

CONVENTIONAL/TRADITIONAL PRACTICAL EXAMINATION (CPE/TDPE) VERSUS OBJECTIVE STRUCTURED PRACTICAL EVALUATION (OSPE)/SEMI OBJECTIVE STRUCTURED PRACTICAL EVALUATION (SOSPE)

Hasan S, Malik S, Hamad A, Khan H, Bilal M*

Department of Physiology, CMH Lahore Medical College, *Department of Statistics, University of Veterinary and Animal Sciences, Lahore

Background: Objective Structured Practical Evaluation (OSPE) was derived from Objective Structured Clinical Evaluation (OSCE) and modified by Harden (1975–79). OSPE and OSCE are considered by some a gold standard for assessing pre-clinical and clinical laboratory skills respectively whereas others plead to benefit from SOSPE. **Objective:** To assess the validity of OSPE over Traditional Practical Examination (TDPE) as a system of assessment. **Methods:** The score of 89 undergraduate students was analyzed at the Department of Physiology, CMH Lahore Medical College after conduction of TDPE and OSPE examinations (2007–08) introduced by the University of Health Sciences, Lahore. The TDPE included subjective practical examination whereas the OSPE involved Objective Non-Observed and Observed Stations. **Results:** Unlike the results of some Asian Medical Colleges, the mean score of TDPE was found to be significantly higher than that of OSPE but like others the correlation was weak indicating that they both test different abilities. The student's attitude towards OSPE was found to be positive, though they found the Observed Stations difficult due to fear/anxiety of being observed. Individual deficiency and competency was discovered. OSPE appeared to be a valid index of the learning attitude of students throughout the year. **Conclusions:** OSPE was found to be a valuable tool to check the depth of understanding. Its practice in routine classes and standardization is imperative. **Future prospects:** Incorporation of structured OSPEs in the practical syllabi along with the addition of new experiments in the deficient areas of Renal, Gastro-intestinal, Reproductive, Endocrine and Electro-Physiology may help in improved products.

Keywords: OSPE, CPE, TDPE, SOSPE

INTRODUCTION

The term OSPE is derived from Objective Structured Clinical Evaluation (OSCE) in 1975 which was later extended to practical examination and was modified by Harden and Gleeson.^{1,2} The method of OSPE like the OSCE tests in the students what they can do rather than what they know. This method is now believed to meet the deficiencies of the conventional system of practical examination. In an international conference held in Ottawa in 1985, OSCE and OSPE techniques were introduced as a teaching and evaluation tool and its advantages were compared with disadvantages.³

The conventional practical examination system usually involves writing of detailed procedure of one or two given practical(s) or experiment(s), one as the major and the other minor. It is followed by un-observed performance on self or subject. The assessment is made on the basis of global performance rather than the candidate's individual competency. Some of the problems involved in conventional practical examination include patient and examiner variability significantly affecting the score. In OSPE the process as well as the product is tested giving importance to individual competency. Patient and examiner variability is prevented in

OSPE thus improving the validity of the examination.⁴

Considering problems mainly of technical nature, which were faced at some places lead them to develop a combination of conventional and OSPE systems called as SOSPE or Semi Objective structured Practical Examination that involve conduction of 1 experiment and the student was questioned on it and OSPE.⁵ The OSPE system has been reported to be a good substitute for the conventional method since it is more objective.⁵ This assessment system is based on competency levels for practical and procedural skills aiming at producing good products as reportedly it allows thorough evaluation and the deficiency is pointed out immediately.⁶

The OSPE system advocated by many can offer a better tool for assessment of skills in the basic sciences. A different skill or task is performed by a student at each station.⁷ OSPE has been claimed to be a reliable device that has a good capacity to differentiate between different categories of students. It also tests the mental attendance and the student's attitude towards learning during the time of practical demonstration and performance.⁸

We at the department of Physiology, CMH Lahore Medical College, Lahore compared the two

systems of examination by conducting practically five OSPE and one Conventional System of examination for eighty-nine students.⁹ The format of

