Journal of Medical Education Development
e-ISSN: 2980-7670
https://edujournal.zums.ac.ir

Volume 19, Issue 4
October 2026
Pages: 114–127

Original Article

Development and validation of the OSCE Perception Questionnaire (OSCEPQ) for nursing students in Iran

Maryam Aghabarary[1*], Roohangiz Norouzinia[1], Mahsa Khedmatizare[2], Pardis Rahmatpour[3]

[1]Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran
[2]School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran
[4]Nursing School of the University of Coimbra, Health Sciences Research Unit: Nursing, University of Coimbra, Coimbra, Portugal

Article info

Article history:
Received 25 May. 2026
Revised 17 Aug. 2026
Accepted 24 Aug. 2026
Published 1 Oct. 2026

***Corresponding author:**
Maryam Aghabarary, Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran.
Email: aghabararym@gmail.com

How to cite this article:
Aghabarary M, Norouzinia R, Khedmatizare M, Rahmatpour P. Development and validation of the OSCE Perception Questionnaire (OSCEPQ) for nursing students in Iran. *J Med Edu Dev*. 2026;19(4):114–127. http://dx.doi.org/10.66224/edcj.19.4.114

Abstract

Background & Objective: The Objective Structured Clinical Examination (OSCE) is a multidimensional and valid method for assessing the clinical competence of health sciences students, including nursing students. Given the need for a valid, reliable, and trustworthy instrument to evaluate nursing students' perceptions and experiences of the OSCE, this study was conducted to develop and psychometrically evaluate the OSCE Perception Questionnaire (OSCEPQ).

Materials & Methods: A cross-sectional methodological study was conducted among eighth-semester nursing students from the School of Nursing at Alborz University of Medical Sciences, Iran. All eligible eighth-semester nursing students (n = 220) who undertook the OSCE during six consecutive academic semesters (July 2022–January 2025) were included in the study. Data were collected using the researcher-developed OSCEPQ and a demographic questionnaire. The sample was randomly split into two independent subsamples for Exploratory Factor Analysis (EFA; n = 120) and Confirmatory Factor Analysis (CFA; n = 100). Internal consistency was evaluated using Cronbach's alpha and McDonald's omega, and construct validity, including convergent and discriminant validity, was assessed.

Results: EFA extracted two factors comprising 19 items, accounting for 60.4% of the total variance. CFA showed an acceptable model fit (CFI = 0.99, RMSEA = 0.08). The scale showed strong internal consistency (> 0.90). Evidence also supported its convergent and discriminant validity.

Conclusion: The OSCEPQ showed satisfactory psychometric properties, including construct validity and reliability. It can be considered a valid and reliable instrument for assessing nursing students' perceptions of the OSCE. Its application may support improvements in nursing education and evaluation practices.

Keywords: students, nursing; psychometrics; reproducibility of results; educational measurement; health knowledge, attitudes, practice; clinical competence

Introduction

Clinical competence is a cornerstone of health sciences education. It is especially important in nursing, as it directly affects the quality of care, patient safety, and nurses' professional preparedness [1, 2]. In recent decades, growing concerns about the readiness and capabilities of newly graduated nurses have led to greater emphasis on competency-based approaches in education and assessment [3, 4]. Competency-based assessment evaluates students' knowledge, attitudes, and skills in simulated situations that closely mirror real clinical practice [5]. Despite its importance, traditional assessment methods such as written examinations, multiple-choice tests, and oral exams are no longer adequate in nursing education due to their subjectivity and limited validity and reliability [6]. In this context, the Objective Structured Clinical Examination (OSCE) has

Copyright © 2026 Zanjan University of Medical Sciences. Published by Zanjan University of Medical Sciences. Commons Attribution-NonCommercial 4.0 International license (https://creativecommons.org/licenses/by-nc/4.0/). Noncommercial uses of the work are permitted, provided the original work is properly cited.

been introduced as a multidimensional and valid method for assessing clinical competence [7]. Initially developed in the 1970s for medical students, the OSCE has since been widely adopted in nursing and other health professions [7–9]. Its structured, multi-station, and time-sequenced format enables the assessment of diverse clinical knowledge and practical skills [10, 11]. Compared to traditional approaches, it offers the opportunity to evaluate essential skills, such as communication and managing unpredictable patient behaviors [12]. Nevertheless, the effectiveness of OSCE is not solely dependent on station design; nursing students' perceptions and attitudes, as the primary participants, play a critical role in their acceptance, active engagement, and effective learning [13, 14]. A positive perception of the process—including adequate preparation, clarity of procedures, and constructive feedback—can enhance motivation and learning, whereas negative perceptions, such as high anxiety, feelings of unfairness, or a lack of transparency in evaluation criteria, may undermine motivation and even influence outcomes [15–17].

