feedback methods, and consistency in scoring before commencement. By adopting this training, the institution sought to bolster reliability and to establish a foundation for future OSCE expansions.

Study Procedures

Shortly after the OSCE sessions concluded, the research team circulated an online survey (Google Forms) to participating students and faculty. The survey contained four open-ended questions, each aligned with a SWOT domain. Students were invited to respond to a structured open-ended questionnaire designed by the primary investigator to explore their perceptions of the formative OSCE through a SWOT lens. The full questionnaire is available in Appendix A. Participants freely typed responses, ensuring anonymity. The survey remained open for two weeks, during which reminder emails boosted participation. Of 455 eligible participants, 424 responded (93.2% response rate), including 419 final-year students and five faculty members.

Data Analysis

Open-ended responses were exported to a spreadsheet for thematic content analysis using a directed approach, guided by the four SWOT categories. Teams of two researchers independently coded responses within each category (e.g., "Strengths"), then discussed and grouped similar codes into subthemes. A third researcher audited the coded data to ensure consistency and resolve disagreements. This investigator triangulation minimized bias and enhanced analytic rigor. The resulting framework captured recurring ideas under Strengths, Weaknesses, Opportunities, or Threats, with multiple subthemes in each domain.

Data Trustworthiness

An anonymous online survey was chosen to mitigate social desirability bias common in focus groups and to encourage candid feedback. The notably high response rate (>90%) increases confidence that the feedback is representative. Multiple researchers coded the data, enabling an internal cross-check of interpretations. A transparent audit trail (raw data, codebooks, and summary notes) was maintained for potential replication or review.

Ethical Consideration

The study involved anonymous feedback from students and faculty. No identifiable data was collected. Ethical approval was obtained from the research ethics committee at the Faculty of Pharmacy, Ahram Canadian University, Reference number: (REC 0021).

RESULTS

Participants

Among the 424 total respondents (93.2% of those eligible), 419 were final-year pharmacy students, and five served as faculty OSCE evaluators or organizers. Approximately 62% of student respondents were female, reflecting the general student demographic. This wide participation provided robust feedback from both learners and evaluators.

Main Themes and Codes

Analysis of the survey responses led to the identification of 26 unique main codes, which were organized into four primary themes corresponding to the SWOT categories: Strengths, Weaknesses, Opportunities, and Threats. Each theme was further broken down into more granular subthemes or categories that encapsulate specific aspects of the OSCE experience highlighted by participants. **Table 1** provides an overview of the final coding framework, listing the themes, subthemes, and example elements mentioned by participants.

Table 1. Final coding framework outlining identified strengths, weaknesses, opportunities, and threats of the formative OSCE.