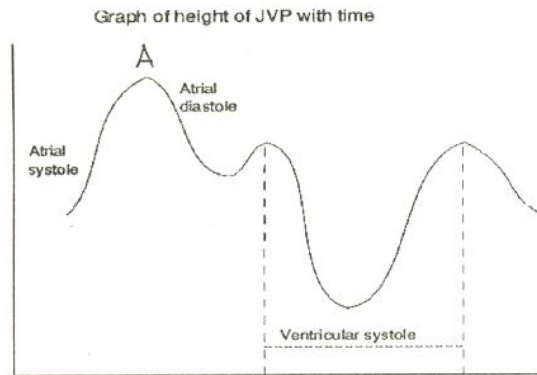
OSPE exam is available at the web site of UHS.¹⁰ A standardized sample of Non Observed and Observed objective stations is given below:

Model Questions of OSPE
(Practical Examination / OSPE)
MBBS First Professional (Part-I)
Physiology

Non Observed Stations

Question:

- | | | |
|-----|---|---|
| i- | Identify area A on the given Graph. | 1 |
| ii- | What do these pressure changes reflect? | 1 |



Key:

- | | | |
|-----|------------------------------|---|
| i- | A = a wave on the JVP Graph. | 1 |
| ii- | Right Atrial Pressure. | 1 |

Question:

- | | | |
|-----|--|---|
| i- | For which blood cell count, the portion of Neubauer Chamber focused is used? | 1 |
| ii- | What is the area of the smallest square in the focused portion? | 1 |

Key:

- | | | |
|-----|-----------------------|---|
| i- | Red blood cell count | 1 |
| ii- | 1/400 mm ² | 1 |

Observed Stations

Question:

- | | | |
|-----|---|---|
| i- | Prepare an unstained blood film for DLC. | 3 |
| ii- | What are the parts of a blood film obtained by Wedge Technique? | 1 |

Key:

- | | | |
|-----|--|-----|
| i- | Check List: | |
| a) | The student sterilizes the tip of his finger with an alcohol swab. | 0.5 |
| b) | Discards the first drop of blood and places the subsequent blood on one side of the slide. | 0.5 |
| c) | Uses the second slide at an angle of 45° and makes the smear in one smooth, gentle and confident push. | 1 |
| d) | Allows the smear to air dry. | 1 |
| ii- | A head, body and tail are obtained. | 1 |

Observed Station

(An example of procedure involving simulated patient / subject)

Question:

- i- Perform Rinne’s test on the subject provided. 3
- ii- What is the principle of the test and what does Rinne’s negative test indicate? 1

Key/Check List-a

i- Check List:

- a) Student introduces himself/herself to the subject, briefs the subject about the procedure of the examination to be performed and takes consent. 0.5
- b) Subject’s ear to be tested should be open while plugs the other ear. 0.5
- c) Sets tuning fork into vibrations, places the stem of vibrating tuning fork firmly on mastoid process. 1
- d) Asks the subject to indicate when the sound disappears, then brings the tuning fork quickly in front of external auditory meatus and observes whether the subject can still hear the sound to declare the positive test. 1
- ii- Air conduction of sound waves is better than bone conduction 0.5
- Conductive deafness 0.5

**OSPE Stations Answer sheet
(MBBS First professional Part-1)**

Station 1:

- a. A 10 year old boy reports to his physician with history of breathlessness on exertion. His lab investigation shows RBC count of 3.5 millions/cmm, Hb 12 gm/dl, haematocrit 36%, MCV 110 cmm, MCH 74 picogram. Give your diagnosis.
- b. What change in MCHC of this patient can be expected?

- KEY:** a. Microcytic, hypochromic anaemia. 1
 b. Decreased MCHC 1

Station 2:

- a. -----
- b. -----

Note: (Number of stations can be adjusted according to the space available)

METHODOLOGY

As recommended by the University of Health Sciences (UHS), Lahore, the OSPE system of examination was practiced at CMH Lahore Medical College, Lahore at the department of Physiology. Five OSPE exams were conducted for 100 students in the years 2007–08. The mean score of those 100 students was included in the study. One Conventional Practical exam was also held in the year 2007 that was attended by 89 out of those 100 students. The two means were compared by applying Student’s *t*-test.

The students participating in the study were first introduced to the system of OSPE. A total of 100 students were divided into 3 practical batches (A, B and C) each consisting of about 33 to 34 students. OSPE examination was scheduled for 3 consecutive days and was conducted conveniently consuming 2 and a half hours each day by further dividing them into 3 sub-batches, each consisting of 11 to 12 students.

