

# Pharmacy Students' Perceptions of the Formative Objective Structured Clinical Examinations (OSCE) and their Learning Outcomes

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## RESEARCH ARTICLE

### Abstract

**Background:** Objective structured clinical examinations (OSCEs) are used frequently in course subjects owing to their utility in determining the students' clinical competencies under a variety of simulated conditions. In the University of the Philippines (UP) College of Pharmacy, the use of a summative OSCE has already been used as a form of assessment in some of its courses. However, previous batches of students felt unprepared for their summative OSCE at the end of the semester. In particular, students reported unfamiliarity with the content and format of the said examination. To address this concern, formative OSCEs were conducted in a Pharmacy laboratory course.

**Objective:** This study aimed to evaluate the effect of the feedback component of formative OSCEs on the students' self-perceived learning and achievement of the course outcomes, facilitating knowledge, skills and attitudes development towards the course, and preparing them for the summative OSCE. It also sought to identify useful aspects of the formative OSCEs and how they can be improved further.

**Methodology:** Four formative OSCEs were administered from January to May 2017 to all fourth-year pharmacy students taking Pharmacy 154 (Dispensing and Incompatibilities). The units covered were: (1) extemporaneous and sterile compounding; (2) over-the-counter (OTC) medicines and prescription drugs; (3) dangerous drugs and medical devices; and (4) therapeutic incompatibilities and medication safety. After each formative OSCE, feedbacks were provided to the students. Once all OSCEs were conducted, an online, self-administered questionnaire consisting of four parts was given to the students. Total population sampling was employed in the study. The responses (n = 44) were analyzed using frequency statistics. Thematic analysis was done for the aspects of the formative OSCEs that were most useful, and how they could be further improved.

**Results and Conclusion:** The frequency analysis of responses from the questionnaire generally showed that the students had positive perceptions to the feedback component of the formative OSCEs. Still, there was no significant association found between passing the summative OSCE and the formative OSCEs owing to the differences in the content of each examination. Overall, formative OSCEs may be a good assessment tool to track the students' progress and give them constructive feedback in terms of the competencies expected in the course and to better prepare them for the summative OSCE. Increasing the time allotted for each station and orienting them better prior to formative OSCEs were the commonly suggested points for improvement.

**Keywords:** *formative, objective structured clinical examination, pharmacy education*

## Introduction

Developing clinical skills and competence among pharmacy students requires time and practice. To increase their rate of development, the educator should be able to provide specific, timely and actionable feedbacks relevant to the competencies being developed [1]. The students should also be given adequate time to examine the available feedbacks to optimize experiential learning and improve future performance [2]. The

objective structured clinical examination (OSCE) is a form of assessment in medical and healthcare education programmes reflecting a competency-based paradigm [3]. OSCEs are used frequently in course subjects owing to their utility in determining students' clinical knowledge and skills under a variety of simulated conditions [4].

The OSCE was introduced in the 1970s [5] as a method to measure the progress of clinical competencies among

students that are required for practice [3, 6]. Whereas, the components of clinical competence are determined in a planned or structured way focusing on the objectivity of the examination [7,8]. The examination consists of a series of stations, with each station focusing on particular components of the competence being measured [7]. Moreover, there has been growing evidence that OSCEs improve student performance and confidence, and enhance enthusiasm for teaching among clinical educators [9]. It was also found that serial administration of formative OSCEs by teaching hospitals enhances the performance of students on the sequential summative OSCE. Furthermore, the faculty members can also improve their teaching, assessment and preceptor skills [10].

The OSCE has become a common method of assessing performance across a variety of health professions, most notably in licensure examinations in countries, such as the United States and Canada [5]. OSCEs are used in different specialties, to test different skills and domains across various settings and can follow either a formative or summative approach [3]. Within the pharmacy education, the OSCE finds growing use in evaluating the clinical and communication skills necessary for students to provide effective patient care [4,11,12].

Formative OSCEs provide opportunities for students to be directly observed, assessed and scored on their competencies through a standardized patient [2]. The primary purpose of the formative OSCE is to familiarize students with the OSCE process and to provide feedback on their performance, thereby enabling improvement before the summative OSCE, which is the method used to formally evaluate students [9].