Strengths	
1. Training in Patient Counseling	
2. Hands-on Learning	
2.1. Linking Theoretical Curriculum to Practical Application	
3. Self-Confidence Building	
4. Structure and Organization	
4.1. Innovative Teaching Methods	
4.2. Well-Organized Sessions	
4.3. Effective Time Management (within stations)	
4.4. Interactive Feedback	
4.5. High-Quality Resources	
4.6. Rigorous Assessment	
4.7. Fostering Enthusiasm and Motivation	
5. Skill Development	
5.1. Communication Skills	
5.1.1. Teamwork	
5.1.2. Relationship Building	
5.1.3. Patient Counseling (Practice)	
5.2. Critical Thinking and Brainstorming	
5.3. Problem-Solving	
5.4. Speed and Efficiency	
5.5. Patience and Responsibility	
6. Familiarity and Awareness	
6.1. Emergency Case Handling	
6.2. Drug Knowledge and Drug–Drug Interactions	
6.3. Data and Resource Utilization	
6.4. Understanding the Pharmacist’s Role	
7. Qualifications of Personnel	
7.1. Experienced Professionals	
7.1.1. High-Caliber Pharmacists as Examiners	
7.1.2. Expert Advisors (Practitioners)	
8. Clinical Experience	
8.1. Practical Clinical Exposure	
8.1.1. Community Pharmacy Practice Exposure	
8.1.2. Medication Dose Adjustment Exercises	
8.1.3. Prescription Verification Practice	
8.1.4. Disease State Recognition	
8.1.5. Appropriate Medication Selection	
Weaknesses	
1. Time Management Issues	
1.1. Inadequate Scheduling / Too Few Sessions	
1.2. Need for More Frequent Sessions	
1.3. Limited Number of Cases per Session	
1.4. Insufficient Time for Each Assessment	
2. Lack of Organization	
2.1. Suboptimal Group Structuring (Group Size)	
2.2. Overcrowding at Stations	
2.3. Lack of a Structured Framework/Checklist	
2.4. Inadequate Space and Facilities	
2.5. Noise and Distractions	
2.6. Underutilization of Available Space	
2.7. Insufficient Availability of Faculty Directors	
3. Resource Limitations	
3.1. Insufficient Drug–Drug Interaction Information	
3.2. Limited Access to Generic Drug References	
3.3. Need for Better Training on Dose Adjustments	
3.4. Low Stock of Supplies in the Educational Pharmacy	
4. Lack of Mutual Feedback Mechanisms (Inconsistent feedback to students)	
5. Absence of Real Patients	
6. Traditional Teaching Methods (Heavy reliance on lectures, lack of role-play)	
7. Need for Innovative Engagement	

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- 8. Incomplete Curriculum Coverage
 - 9. Insufficient Pre-Session Preparation
 - 10. Gap Between Theory and Practice (within hands-on learning)
 - 10.1. Difficulty Applying Theoretical Knowledge
 - 10.2. Challenges in Real-Life Decision-Making
 - 10.3. Lack of Challenging/Realistic Scenarios
 - 10.4. Need for Additional Practical Training Sessions
 - 10.5. Need for Extensive Training in Patient Counseling
 - 10.5.1. Prescribing Medications
 - 10.5.2. Managing Drug Interactions
 - 10.5.3. Handling Drug-Disease Interactions
 - 10.5.4. Enhancing Communication Skills
 - 10.5.5. Patient Education Techniques
 - 10.5.6. Over-the-Counter (OTC) Consultations
 - 10.5.7. Collaborating with Physicians
 - 10.5.8. Improving Drug Identification Skills
 - 10.5.9. Ensuring Accurate Drug Dosing
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- Opportunities
- 1. Enhanced Facilities
 - 1.1. Upgraded Educational Pharmacy Infrastructure
 - 1.2. Expansion of Clinical Skills Lab Space
 - 1.3. Use of Community Pharmacy Settings for Training
 - 1.4. Integration with Hospital Pharmacy Environments
 - 2. Stakeholder Engagement
 - 2.1. Students – Smaller, Focused Groups for Training
 - 2.1.1. More Individualized Coaching
 - 2.1.2. Improved Communication Skills Practice
 - 2.1.3. Rotations in Community Pharmacies
 - 2.2. Patients – Incorporate Real Patient Cases
 - 2.3. Instructors/Healthcare Professionals
 - 2.3.1. Involvement of Specialized Physicians in Training
 - 2.3.2. External Expert Evaluators (e.g. experienced pharmacists)
 - 2.3.3. Collaboration with Multi-disciplinary Healthcare Teams
 - 3. Expanded Practical Training
 - 3.1. Access to Specialized Training Courses/Workshops
 - 3.2. Regular Weekly Practical Sessions
 - 3.3. Hospital-Based Training Rotations
 - 3.4. Allocation of Sufficient Time for Skills Practice
 - 4. Curriculum and Content Development
 - 4.1. Use of Real Prescriptions in Training
 - 4.2. More Comprehensive Prep Sessions
 - 4.3. Enrichment of Theoretical Curriculum with More Clinical Content
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- Threats
- 1. Limited Time (External Constraints)
 - 1.1. Insufficient Overall Training Period in the Program
 - 1.2. Tight Academic Schedule for Practical Sessions
 - 2. Teaching and Support Challenges
 - 2.1. Inadequate Support from Teaching Assistants
 - 2.2. Variability in Faculty Engagement
 - 2.3. Insufficient Study Materials
 - 2.4. Communication Barriers
 - 2.5. Gaps in Teamwork
 - 3. COVID-19 Pandemic Impacts
 - 4. Design and Infrastructure Limitations
 - 4.1. Overcrowding due to High Student Numbers
 - 4.2. Inadequate and Narrow Learning Spaces
 - 4.3. Logistical Difficulties in Organization (coordination challenges with large groups)
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This table presents the SWOT framework applied to a formative OSCE implementation. Each main SWOT category is broken down into codes and sub-codes that highlight specific themes or issues reported by participants.