Despite the long-standing use of OSCE in nursing education, validated instruments to assess students' perceptions and experiences comprehensively remain limited. For example, the scale Satisfaction with Nursing Skill Examination: Objective Structured Clinical Assessment (SINE-OSCA), developed by Hunt et al. in Australia, is a 10-item measure designed to evaluate satisfaction with OSCE, showing satisfactory psychometric properties including strong construct validity and high reliability [18]. This instrument was later culturally adapted and psychometrically tested by Romero-Saldaña et al. among Spanish-speaking nursing students, showing excellent internal consistency (α = 0.928) and strong test–retest reliability (ICC = 0.974) [19].

Similarly, Sengul et al. in Turkey developed the scale Objective Structured Clinical Examination Perception Scale (OSCEPS) with 19 items to measure medical and nursing students' perceptions of OSCE, reporting high internal consistency (α = 0.94) and good model fit indices [20]. Although these instruments represent important advances, many are either short or primarily focused on satisfaction, limiting their ability to capture the broader dimensions of nursing students' experiences and perceptions of OSCE. Moreover, there remains a lack of culturally adapted tools suited to the Iranian educational context. Accordingly, the present study aimed to develop and psychometrically evaluate the OSCE Perception Questionnaire (OSCEPQ) among nursing students, providing a comprehensive and valid tool to assess their perceptions and experiences of the OSCE, thereby facilitating the continuous improvement of this assessment method within the Iranian educational context.

Materials & Methods

Design and setting(s)

A cross-sectional methodological study was conducted to develop and psychometrically evaluate the OSCEPQ among eighth-semester nursing students from the School of Nursing at Alborz University of Medical Sciences, Iran. (1 July 2022–1January 2025)

Participants and sampling

All eligible eighth-semester nursing students (n = 220) who undertook the OSCE during six consecutive academic semesters (July 2022–January 2025) were included in the study. Eligible participants were undergraduate nursing students in their final semester who had completed the final OSCE assessing their clinical competencies before graduation and who provided informed consent to participate in the study. Participants were recruited immediately after completion of the end-of-semester OSCE examination. Because the OSCE is administered only at specific time points during the academic year, recruitment was limited to these examination periods. In addition, unavoidable interruptions in the academic schedule extended the overall data collection period. Throughout the study period, the OSCE format, station content, and assessment procedures remained consistent without any significant changes.

Tools/Instruments

Data were collected using a researcher-developed OSCEPQ with a demographic section (gender, marital status, age). The questionnaire's design process, number of items, dimensions, validity, and reliability are presented below.

Phase 1: Item generation. The initial version of the OSCEPQ, consisting of 26 items, was developed and constructed based on a review of the relevant literature [18, 21–23]. The items were rated on a 5-point Likert scale ranging from 1 ("strongly disagree"), 2 ("disagree"), 3 ("neutral"), 4 ("agree"), to 5 ("strongly agree"). Higher scores on the questionnaire indicated a more positive perception of the examination by the students.

Phase 2: Evaluate the validity and reliability. To evaluate face validity, ten nursing students were randomly selected to review the initial version of the questionnaire. They assessed the items for clarity, comprehensibility, wording, readability, and ease of understanding. Based on their feedback, minor revisions were made to improve the wording of several items.

Content validity was established by a panel of ten experts in nursing, medical education, and instrument development, who evaluated each item for relevance and necessity. The Content Validity Ratio (CVR) was calculated using Lawshe's method, with a minimum acceptable value of 0.62 for a panel of ten experts [24]. In addition, the Item-Level Content Validity Index (I-CVI), Scale-Level Content Validity Index (S-CVI/Ave), and modified kappa statistics were calculated, with modified kappa values ≥0.60 considered acceptable [25].