Eleven Non Observed (response) stations were set in the practical laboratory in a clockwise manner. Each station offered 2 objective questions. The first question tested the practical knowledge about the equipment placed or against a given problem the problem solving ability was tested whereas the second one tested the theoretical aspect. All the objective response stations were un-related to each other and encompassed the whole practical syllabus. Along with the Non Observed stations, two Observed (procedure) stations were arranged each carrying 4 marks. Three out of 4 marks were reserved for the performance, giving credit to the attitude towards the simulated patient/normal subject, judged from the self introduction and seeking of consent. The remaining 1 mark was reserved for a related theoretical question. An observer appointed at each observed station was provided with an agreed checklist to mark immediately according to the observed procedure.

At each Non Observed station, the time allowed was 1.5 minutes, whereas at each Observed station, maximum time allowed was 4 minutes. The total utilized time for conduction of OSPE exam (Observed and Non Observed) for a batch of 33 students was 2 hours and 30 minutes. About 50 minutes were estimated for 3 rotations around 11 stations but the re-setting of Non Observed stations before each rotation and transfer of new sub-batches of students utilized another 10 minutes time. Meanwhile, when 1st rotation was going on, 2 students out of the third sub-batch of 11 students were being observed at the 2 procedure students each carrying 4 marks and allowed 4 minutes, thus utilizing a total of 2 hours and 32 minutes for 33 students, who were called intermittently, as per ease, during the total duration to save time. After spending 1st one hour on 3 rotations around Non Observed stations, a maximum of 7 minutes were allowed for procedure writing of the given practical, once the students assumed their respective positions, utilizing approximately 5 minutes. The batch of 33 students was still left with at least 1 more hour, out of which 30 minutes were used for practical performance and remaining half an hour was used in practical related viva voce by senior teachers.

RESULTS

Out of the 100 students, who participated in the Objective Structured Practical Evaluation, 89 students had also appeared in the Conventional practical exam in the previous year. The results of those 89 students in the 2 different types of exam systems were compared in terms of mean score and paired *t*-test. The distribution of score in both the old/Conventional and new/OSPE systems of examination is shown in Figure-1 and 2 respectively.

Table-1: Paired Samples Statistics

Stat. Parameters	Pair	
	CPE (old)	OSPE (new)
N (No. of Students)	89	89
Mean (Score)	36.7303	27.7384
Mode	39	28.6
Range	25-46	15.50-34.20
Std. Deviation (Mean)	±5.14	±3.52
Std. Error (Mean)	0.54	0.37
95% Confidence Interval:		
Upper	7.7146	
Lower	7.7146	
Correlation (<i>p</i> -value)	0.581	
<i>t</i> -test, 2-tailed (<i>p</i> -value)	0.0001	

The Pearson correlation co-efficient is 0.059, which is very low and indicates that there is a very weak relationship between the 2 variables (old course/CPE and new course/OSPE) and the *p*-value is 0.581, which is greater than 0.05, so the relationship slightly exists but is very weak.

The data was entered on SPSS software (version 13) to obtain a Regression Model of the new course/OSPE that shows relation between dependant and independent variables, where OSPE data is used as dependant variable/*Y* and CPE data as independent variable/*X*. The following formula was obtained:

$$Y = 26.410 + 0.361X$$

With the help of this model, we estimate the marks of OSPE on the basis of CPE. The value 0.361 shows the average increase in OSPE score if there is unit change in the score of CPE. The value of R-square (that shows proportionate variation of dependant variable/*Y* due to independent variable/*X*) in the regression model is 0.06 which is very low, suggesting that the model adequacy is not good.

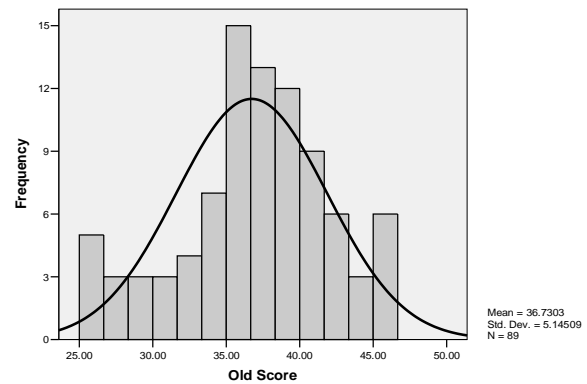


Figure-1: The histogram of student's score in the Conventional Practical exam (Old score). The average score was between 35 and 40 out of 50.