Supporting evidence

Below are the main themes, along with participant quotations and summaries illustrating each dimension.

Strengths

The formative OSCE sessions offered multiple advantages in skill-building and student development. Chief among these was the focus on patient counseling. Many respondents highlighted the value of practicing communication about medications and health conditions in a supervised environment. One participant noted, "It taught me how to better advise patients and provide an improved level of service." Such experiential learning bridged academic knowledge and real-world application, leaving students feeling more practice-ready. Another student remarked, "We applied what we learned in class, which boosted our confidence in our understanding." This suggests the OSCE effectively reinforced theoretical concepts through hands-on exercises.

A second strength was how the OSCE fostered self-confidence in clinical abilities. Participants mentioned that practicing tasks under realistic conditions helped them become more capable and less anxious about patient interactions. One participant noted, "These sessions increased my confidence and prepared me for the real world." Many also praised how the OSCE improved teamwork and communication with one other student suggesting, "The sessions helped me go develop my communication and collaboration abilities, which are vital within the pharmacy observe."

This utility was supplemented by the OSCE's structured format. The stations were said to reflect community pharmacy and clinical assessments, giving realistic scenarios and participants valued the relevance. As one student noted, "It felt real life, so it taught us how to approach patients in a structured manner." Students made praise for prompt, constructive comments from faculty: "The feedback from instructors were extremely helpful to improve our skills." These kinds of immediate, targeted insights enabled them to identify gaps in knowledge and fine-tune their performance.

Another advantage was being exposed to multiple clinical scenarios in the OSCE. These stations expanded participants' knowledge of drug-drug interactions, acute care responses, and the pharmacist's role in holistic care of the patient. As one student noted, "These workshops expanded my knowledge about drug interactions and got me ready for an emergency in the real world." What's more, high-quality OSCE resources (e.g., reference charts and checklists) facilitated learning and made the sessions even more effective.

The students also credited a great deal of the OSCE's success to the clinical expertise of the faculty. The instructors were highly qualified pharmacists and experienced educators, meaning that their background and mentorship provided added value to the assessment,

as mentioned by the students. One participant said, "The instructors were skilled professionals, which I think made the sessions incredibly impactful." Moreover, learners consistently highlighted the practical aspect especially through community pharmacy-aligned tasks, including adjusting doses and checking prescriptions. The hands-on experience under the educational community pharmacy was invaluable," wrote a student who emphasized how this OSCE was instrumental to connecting theory to real life practice.

Weaknesses

Participants highlighted a number of areas of improvement, despite obvious strengths. Time management was high on the complaints list: many students said they didn't have enough time at each station to experience the scenarios fully. "We only handled a few cases, and we needed more time to get through everything," one of the participants said. Some lobbied for multiple OSCEs every semester; they believed that practice makes perfect. As one respondent said, "We need more regular sessions to practice our skills."

The problem was aggravated with scheduling constraints of a busy curriculum. Big cohorts meant station interactions were few and far between, and students were not able to showcase their full potential. "The assessment time is too short, and I didn't think I could show in the exam all I know," one said. The short timeframe limited substantive feedback as well as reflection after the station.