Data collection methods

The initial 26-item version of the paper-based OSCEPQ was administered immediately after completion of the OSCE. All students who participated in the OSCE were provided with the questionnaire and asked to complete it immediately after the examination. The questionnaire was completed anonymously, without any identifying information. All distributed questionnaires were fully completed and returned to the researchers.

Data analysis

Construct validity was evaluated using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) on two independent subsamples obtained by randomly splitting the total sample (n = 220) into a derivation sample (n = 120) and a validation sample (n = 100), respectively [26, 27].

To ensure independent exploration and validation of the latent structure, the sample was randomly divided into two independent subsamples. The first subsample (n = 120) was used for EFA, and the second subsample (n = 100) was used for CFA. However, methodological evidence indicates that the adequacy of sample size in CFA depends on model complexity, factor loadings, and the number of indicators per factor, not solely on a fixed minimum number [26, 28]. Given our relatively simple two-factor structure and the use of the Diagonally Weighted Least Squares (DWLS) estimator for ordinal data, the validation sample (n = 100) was deemed sufficient for model evaluation. EFA was performed using JASP version 0.18. Sampling adequacy and factorability were evaluated using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity. Univariate normality was assessed using skewness and kurtosis indices, whereas multivariate normality was evaluated using Mardia's test. Because the questionnaire consisted of ordinal (Likert-type) items and multivariate normality was violated, a polychoric correlation matrix was analyzed using the Weighted Least Squares (WLS) estimator [29, 30]. The number of latent factors was determined using factor analysis–based parallel analysis, and an oblimin rotation was applied because correlations among latent factors were expected [27, 31]. The final factor structure was subsequently cross-validated using CFA in an independent sample (n = 100) with the SEMLj module of Jamovi (v.2.3.28). Because multivariate normality was not satisfied and the observed variables were ordinal, model parameters were estimated using the DWLS estimator, which is recommended under these conditions [30, 32]. Model fit was evaluated using the chi-square statistic (χ^2), relative chi-square ($\chi^2/df<3$), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). Correlated residuals were added only when supported by strong theoretical justification. Accordingly, covariance terms were specified between one pair of items assessing pre-examination preparation and another pair assessing OSCE equipment, resulting in the final measurement model. Internal consistency was assessed using Cronbach's alpha and McDonald's omega, with coefficients ≥ 0.70 indicating acceptable reliability [33]. Corrected item-total correlations were also examined to evaluate the consistency of individual items with their respective domain score. Convergent validity was evaluated according to the criteria proposed by Fornell and Larcker; Average Variance Extracted (AVE) values ≥ 0.50 indicated adequate convergent validity [34]. Discriminant validity was assessed using the Heterotrait–Monotrait Ratio of Correlations (HTMT), with values < 0.85 considered indicative of adequate discriminant validity [35]. Floor and ceiling effects were assessed for the final 19-item questionnaire by calculating the percentage of participants who obtained the minimum and maximum possible total scores. Floor or ceiling effects were considered present if more than 15% of participants achieved the lowest or highest possible score [36].

Results

A total of 220 eighth-semester nursing students completed the questionnaire. The average age of

respondents was 23.89 years (SD = 2.87), with 52.7% identifying as female (**Table 1**).

The content validity assessment showed excellent expert agreement. All items achieved a CVR value of 1.00, indicating that every expert considered each item essential. In addition, all items obtained an I-CVI of 1.00 and a modified kappa coefficient (K^*) of 1.00, reflecting perfect relevance ratings and complete agreement beyond chance. The overall scale content validity was also excellent, with an S-CVI/Ave of 1 (**Appendix 1**).

Table 1. Demographic characteristics of nursing students

Variables	n (%)
Gender	
Male	104 (47.3)
Female	116 (52.7)
Marital status	
Single	195 (88.6)
Married	25 (11.4)
Year	
July 2022	34 (15.5)
January 2023	35 (15.9)
July 2023	35 (15.9)
January 2024	36 (16.4)
July 2024	45 (20.5)
January 2025	35 (15.9)
Age	
21–23	141 (64.1)
24–26	61 (27.7)
27⩽	18 (8.2)
Min–Max	21–43
Mean ± SD	23.89 ± 2.87

Note: Data are presented as frequency (percentage) for categorical variables and as mean ± standard deviation (range) for age. The total sample size was 220 participants.
Abbreviations: n., number; %, percentage; SD, standard deviation; Min, minimum; Max, maximum.