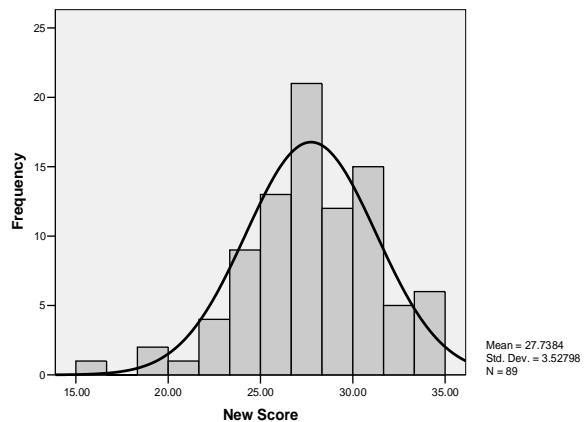


Figure-2: The histogram of student's score in the OSPE (New score). The average score was between 25 and 30 out of 50.

No linear relationship was seen between dependant variable/new course (OSPE) and Regression Standardized Predicted value indicating that we cannot predict the score in case of new course on the basis of the old score.

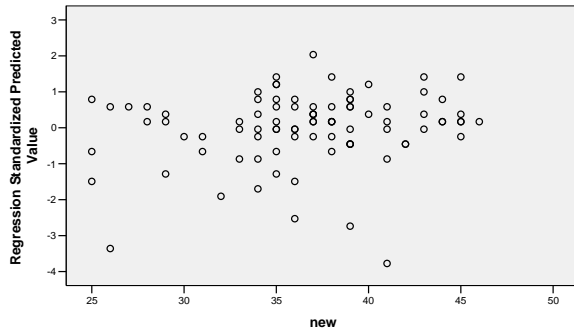


Figure-3: Scatter plot

DISCUSSION

The significantly higher score of Conventional as compared to OSPE system in the present study indicates the structured nature of the newer evaluation system that does not give any advantage to memory and luck. Also in OSPE patient and examiner variability is reduced making it a more valid system of assessment. In pure OSPE all the students have to pass through the same observed and non observed stations instead of performing an experiment allotted by balloting like in CPE. A similar study that compared the results of Physiology practical examination of 400 students from 4 Medical Colleges under Dhaka University, Bangladesh showed significantly higher score in OSPE as compared to TDPE.¹¹ This difference may result from different standards of OSPE evaluation at the two universities and indicates the need to establish uniform international standards. The result variability may be due to the different inclusion criteria involving students from private as well as government medical colleges under Dhaka University having different intellectual standards, whereas the current study-population belonged only to a private medical college. A regular practice of the objective evaluation may help in obtaining solid marks. A marked improvement in the mean score in Physiology courses was seen after regular practice of OSPE at King Faisal University of Saudi Arabia.¹² According to All India Institute of Medical Sciences, New Delhi, a true comparison between the OSPE and CPE, requires a common course format. Furthermore, they accept that OSPE can assess a student in greater depth in all the relevant aspects of the subject than was usually possible with the Conventional system.¹³

In an Indian study, a combination of CPE and OSPE was preferred over pure OSPE and a majority of students considered it as an effective, useful, interesting and challenging examination and it has been considered as a reliable device to discriminate between different categories of students.¹⁴ The OSPE system involves wider coverage of the course and it tests individual

competency in different topics and skills by asking targeted questions at the Non Observed Stations. On the contrary, the Conventional system evaluates randomly the subjective recall of the given practical(s). Students both regular and irregular were able to score high in TDPE by memorizing the procedure. OSPE has been shown to have a better scope for being structured so that all the objectives of laboratory teaching can be tested.¹⁵ In the current study the students' attitude and communication skills were also tested by the teachers appointed at the observed OSPE stations. More than 50% of the students inquired about their deficiencies after the OSPE exam and reflected a positive attitude towards the combination of OSPE and the Classical practical examination (CPE).