In the University of the Philippines College of Pharmacy, the use of a summative OSCE was introduced in 2011 in its Dispensing and Incompatibilities laboratory course due to the idea that traditional methods of assessment (e.g., written exams) may not adequately evaluate the competencies acquired by students in the said course. It was perceived by the students as an adequate measure of their competencies and would recommend it as an assessment tool for use in the future batches. However, a low (33.8%) passing rate was observed, with majority of the students commenting that the allotted time was insufficient [1]. Succeeding batches of students who took the course with similar assessment method commented on the student evaluation of teachers (SET) tool that they felt unprepared for their summative OSCE at the end of the semester. They also reported unfamiliarity with the content and format of the said examination. In order to

address these concerns, formative OSCEs were introduced in the same course prior to a summative OSCE. The formative OSCEs were designed to allow students to experience OSCE conditions, as well as to practice this form of assessment and to receive constructive feedback to facilitate learning.

Although summative OSCE has long been introduced in the course subject, there are limited data to show that formative evaluations are good preparatory assessment experiences for students prior to summative OSCEs. We reported in this paper the effects of the feedback component of the formative OSCEs in students' learning and achievement of course outcomes, facilitating their knowledge, skills and attitudes towards the course, and preparing them for the summative OSCE.

## Methodology

### *Study Design*

A descriptive study among fourth-year pharmacy students of the UP Manila College of Pharmacy

### *Conduct of the Formative OSCEs*

Four formative OSCEs were administered throughout the Dispensing and Incompatibility course from January to May 2017. Specifically, a formative OSCE was given after each course unit, which were: (1) extemporaneous and sterile compounding; (2) over-the-counter medicines and prescription drugs; (3) dangerous drugs and medical devices; and (4) therapeutic incompatibilities and medication safety. Formative OSCEs were then done after every two major topics in the course outline were discussed, which was relatively two weeks apart from each other. For the summative OSCE, a one-week break was provided to the students for them to review further and go over the learning materials and the previous discussions in order to optimize experiential learning and improve future performance.

Although the technical content for each formative OSCE differed, the knowledge and skills that were observed and evaluated remain similar. To account for the differences in the content of each formative OSCE, books, manuals and online references were made available during the examination. Each OSCE was comprised of a patient case, with stations for: (1) validating the prescriptions; (2) collecting patient data and medication history; (3) identifying potential drug-related problems, such as medication non-adherence, drug-drug interactions, (4) scheduling patient's

treatment regimen; and, (5) culminating in medication dispensing and counseling to a standardized patient.

The patient cases for the formative OSCEs were as follows: (1) a 60-year old, female patient who has Tuberculosis and will be taking Rifampicin, Pyrazinamide, Isoniazid and Ethambutol; (2) a 22-year old, male patient who has comorbidities of Hypertension, Diabetes and Dyslipidemia and will be taking Amlodipine, Simvastatin and Metformin; (3) a 25-year old, male patient who has Asthma and will be taking Salbutamol, and Salmeterol and Fluticasone (medical device); and, (4) a 64-year old, female patient who has Hypertension and will be taking Amlodipine and Calcium Carbonate. On the other hand, the patient case for the summative OSCE was a 28-year old, female patient who has a sexually-transmitted infection and will be taking both Cefixime and Azithromycin monohydrate. The patient was also currently taking oral contraceptive pills.

The performance of the students for each formative OSCE was evaluated through a checklist of the expected outcomes that generally answered the following questions: (1) was the student able to determine if the prescription was valid or not prior to dispensing? (2) was the student able to collect to identify and collect pertinent patient data and medication history? (3) was the student able to recognize drug-related problems from the patient's case? (4) was the student able to schedule appropriately the patient's treatment regimen in consideration of the potential drug-related problems? And (5) was the student able to dispense accurately and counsel based on the patient's medication and healthcare needs?

Following the completion of each formative OSCE, the students were provided with their scores that corresponded to either 'pass' or 'fail'. After which, specific and actionable feedbacks were provided to the students. The feedbacks were structured to first identify their strong points, then discuss their weak points and how these could be addressed. The scores of students in each formative OSCE and the summative OSCE were recorded.

#### *Evaluation of the Feedback Component of the Formative OSCEs*

Since the entire student cohort taking the laboratory course was examined, total population sampling was employed. After the summative OSCE, all of the students were instructed to complete an online, self-administered questionnaire. Those who had given their informed consent were provided with the questionnaire for completion. The

contents of the researcher-made questionnaire were based on the instructional design of the course subject. Prior to the distribution of the tool, the questions were intuitively assessed by the faculty members based on their clarity, simplicity and understandability.