EFA was initially performed on the 26-item questionnaire using the derivation sample (n = 120). During the iterative refinement process, four items (items 12, 26, 24, and 3) were removed because of multicollinearity, two items (items 2 and 7) were excluded due to low communalities (< 0.20), and one item (item 10) was eliminated because its standardized factor loading was below the acceptable threshold of 0.40.

The final 19-item questionnaire showed a clear and interpretable two-factor structure—Organization and Administrative Support (10 items) and Educational and Clinical Development (9 items)—with satisfactory factor loadings and no problematic cross-loadings. Following oblimin rotation, the two retained factors jointly explained 60.4% of the total variance, with the first and second factors accounting for 30.8% and 29.6%, respectively (**Table 2**).

Table 2. Descriptive statistics, factor loadings, and corrected item-total correlation of the OSCE perception questionnaire items

Item code	(M ± SD)	h² *	Factor loading	Corrected item-total correlation
Organization and administrative support (variance = 30.8%)				
Q19	2.93 ± 0.88	0.251	0.910	0.80
Q20	3.15 ± 0.88	0.336	0.856	0.63
Q18	3.02 ± 1.00	0.250	0.848	0.64
Q25	2.87 ± 0.95	0.662	0.528	0.59
Q21	2.89 ± 0.95	0.458	0.722	0.78
Q22	2.88 ± 1.04	0.311	0.721	0.77
Q17	2.97 ± 1.04	0.453	0.631	0.78
Q16	2.74 ± 1.13	0.392	0.610	0.70
Q23	2.55 ± 1.18	0.528	0.662	0.53
Q15	2.90 ± 0.93	0.414	0.527	0.72
Educational and clinical development (variance = 29.6%)				
Q6	2.90 ± 1.04	0.364	0.746	0.80
Q13	2.71 ± 1.04	0.328	0.899	0.69
Q8	2.87 ± 1.00	0.301	0.773	0.79
Q5	2.55 ± 1.18	0.662	0.528	0.72
Q1	2.70 ± 1.06	0.380	0.712	0.71
Q9	2.80 ± 1.16	0.304	0.898	0.71
Q11	2.68 ± 1.09	0.448	0.716	0.76
Q14	2.79 ± 1.06	0.297	0.754	0.69
Q4	2.69 ± 1.04	0.543	0.527	0.66

Note: Data were obtained from 120 participants. h²* = item communality. Only items with standardized factor loadings ≥ 0.40 are presented. The number of factors was determined using factor analysis–based parallel analysis on a polychoric correlation matrix with oblimin rotation. Total variance explained = 60.4%.
Abbreviations: M, mean; SD, standard deviation; h², communality.

The two-factor structure identified in the EFA was subsequently evaluated in an independent validation sample (n = 100) using CFA. Mardia's test showed significant multivariate non-normality (multivariate skewness: coefficient = 120.010, χ^2 = 2400.198, df = 1330, $p < 0.001$; multivariate kurtosis: coefficient = 492.402, z = 18.110, $p < 0.001$).

Therefore, the model was estimated using the DWLS estimator. Inspection of modification indices suggested several potential residual covariances. However, correlated residuals were specified between Items 16 and 17 and between Items 19 and 21 because each pair measured conceptually overlapping aspects of pre-examination preparation and OSCE equipment, respectively. No additional modifications lacking conceptual justification were incorporated into the model (**Figure 1**).

The two latent factors were strongly correlated. However, because the measurement model comprised only two first-order factors, a second-order factor model was not specified, and the correlated two-factor model was retained as the final measurement model. The final 19-item model showed an acceptable fit to the data (χ^2 = 257, df = 149, $\chi^2/df = 1.72$, $p < 0.001$, CFI = 0.993, TLI = 0.992, SRMR = 0.080, and RMSEA = 0.085, 95% CI: 0.067–0.103).