Another recurring flaw had to do with the logistics of hosting large groups. Participants described "overcrowded" stations that made focus tough. Someone else said, "There were times that too many students were in the room all at once, and it was chaotic and impacted the ability to concentrate." Poor room configurations and a lack of soundproofing made hearing neighboring groups "distracting," the planners said. These problems emphasized the need for better scheduling, clear group sizes and more appropriate physical space.

Performance was also undermined by resource constraints. And students noted that drug interaction and alternative therapy references were often incomplete or out of date. "We did not have enough information about drug interactions, which is critical to our practice," said one. And another mentioned that there was a limited number of generic drugs, making it difficult to learn what the alternatives are. These gaps diminished the realism of the OSCE setting, scrambling the educational value of the exercise.

In addition, some considered the lack of real patients a disadvantage. While participants acknowledged that standardized patient simulations are the norm, some felt that real patient encounters would contribute to more accurate preparation for authentic clinical environments. "Practicing with real

patients...would have allowed us to learn more,” one student said. Scarce evidence exists of the growth in communication, professionalism, and clinical skills when students must deal with confounding real- patient variables in OSCEs, but such OSCEs certainly raise issues of consistency and ethics; however, participants were loud on wanting more engagement that is real.

Another concern was inconsistency of feedback delivery. Although students appreciated detailed feedback when they received it, they felt feedback varied greatly between stations. “We weren’t getting the feedback that we needed throughout the sessions to see if we were making progress,” one participant grumbled. Inadequate orientation of students prior to the OSCE broadens anxiety and confusion. “We didn’t always come fully prepared... it felt at times we were rushing through the content,” another added, hinting at a larger need for preparatory briefings or materials.

Ultimately, connecting theory to practice did not resonate for some. Several participants asked for more challenging cases or more expansive coverage, with one saying, “We could use more hands-on practice with challenging cases.” While they welcomed practical scenarios, many also wanted a broader range of challenges that mimic actual clinical requirements.

Opportunities

In spite of these challenges, participants recognized a number of avenues for making improvements. One of the main ideas was extending practical places of training into real practicing sites out of the university. “We need more in-person components in both community pharmacy and hospital-based practical sessions,” one student suggested, explaining that interacting with patients would develop adaptability and contextual skills. This could include externships, formal partnerships with local facilities, or visits to field sites to complement the controlled environment of OSCE.

Students also requested smaller group formats. “It would be easier to focus and communicate in smaller groups,” one participant said. Reducing attendance at a session could facilitate more direct interaction with instructors and practice to avoid confusion and maximize feedback. While dividing large cohorts into more sessions was logistically tricky, many felt the educational benefits of face-to-face contact outweighed the obstacles.

And another opportunity sat with increased engagement from external professionals specialty physicians or clinical pharmacists who could set expectations to inform stations or provide feedback aligned with industry standards. “It would be good to have more input from physicians and expert pharmacists their feedback would help give us a clearer idea of what is needed,” one respondent said. Such interprofessional

collaboration may also promote interprofessional learning and add further realism to OSCE stations.

Respondents also requested specialized training modules or workshops focusing on advanced counseling, emergency pharmacy procedures or more complex decision-making scenarios. “We’d like to have more specialized courses and more consistent sessions to practice those difficult-to-master skills that can take only a few sessions to learn,” wrote one. Without a single OSCE, the learned skills could gradually improve with the association of the processes to practical OSCE-style scenarios (or perhaps mini-version role-play & OSCEs). Finally, students suggested the importance of embedding real patient stories, either through anonymized case studies or using data from local health care. “A lot of what we do as pharmacist are from real patients cases, we need more real patients working to fully under what it’s like to work in a pharmacy setting” mentioned a participant. Emphasizing interactivity-based exercises around communication was another priority, highlighting how vital good relational abilities are to patient counseling and joint approach to care. “Communicating more and less necessarily, like in real settings would help us ... work with doctors,” another student said. Putting this all together, the recommendations here suggest more authenticity, more communicative power and more diversity of scenarios.