The questionnaire consisted of four parts. The first part was comprised of statements that measured the students' degree of agreement (e.g., agree, disagree or neither agree nor disagree) on the effect of formative OSCEs on their: learning of the course outcomes; and, facilitating their knowledge, skills and attitudes development towards the course. The second part measured the students' perception on the effect of the feedback component of the formative OSCEs in helping them prepare for the summative OSCE. This part was answered by 'yes' or 'no'. Open-ended questions were used for the third and fourth parts. The third part identified the most useful aspects of the formative OSCEs, while the fourth part determined how the formative OSCEs can still be improved.

#### *Data Analysis*

Frequency statistics and chi-square test of association, using Stata/IC 12.0, were used to examine the self-perceived responses of the students in the effect of feedback component of formative OSCEs on: the learning and achievement of course outcomes, the facilitation of knowledge, skills and attitudes development towards the course; and, the preparedness for the summative OSCE. Thematic analysis was done to determine what aspects of the formative OSCEs were most useful. This was also used in determining how the formative OSCEs can be further improved.

## **Results**

A total of 61 students, who were enrolled in the Dispensing and Incompatibilities, took the formative OSCEs. Among them, forty-four students gave an informed consent and completed the questionnaire. 14 (31.8%) of the respondents were males and 30 (68.2%) of whom were females.

In terms of the effect of the feedback component of the formative OSCEs in achieving the course outcomes (see Table 1), there were many students who agreed to majority of the statements in the questionnaire. However, few agreed that taking formative OSCEs helped them describe and efficiently demonstrate compounding techniques used in sterile and non-sterile preparations (item no. 4) and helped them commit to memory common brand names of top drugs in the Philippines (item no. 5).

**Table 1.** Perceived responses on formative OSCEs in achieving the course outcomes (n=44)

Item No.	Statement	Disagree	Neither agree nor disagree	Agree
1	Taking formative OSCEs helped me understand the philosophy of Good Pharmacy Practice and Medication Safety	2	0	42
2	Taking formative OSCEs helped me explain and demonstrate the technical procedures of preparing and dispensing drugs and medical devices	2	2	40
3	Taking formative OSCEs helped me accurately perform drug packaging, labeling and appropriate record keeping exercises	3	2	39
4	Taking formative OSCEs helped me describe and efficiently demonstrate compounding techniques used in sterile and non-sterile preparations	7	4	33
5	Taking formative OSCEs helped me commit to memory common brand names of top drugs in the Philippines	13	9	22
6	Taking formative OSCEs helped me correctly identify and address preventable and non-preventable adverse drug events	3	0	41
7	Taking formative OSCEs helped me properly disseminate drug and other health information using reliable and relevant sources	4	1	39

In terms of the effect of the feedback component of the formative OSCEs in facilitating learning (see Table 2), majority agreed that formative OSCEs helped them understand, integrate and apply the lessons covered in the course to real situations and consequences. Almost all statements were agreed upon by the students when it comes to facilitating the development of their skills (see Table 3). But still, few neither agreed nor disagreed that taking formative OSCEs helped to

develop teamwork and leadership skills (item no. 5). In terms of facilitating the students' positive attitude towards the course (see Table 4), some students felt neutral that taking formative OSCEs increased their enthusiasm for a career as a pharmacist involving dispensing and medication safety.

When it comes to the effect of the feedback component of the formative OSCEs in preparing students for the

**Table 2.** Perceived responses on formative OSCEs in facilitating the learning of the course (n = 44)

Item No.	Statement	Disagree	Neither agree nor disagree	Agree
1	Mastering materials, lectures and readings covered in this course	2	1	41
2	Tying together concepts covered in this course	0	2	42
3	Developing a deeper understanding of material covered in this course	0	1	43
4	Developing a deeper understanding of material outside of this course that is relevant in the program	0	3	41
5	Applying concepts covered in this course to real situations and consequences	0	0	44

**Table 3.** *Perceived responses on formative OSCEs in facilitating skills development in the course (n = 44)*

Item No.	Statement	Disagree	Neither agree nor disagree	Agree
1	Learning to work more effectively with people	2	3	39
2	Improving my problem-solving skills	0	1	43
3	Improving my oral communication skills	0	0	44
4	Improving my written communication skills	2	3	39
5	Developing teamwork and leadership skills	3	9	32

**Table 4.** *Perceived responses on formative OSCE in facilitating positive attitude to the course (n = 44)*

Item No.	Statement	Disagree	Neither agree nor disagree	Agree
1	Feeling more connected to the practice of dispensing and medication safety	0	0	44
2	Developing a deeper understanding of the problems in the practice of dispensing and medication safety	0	0	44
3	Increasing my enthusiasm for a career as a pharmacist involving dispensing and medication safety	2	5	37

summative OSCE, many (95.5%) agreed that these OSCEs enhanced their level of preparedness for the said OSCE. All (100.0%) said that they would recommend taking formative OSCEs before the summative OSCE. Table 5 shows the summary of the proportion of students who passed in the four formative OSCEs and the summative OSCE. The passing score was set at 70.0%. Upon statistical analysis, there was no significant association between the results of the summative OSCE and all of the formative OSCEs (first,  $p = 0.309$ ; second,  $p = 0.459$ ; third,  $p = 0.353$ ; fourth,  $p = 0.336$ ).