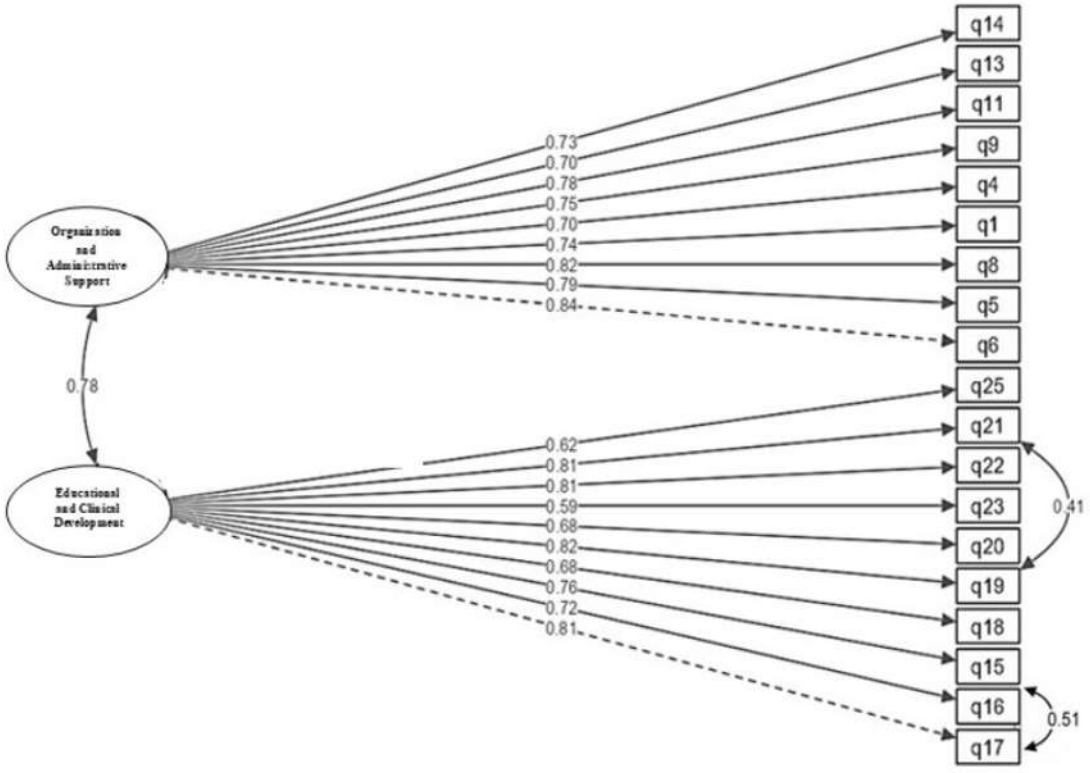


Figure 1. Confirmatory factor analysis (CFA) structure of the final 19-item OSCEPQ (n = 100)

According to Fornell and Larcker's criteria [34], the conditions for establishing convergent validity of the OSCEPQ were met. AVE values were above 0.50, supporting convergent validity. Discriminant validity was also supported, as the HTMT ratio between the two latent constructs was below the recommended threshold of 0.85 (**Table 3**).

With respect to internal consistency and reliability, Cronbach's alpha and Omega coefficients for the two factors were all greater than 0.70, indicating excellent internal consistency (**Table 3**). Corrected item-total correlations ranged from 0.53 to 0.80 in domain 1, and from 0.66 to 0.80 in domain 2 (**Table 2**).

No floor or ceiling effects were observed for the final 19-item questionnaire. One participant (0.5%) obtained the minimum possible score (0), and 11 participants (5.0%) obtained the maximum possible score (76), both of which were below the recommended 15% threshold.

Table 3. Reliability, convergent, and discriminant validity indices of the final two-factor OSCE perception questionnaire

Factors	α	ω	AVE	HTMT	
				1	2
1. Organization and administrative support	0.918	0.925	0.659	–	
2. Educational and clinical development	0.925	0.930	0.663	0.837	–

Note: Convergent validity is supported when AVE > 0.50. Discriminant validity is supported when HTMT < 0.85.
Abbreviations: α, Cronbach's alpha; ω, McDonald's omega; AVE, average variance extracted; HTMT, heterotrait–monotrait ratio of correlations.

Discussion

This study was conducted to develop and psychometrically evaluate the OSCEPQ for nursing students. Based on a literature review [18, 21–23], an initial draft of the questionnaire, comprising 26 items, was designed. Subsequently, the processes of face validity, content validity, construct validity, and reliability testing were carried out.