A study on the Assessment of laboratory exercises in Physiology considers it as an integral part of teaching-learning process and shows a weak correlation in the results of CPE and OSPE.¹⁶ This correlation is in line with the current study (Tables-1 & 2, Figure-3) suggesting that both the evaluation systems test different abilities, and that their combination may improve the validity of the examination. When the individual scores of the students for each station were studied, some students who passed the examination had low scores for some of the skills. This revealed a need to set up standards for pass/fail decisions for individual practical skill. The competency levels were found useful for the faculty in planning for assessment of practical skills and to monitor progress of student during the whole undergraduate period. Furthermore similar competency approaches can be implemented in the clinical undergraduate students.

Instead of the established benefits of OSPE, it is not implemented everywhere due to its limitations. The major reasons for not practicing OSPE are time constraints and space restraints in small setups. More time is required to examine a batch, if less number of stations could be set due to lack of space. Cutting the time limit at each station would amount to testing how fast they could do the task rather than how well they could perform it. Many a times, logistical problems and time constraints do limit the types of laboratory activities but the creative use of CD and web-based media can overcome this pedagogical restraint. Virtual laboratories have been found to have the same academic value as hands-on laboratory sessions.¹⁷

In conduction of OSPE, more effort is required on the part of faculty as more objective questions have to be designed for different stations and may have to be modified or changed for each rotation. In doing so the difficulty levels or the standard has to be maintained uniformly. If the

questions are repeated periodically, then it becomes a simple matter of testing recall. Some of the advantages of OSPE are objectivity and uniformity in the questions and in the marking of students¹⁸. OSPE requires participation of all faculty members for smooth conduction and proper organization to compensate for the time constraint. In a bid to save on observers, there is an increasing trend to set more un-observed (response) stations.⁵

Besides this the study faced some technical difficulties that consume time and assistance like disinfection of the mouth-piece after demonstration of lung volumes by Spirometry, filling of the marker's ink or replacement of the spirogram (paper) when the space is consumed. Likewise if an Observed Station is meant for checking the blood pressure with sphygmomanometer, the cuff has to be deflated by the student before each attempt. Sometimes discrepancy in the results of OSPE may be seen due to observer fatigue that may occur after observing ten or more students, the observer starts giving tips or suggestions to the students to complete the task. It may happen because the observer gets bored and may wish to interact with the students.⁴ Currently due to load-shading problem, an entire session can be thrown out of gear in case the apparatus at the observed station requires electric supply. Setting up an alternative station or location of another power source can be time consuming.

The checklists require modification each time, in the light of comments of the faculty appointed at a particular station. For example the checklist must specify that the student had to greet the patient first and not in between or last! Based on the OSPE experience, more emphasis can be made in further practical demonstrations on the common mistakes committed by the students. The students also receive an immediate feedback thus understanding the importance of mental as well as physical attendance during the routine demonstrations. At the end of the test, students' feedback has an important role to emphasize the formative aspect of the test and also increases the confidence of the students in their clinical skills as indicated in an American study.^{19,20}

CONCLUSIONS

Objective Structured Practical Evaluation appears to be important for performance discrimination on the basis of individual competency, attitude towards learning and communication skills. It may not only improve the quality of student's performance in the laboratory exercise but may prepare them for their clinical years so that good clinicians may be produced. Both the OSPE and Conventional techniques independently test different abilities. A

combination of one subjective practical and objective OSPE called Semi Objective Structured Practical Evaluation (SOSPE) remains a successful tool for teaching-learning evaluation. The lower scores of OSPE indicate the need for its practice in routine practical classes along with its incorporation in the practical journals.

RECOMMENDATIONS

There is a dire need to revise the syllabus of undergraduate Practical Physiology with a suggestive inclusion of animal experiments especially in the field of electrophysiology and to devise new experiments in the deficient areas like Endocrinology, Reproduction, Renal and Gastro-intestinal Physiology. The more clinically oriented bedside teaching techniques should be left for the clinicians to deal with in the clinical years of study where they will be more worthwhile and comprehensible. Moreover, uniform international standardization of OSPE as well as the syllabus of undergraduates is required through collaborative efforts of subject specialists.

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Address for Correspondence:

Dr. Samina Malik, 277-X, St. 8, Defence Housing Authority, Lahore, Pakistan. Tel: +92-301-8652128

Email: drsemymalik@yahoo.com