Threats

Participants also mentioned challenges at the external or system-wide level that threaten the long-term viability of the OSCE. Worst among these was a lack of curriculum time for hands-on training. One respondent said bluntly, “We need more time and guidance in the sessions to do things properly,” noting heavy academic curriculum and accreditation requirements often limit the scope for skill-based assessment. Thus, implementing more frequent OSCEs may require broader curricular changes or additional time commitments, which is typically managed at the university or national level.

Understaffing similarly threatened OSCE quality. A shortage of trained teaching assistants or clinical faculty places an extra burden on existing instructors with resulting inconsistency of feedback and reliability of stations. But decisions about budgeting and hiring are largely beyond the control of individual educators. For large cohorts, such constraints can diminish OSCE credibility.

An external threat that appeared overnight was the COVID-19 pandemic that interrupted scheduling, restricted physical presence and even caused session contemplation. “The coronavirus made things hard because we weren’t able to have all the sessions that we needed,” said one participant. Many hands-on competencies (like patient counseling or physical assessments) simply cannot be practiced effectively remotely or in socially distanced formats. While

pandemic conditions likely improve over time, this experience has reinforced the importance of contingency plans (such as tele-OSCEs) in the event of future crises. Alongside systemic barriers was a lack of adequate infrastructure. Raising enrollment without a corresponding increase in labs or physical space leads to crowded environments that lessen the effectiveness of hands-on training. One also observed, "There were too many students in the lab at the same time and it was difficult to focus/keep things in my mind," reflecting institutional or national education policies typically beyond the reins of any instructor.

Also, cultural considerations may prevent OSCE goals from being met: For example, if students come to a program lacking soft skills or experience with interactive learning, it may make the implementation of OSCEs more challenging. Challenging entrenched educational traditions takes time. Although not explicitly stated, criticism of poor communication skills or teamwork are not-so-subtle clues to systemic problems.

In a nutshell, these Threats reveal that variables like pandemics, fixed curricula, budgetary constraints, or entrenched academic cultures cannot be fully managed by OSCE gatekeepers. Yet if these components are acknowledged, they might inspire more systemic requirements-be it institutional or policy, for example, detailing tele-OSCE planners or pushing for more workable hours. By pinpointing external pressures, pharmacy educators can forge strategic, collective responses to safeguard and strengthen OSCE initiatives.

DISCUSSION

Our findings highlight the potential of formative OSCEs to substantially improve clinical competencies in pharmacy education, even in environments with constrained resources. Participants consistently valued the authentic application of theoretical knowledge through interactive, station-based assessments, especially in patient counseling and problem-solving. Similar to previous OSCE research¹¹⁻¹⁴, these results underscore how structured simulations help students bridge the gap between classroom concepts and real-world professional tasks. By navigating realistic pharmacy scenarios, students reported heightened self-efficacy and deeper engagement, reflecting a broader literature consensus that OSCEs offer direct experiential learning unachievable through lectures alone^{5,12}.

Faculty expertise also emerged as pivotal; students appreciated standardized patients and examiners who provided targeted, practical feedback. Effective OSCE performance hinges on well-prepared assessors capable of role-playing clinical cases consistently¹⁴. Moreover, immediate individualized feedback was cited as highly beneficial, a finding aligned with best practices in formative assessments². Yet, the variability in

feedback quality noted in some responses suggests the need for faculty training in standardized rubrics and consistent debriefing methods¹⁵. This underscores that while the OSCE format can be powerful, its success rests on educator preparedness, highlighting an area for institutional focus.