In the face and content validity stage, each item of the questionnaire was evaluated in terms of sentence structure, relevance, and necessity by a panel of ten experts in nursing and medical education and instrument

development. According to the experts' assessments, all items received the maximum possible scores for both relevance and necessity. Thus, by consensus of the panel, all 26 items were deemed essential and highly relevant, and the adequacy of the 26-item questionnaire in terms of face and content validity was confirmed. In other words, the items showed satisfactory linguistic and content validity and appropriately reflected the construct they were intended to measure.

For construct validity, both EFA and CFA were employed. Before conducting EFA, sampling adequacy and data suitability for factor analysis were confirmed using the KMO test and Bartlett's test of sphericity [27, 37]. Construct validity analysis resulted in the removal of seven items from the initial 26, yielding a two-factor structure: Organization and Administrative Support (10 items) and Educational and Clinical Development (9 items). The factor loadings of the items ranged from 0.527 to 0.910, indicating strong inter-item correlations. Organization and Administrative Support factor explained 30.8% of the total variance, with items related to test structure and stations, instructions, coordination, and communication. The highest factor loadings were observed for the items: "The environment and equipment in each station matched the clinical skill being assessed at that station." and "The OSCE stations had acceptable conditions in terms of cleanliness, lighting, quietness, and ventilation." These findings underscore the importance of high-quality organization and standardized examination conditions from the students' perspective.

The second factor, Educational and Clinical Development, comprised items related to test characteristics, performance and clinical experience, and learning motivation, explaining 29.6% of the total variance. The highest factor loadings corresponded to the items: "The OSCE identified my strengths." and "Successfully completing the assigned tasks in each station enhanced my self-confidence." These findings highlight the educational and empowering role of the OSCE in enhancing students' learning and self-efficacy.

The combined use of EFA and CFA provides strong evidence for evaluating factor structure and construct validity [20]. Accordingly, after extracting the initial factor structure through EFA, we further assessed the questionnaire's construct validity using CFA. To evaluate the degree of fit between the proposed model and the observed data, a set of goodness-of-fit indices was calculated [38]. The results indicated that the 19-item CFA model showed an overall satisfactory fit, with indices confirming an adequate level of model–data consistency. Ultimately, the two-dimensional structure of the questionnaire was validated, showing the instrument's ability to measure the intended construct effectively and confirming its construct validity.

In this study, internal consistency was examined using Cronbach's alpha coefficient and McDonald's omega index. The Cronbach's alpha values for the questionnaire factors ranged from 0.91 to 0.92, while McDonald's omega ranged from 0.92 to 0.93. These findings indicate that the questionnaire items were reliable and consistently measured the intended construct among participants.

In analyzing and comparing the results of the present study, a review of the literature shows that previous research on OSCE has primarily focused on students' attitudes, experiences, and perceptions [39, 40]. These studies have examined multiple aspects of the examination process, including students' perceptions and satisfaction with OSCE, the organization and implementation of the test, as well as its impact on participants' stress levels [16, 23, 41]. Moreover, part of the existing research has been directed mainly toward the evaluation of clinical skills using OSCE, with less emphasis on the psychometric analysis of assessment scales [22, 42]. Accordingly, the questionnaire developed in the present study—which was systematically examined in terms of construct validity and reliability—is not directly comparable with previous instruments reported in the literature. This limits the extent to which the findings related to the present questionnaire, particularly regarding construct validity and reliability, can be compared with those of earlier tools.

Nevertheless, the most relevant and comparable study to the present findings is that of Sengul et al., who designed and psychometrically tested the Objective Structured Clinical Examination Perception Scale (OSCEPS) to evaluate OSCE characteristics from the perspective of health sciences students in Turkey. The initial version of this scale consisted of 32 items, which were reviewed by eight experts in assessment and evaluation with experience in administering OSCE in nursing and medical education. Based on content validity evaluation, 13 items were removed due to low content validity indices and semantic overlap with other items. The content validity index (CVI) for the remaining 19 items was greater than 0.87. Ultimately, the scale-level CVI was calculated at 0.97, while the item-level CVI was 0.91. In OSCEPS, a single factor with 19 items was

extracted, with the highest factor loadings corresponding to the items “The content of the OSCE skill/scenario was well structured” and “The OSCE provided an opportunity to apply my theoretical knowledge” [20].