The following common themes emerged in terms of the useful aspects of formative OSCEs: (1) learning to discern what information to communicate to the patient; (2) honing skills in communication and counseling; (3) knowing what to expect in the summative OSCE; and, (4) being aware of the points to improve on through feedback. Table 6 presents the students' recommendations on how to improve the formative OSCEs, namely: (1) allotting more time for each station; (2) putting focus on sterile compounding; and, (3) providing better orientation on the counselling, the objectives of the formative OSCE and the expectations from the students.

## Discussion

Essentially, this study was an action research that sought to address the problems experienced by the students during the summative OSCEs through the introduction of the feedback component of the formative OSCEs. Furthermore, this study was meant to generate hypothesis, in which the feedbacks from the formative OSCEs may help students learn and achieve the course outcomes, facilitate their knowledge, attitude and skills development towards the course, and prepare them for the summative OSCE.

Although majority of the respondents agreed to many of the statements in the questionnaire regarding the effect of the feedback component of formative OSCEs in their learning and in preparing for their summative OSCE, only half of them passed the final examination. Furthermore, no significant association was found between the results of the summative OSCE and all the formative OSCEs. This implied that the students' outcome in the summative OSCE was not influenced by their passing or failing from the previous formative OSCEs. This finding did not conform with the study

**Table 5.** Mean scores of the formative OSCEs and the summative OSCE (n = 61)

Description and type of OSCE	Proportion of students who passed
First, Formative	36.07%
Second, Formative	95.08%
Third, Formative	98.06%
Fourth, Formative	77.05%
Final, Summative	54.10%

**Table 6.** Responses of students on how formative OSCEs can be further improved (n = 44)

Choice	Responses (frequency, %)
Allotting more time for each station in the OSCEs	34 (77.3)
Providing better information and orientation for each OSCE	34 (77.3)
Clarifying the objectives of each OSCE	27 (61.4)
Improving the organization of the OSCEs	24 (54.5)
Slowing down the pace of the OSCEs	23 (52.3)
Updating the content covered in the OSCEs	21 (47.7)
Increasing the relevance and content covered in each OSCE	16 (36.4)
Making the OSCEs less difficult	8 (18.2)

conducted by Chisnall *et al.* [9], which showed that formative OSCEs were associated with improved performance in the summative OSCEs. The non-conformity may be attributed to the fact that the patient cases were different for all OSCEs even if books and references were made available during each examination. Notably, the summative OSCE was more complex because it combined all the formative OSCEs, and the students may have found it difficult to integrate all the required knowledge and skills in the given time. Considerably, there is a need to modify the time allotted for each station depending on the difficulty of each station in the OSCE. This is because the complexities of the competencies tested at different stations may vary significantly and the level of learning required to achieve the competency being evaluated may also differ from one station to another.

Nevertheless, few students mentioned that because of the feedback component of formative OSCEs, they gained familiarity and knew what to expect in an OSCE. They also gained awareness of what to improve on in their succeeding clinical examinations. This finding suggests that formative evaluations may still have beneficial effects for students because OSCEs can: (1) assess the knowledge and skills, which were taught in lessons before; (2) direct the learning behavior of students; and, (3) lead them to the practical exercise and acquisition of outcome-specific and practice-oriented competence [4,5].

Majority of the statements that pertain to the effect of the feedback component of formative OSCEs in the students'

achievement of course outcomes had relatively high proportions of agreements, with exceptions for no. 4, and no. 5. This may be due to the fact that one limitation found in the conduct of formative OSCEs in the course was that patient cases were focused on a limited number of drugs, which minimized the utility of the OSCEs in helping the students demonstrate compounding techniques appropriately, and commit to memory a wide variety of common OTC and prescription drugs in the country. Moreover, rather than as a course requirement, the faculty members provided activity worksheets on brand names as a supplement to the students' learning. This may denote that the students may not be giving much emphasis on these worksheets since they were not being graded. On a significant note, it is evident from the course outcomes that the course syllabus was not able to cover the affective aspects of counseling (e.g., showing care and concern for the welfare of the patient, making the patient feel understood), which are also important components of the counseling process. In this regard, it is recommended that the syllabus be modified in such a way that it captures outcomes influencing the affective domain [12].