The most worrying weakness was time management. The entire week was "condensed" into limited set of sessions, which made it difficult for students to engage, as they had done with clinical scenarios. This challenge is representative of time limitations in many large-enrollment pharmacy schools, especially those with curricular hours dominated by didactic coursework. Similar settings^{12,13} have shown that allotting sufficient time per station is necessary to allow for solid skill demonstration and feedback for performance. One potential solution is increasing the number of OSCEs in a semester changing from a single "one-off" OSCE to a series of shorter OSCEs or mini-stations, which gives students opportunities for repeated practice. This is a challenge for both administrators that must balance their needs with overall curricular requirements (which often favor theoretical content over practical exercises).

Operational and logistical challenges (e.g., overcrowded stations and inadequate physical space) are comparable to structural issues common to resource-limited institutions^{9,14}. As participants pointed out, noise levels and minimal privacy disrupted concentration, while large group sizes limited personalized attention. Given a massive amount of overcrowding specifically in the Egyptian educational system, asking for more OSCE logistics (staggering session times, dividing rooms, splitting the class, etc.) would alleviate the problem quite effectively. Just as important is having enough qualified teaching assistants or volunteer staff. Although it can be hard financially to bring on others, rotating faculty from other departments or working with practitioners can help relieve some staffing pressure¹⁶.

Resource constraints were also reflected in the limited reliable reference materials available for drug-drug interactions, as well as limited medication availability in the "educational pharmacy". To emulate real-world practice conditions, it is important to have timely guidelines, comprehensive interaction databases, and broad formularies¹⁵. Closing these gaps could require partnering with nearby healthcare providers or digital services that provide comprehensive medication information. Alternatively, they could seek external financial support or partner with software providers to purchase access to databases, increasing OSCE realism. The other would be creating shared resources like a central repository of instructional materials available to multiple departments. Regardless of the method, resource shortages must be addressed if OSCEs are to replicate true-to-life pharmacy experiences.

Participants reported a strong interest in real-world training opportunities, such as rotatory placements in community or hospital pharmacies. This supports wider pleas for practice based learning within pharmacy curricula⁵. While fully immersing students in actual patient care raises logistical and ethical considerations, forming partnerships to facilitate supervised interactions can enhance clinical competence and empathy. Likewise, forming alliances with local health networks or hospitals could support advanced OSCE stations or clinical rotations¹⁴. Such expansions not only bolster student preparedness but also strengthen links between academic institutions and healthcare facilities.

Another promising strategy involves using smaller, more focused groups for skill sessions. Such an approach would allow for closer instructor-student interactions, higher-quality feedback, and more peer-to-peer learning. Repeated evidence shows that smaller group settings improve engagement and skill retention in applied exercises^{11,13}. While smaller groups require more scheduling blocks or more staff, these logistical hurdles can be offset by improved outcomes. Utilizing digital scheduling tools, staggering lab sessions, and rotating faculty among specialized modules are potential methods for managing group-based OSCEs.

Another opportunity involves broadening the range of case complexity and integrating advanced simulations. OSCE stations could incorporate challenging comorbidities or multiple drug interactions, compelling students to exercise problem-solving under time pressure. This approach refines critical thinking and parallels real-world complexities, as recommended in prior pharmacy education research^{5,17}. Additionally, digital or hybrid simulations (e.g., tele-OSCEs, interactive case-based e-learning) can supplement in-person stations particularly valuable in pandemic-like disruptions. Implementing pilot modules to test these strategies would allow educators to gauge feasibility and refine approaches for large-scale adoption.

Institutions may opt to formalize OSCE sessions each semester, providing consistent, safeguarded time for hands-on skill development. The pandemic's influence emphasizes how essential adaptable strategies can be. In some pharmacy contexts, tele-OSCEs, smaller in-person cohorts, or remote modules¹⁸ have emerged. While these alternatives may lack the fidelity of traditional on-site OSCEs, they help preserve core skill evaluation during crises. Likewise, contingency plans such as alternating online and physical attendance allow partial in-person training to continue. Given that many public health constraints extend beyond local control, schools must remain agile in meeting evolving directives.

Overarching infrastructure challenges, including crowded classrooms or insufficient specialized laboratory facilities, often arise from budgetary or policy decisions at the institutional or governmental level.