Similarly, in the 10-item SINE-OSCA scale developed by Hunt et al. in Australia to measure satisfaction with OSCE, only one factor was extracted using the Principal Axis Factoring method, which explained 51% of the variance. Factor loadings for all 10 items ranged from 0.45 to 0.86, exceeding the commonly accepted threshold of 0.40 [18].

In the study by Sengul et al., the highest factor loadings were observed for the items related to the well-designed OSCE content and scenarios, the opportunity to apply theoretical knowledge, the appropriateness of equipment for the skills being assessed, and the alignment of the assessment system with educational objectives [20].

Both the present study and Sengul et al. identified the quality of OSCE design and implementation, as well as the appropriateness of station equipment for the assessed clinical skills, as key determinants of students’ perceptions of OSCE quality. These findings underscore the importance of standardizing both the examination environment and the assessment process. However, a notable difference was observed between the two studies. Sengul et al. primarily emphasized the structural and educational characteristics of the examination, including scenario design and alignment with educational objectives [20]. In contrast, the present study additionally highlighted the individual and educational outcomes of the OSCE. Specifically, identifying students’ strengths and enhancing their self-confidence after completing station tasks were among the strongest indicators of the Educational and Clinical Development factor. These findings suggest that participants perceived the OSCE not only as a tool for evaluating performance but also as an opportunity for feedback, self-reflection, and professional development.

The findings of Hunt et al. also provide partial support for the present results. During the validation of the OSCA Satisfaction Scale, they identified a single-factor structure in which the highest factor loadings were associated with the items "The OSCA provided a good opportunity to demonstrate my knowledge," "The OSCA provided a good opportunity to demonstrate my practical skills," and "The OSCA was a fair method for assessing clinical skills." In contrast, items related to having sufficient time for practice and completing the examination showed relatively lower factor loadings. These findings indicate that students’ perceptions of educational quality, opportunities to show their knowledge and practical skills, and assessment fairness are key determinants of their satisfaction with the OSCA [18].

The findings of the present study extend these results. Although items related to opportunities to show knowledge and practical skills were not among those with the highest factor loadings, items concerning the identification of students’ strengths and enhancement of self-confidence suggest that students value the OSCE when it helps them recognize their competencies and strengthens their sense of professional competence. In contrast, Hunt et al. primarily emphasized the evaluative function of the OSCA, including opportunities to show knowledge and skills and ensuring fairness. The present findings, however, highlight the learning-oriented and transformative role of the OSCE in shaping students’ positive perceptions of this assessment method [18].

The Cronbach’s alpha coefficient reported for the OSCEPS scale developed by Sengul et al. was 0.943 [20]. Similarly, Hunt et al. reported a Cronbach’s alpha of 0.91 for the SINE-OSCA instrument [18]. In the study by Alamri et al., which utilized an 11-item questionnaire to assess students’ perceptions of OSCE, Cronbach’s alpha was reported as 0.90 [13].

This study has several limitations. First, participants were recruited from a single university, which may limit the generalizability of the findings to other educational settings and student populations. Second, data collection was conducted over multiple OSCE examination periods because participants were eligible for recruitment only after completing the end-of-semester OSCE examination. Although no major changes were made to the OSCE format or assessment procedures during the study period, the potential influence of temporal variation cannot be entirely excluded. Third, in this study, test–retest reliability was not evaluated; therefore, the temporal stability of the OSCEPQ could not be established. In addition, criterion validity was not assessed because no established instrument measuring the same construct was available for comparison. Future studies are recommended to further evaluate the questionnaire’s psychometric properties by examining test–retest reliability, criterion validity, and external validation using independent samples. These additional investigations will provide stronger evidence for the stability, validity, and generalizability of the OSCEPQ. Also, although the questionnaire was specifically developed for nursing students, future multicenter studies with larger samples involving students from other

health science disciplines where OSCE is implemented are recommended to further evaluate the generalizability and applicability of the OSCEPQ.