In terms of the students' perception on the effect of the feedback component of the formative OSCEs in facilitating their learning of the course, majority of the outcomes had also relatively high proportions of agreements. This implies that feedbacks from the formative OSCEs were able to help students to enhance their knowledge and understanding of the laboratory course, and to supplement the concepts they learned from the lecture course. However, the students thought that the

objectives of each OSCE should have been clarified prior to the conduct of formative OSCEs. Likewise, better information and orientation about each formative OSCE should have been given. This means that although students viewed the formative OSCEs as a positive and useful tool in facilitating learning, better communication about the role and purpose of these OSCEs should be done to maximize their benefits as a tool for learning and improve the students' future performance [2,9]. Likewise, more time to conduct a checklist review and debriefing should be considered since these activities were found to be associated with an improved performance on subsequent OSCEs [2].

In terms of the students' perception on the effect of the feedback component of the formative OSCEs in developing their skills, few students agreed that formative OSCEs were able to develop teamwork and leadership skills. The development of teamwork and leadership skills may not have been facilitated since the cases in the formative OSCEs were administered among the students individually, and thus each student had to rely on their own analysis of the cases to meet the needs of the case patients. Likewise, few students agreed that formative OSCEs were able to improve problem-solving skills. This can be attributed to the fact that students felt that the time allotted for each station in the OSCEs was inadequate, which then led to their inability to fully analyze the problems in the cases, and to provide solutions to these problems. This was evident when they answered that the ways of further improving formative OSCEs were through giving more time for each station in the OSCEs and slowing down the pace of OSCEs. It is important to note that students were able to hone their skills in communication and counseling, including the capacity to determine what information is needed to communicate with the patients based on their medication needs, and to organize a structured counseling session with simulated patients.

In terms of the students' perception on the effect of the feedback component of the formative OSCEs of formative OSCEs in developing positive attitude towards the course, item no. 3 showed a relatively lower agreement as compared with the other statements in the group. This may be because the cohort of student respondents came from both Pharmacy and Industrial Pharmacy students. Thus, some are possibly more interested in pursuing careers that are more product-oriented (e.g., drug discovery and development). Nevertheless, this value may show that formative OSCEs may increase the students' appreciation to the roles of a pharmacist in the area of dispensing and ensuring medication safety. By developing value and appreciation in the students, they may foster early feelings of responsibility and professional identity that are essential for a patient-centered practice [3].

The findings from this study suggest that conducting formative OSCEs and providing feedback to students somewhat helped them prepare for their summative OSCE, such that they gain familiarity and confidence with the content and format of the assessment method, which may increase the likelihood of them passing the summative OSCE. The results obtained were congruent with the study conducted by Lien *et al.* (2016) [10], such that serial administration of formative OSCEs had a beneficial education effect for the students and enhanced their performance on the summative OSCE. Additionally, all 44 (100.0%) said that they would recommend taking formative OSCEs before the summative OSCE. Because of formative OSCEs, they were able to determine what to expect in the summative OSCE, as well as become aware of the points to improve on through available feedbacks. Moreover, their complete favor to conduct formative OSCEs may imply that they appreciated opportunities that enable them to practice their knowledge and skills under low-risk conditions of a formative evaluation and to enhance their readiness for the summative OSCE.

## Conclusion

Students had generally positive perceptions to the feedback component of the formative OSCEs, in terms of their learning and achievement of course outcomes, and facilitating knowledge, skills and attitudes development towards the course. Furthermore, many noted that formative OSCEs helped them prepare for the summative OSCE, and they would recommend taking formative OSCEs before the final examination. However, the passing rate for the summative OSCE was relatively low. Likewise, no significant association was found between the results of the summative OSCEs and the formative OSCEs. Overall, formative OSCEs may be a good assessment tool to track the students' progress and give specific and constructive feedbacks for them improve based on the competencies expected in the course. They may also provide students an opportunity to be familiar with the content and format of an OSCE, which would help them enhance their readiness for the summative OSCE. The authors perceive that formative OSCEs should be continued as a form of evaluation for the students, but should be optimized in terms of objective, content and time on the basis of the competencies expected from the students.

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