Although individual instructors often cannot rectify these large-scale inadequacies, a well-documented SWOT analysis can guide resource allocation. By presenting evidence-based arguments that OSCE expansions benefit graduate competence and employability, educational leaders may convince administrators to invest in modest renovations, additional lab areas, or new equipment. Collaboration with donors, international development grants, or public-private partnerships is another avenue for securing the needed infrastructure^{16,19}. Ultimately, success hinges on sustained institutional commitment, reflecting the realization that OSCEs are not one-time events but integral, recurring components of a modernized pharmacy curriculum.

Limitations

This study was conducted at a single private university in Egypt, which may limit generalizability; however, many of the contextual features such as large class sizes and limited infrastructure are common across resource-constrained pharmacy programs. While the survey achieved a high response rate, reliance on open-ended online questionnaires without follow-up interviews may have constrained the depth of feedback. The OSCE was designed as a formative, low-stakes experience and was not assessed using standardized rubrics or quantitative scoring. Future research may benefit from combining qualitative feedback with performance metrics and implementation frameworks to gain a more comprehensive understanding.

Future Research and Program Development

Several directions emerge from this evaluation. First, exploring technology-enhanced or hybrid OSCEs (incorporating online patient simulations) could address space constraints and pandemic-related restrictions, an approach that has shown promise in other contexts. Comparative studies might assess the learning outcomes of fully in-person vs. hybrid OSCEs. Second, systematically evaluating repeated OSCEs across multiple semesters could capture whether skill acquisition improves with exposure. Tracking student performance, confidence, and subsequent professional success would substantiate OSCE efficacy over time. Finally, conducting interviews or focus groups with administrators and standardized patients could illuminate logistical or administrative realities not fully captured in student-focused data. Even understanding faculty workloads budget negotiations and institutional policy thresholds would shed more light on how to sustain OSCEs in contexts like ours.

In light of pharmacy training, from a design perspective, future work may focus on designing standardized rubrics or checklists focusing on formative OSCEs in pharmacy. Combining these tools with structured debriefs would provide consistent, high-quality feedback, considered by many to be a key driver

of formative learning². Adding real patient interactions or sophisticated role-play simulations, either in partnership with local clinics or in more sophisticated in-house methods, could address students' insistence for more authentic experiences, and thus enhance the realism of OSCE tasks.

CONCLUSION

The formative OSCEs provide a valuable and strong means of reinforcing pharmacy students' clinical competence, despite the challenging context of resource-constrained settings. In the Egyptian context discussed, participants appreciated the emphasis on hands-on, scenario-based training for enhancing patient counselling, bridging theory into practice, and building confidence. But also, critical gaps emerged time constraints, limited materials, uneven systems of feedback alongside bigger, systemic challenges like overcrowded facilities, inadequate funding and pandemic-related disruptions.

The participants proposed some concrete ways to improve the experience such as smaller groups, more actual patient encounters, and specialized skills workshops. Achieving these ends calls for institutional support, flexible schedules and, in some cases, partnerships beyond campus. Pharmacy schools with limited resources have the potential to develop a stronger integration of formative OSCEs into curricula by adopting more broad systematic solutions to address issues of implementation and relying on available opportunities towards providing students with the competencies defined in the updated curricula of modern health care. Crucially, these insights do not pertain merely to one Egyptian institution. Many programs elsewhere face the same enrollment pressures and funding challenges. With thoughtful design, purposeful concentration of resources, and iterative refinement of face-to-face and blended OSCE models, educators can harness OSCEs' transformational promise to prepare students to competently and confidently negotiate complex clinical environments for graduates.

List of Abbreviations

OSCE: Objective Structured Clinical Examination;
SWOT: Strengths, Weaknesses, Opportunities, and Threats; CFIR: Consolidated Framework for Implementation Research.

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Conflict of interest

The author declares that there isn't any conflict of interest regarding the publication of this paper.

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