Conclusion

In this study, the OSCEPQ was developed and psychometrically evaluated for Iranian nursing students. The questionnaire provides a means of assessing nursing students' perceptions and experiences of the OSCE. The findings showed satisfactory construct validity, internal consistency, and reliability based on Cronbach's alpha and McDonald's omega. These results suggest that the OSCEPQ is a promising instrument for assessing nursing students' perceptions and experiences of the OSCE. It may also support educators and researchers in evaluating and improving the design and implementation of the OSCE, as well as in examining its educational outcomes. However, further studies are recommended to evaluate additional psychometric properties, including test–retest reliability and external validation in independent samples, to further establish the questionnaire's measurement properties. To the best of the authors' knowledge, this is the first questionnaire in Iran specifically developed and psychometrically evaluated to assess nursing students' perceptions and experiences of the OSCE.

Ethical considerations

Ethical approval for this study was granted by the Ethics Committee of Alborz University of Medical Sciences (IR.ABZUMS.REC.1398.175). The study was conducted in accordance with the ethical standards of the institutional and national research committees and with the principles outlined in the Declaration of Helsinki. Participants were fully informed of the study objectives, their right to withdraw at any time without penalty, and the confidentiality and anonymity of their responses. The voluntary completion and return of the paper-based questionnaire implied informed consent.

Artificial intelligence utilization for article writing

The authors confirm that no generative AI tools were used in the writing of this manuscript or in the creation of any data, tables, or captions.

Acknowledgment

The authors wish to express their sincere gratitude to the Student Research Committee and the Research and Technology Deputy of Alborz University of Medical Sciences, Karaj, Iran, for their invaluable assistance (Research code: 3510). Additionally, we extend our appreciation to the students who contributed to this project.

Conflict of interest statement

The authors declare that they have no competing interests.

Author contributions

M.A. and M.K. were involved in developing the study concept and design. M.K. and M.A. carried out data collection, while R.N. and P.R. contributed to the design of the statistical analyses. All authors collaborated in drafting the initial manuscript, provided critical revisions, and approved the final version for submission.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

1. Al-Ali A, Bani Hani S, Abu Aqoulah EA. Assessing professional competencies among undergraduate Jordanian nursing students: a cross-sectional study. *SAGE Open Nurs.* 2025;11:23779608251337241. https://doi.org/10.1177/23779608251337241
2. Zaitoun RA. Assessing nurses' professional competency: a cross-sectional study in Palestine. *BMC Nurs.* 2024;23(1):379. https://doi.org/10.1186/s12912-024-02064-y
3. Hyun A, Tower M, Turner C. The current contexts of newly graduated nurses' competence: a content analysis. *Healthcare (Basel).* 2022;10(6):1071. https://doi.org/10.3390/healthcare10061071
4. Chen SH, Chen SC, Lai YP, Chen PH, Yeh KY. The objective structured clinical examination as an assessment strategy for clinical competence in novice nursing practitioners in Taiwan. *BMC Nurs.* 2021;20(1):91. https://doi.org/10.1186/s12912-021-00608-0
5. Rayyan MR. The use of objective structured clinical examination in dental education: a narrative

review. *Front Oral Health.* 2024;5:1336677. https://doi.org/10.3389/froh.2024.1336677
6. Wass V, Van der Vleuten C, Shatzer J, Jones R. Assessment of clinical competence. *Lancet.* 2001;357(9260):945–949. https://doi.org/10.1016/S0140-6736(00)04221-5
7. Chabrera C, Diago E, Curell L. Development, validity and reliability of objective structured clinical examination in nursing students. *SAGE Open Nurs.* 2023;9:23779608231207217. https://doi.org/10.1177/23779608231207217
8. Harden RM, Stevenson M, Downie WW, Wilson GM. Assessment of clinical competence using objective structured examination. *Br Med J.* 1975;1(5955):447–451. https://doi.org/10.1136/bmj.1.5955.447
9. Cuschieri A, Gleeson FA, Harden RM, Wood RAB. A new approach to a final examination in surgery: use of the objective structured clinical examination. *Ann R Coll Surg Engl.* 1979;61(5):400–405. https://pmc.ncbi.nlm.nih.gov/articles/PMC2492215/
10. Alinier G. Nursing students' and lecturers' perspectives of objective structured clinical examination incorporating simulation. *Nurse Educ Today.* 2003;23(6):419–426. https://doi.org/10.1016/s0260-6917(03)00044-3
11. Pérez Baena AV, Sendra Portero F. The objective structured clinical examination (OSCE): main aspects and the role of imaging. *Radiologia (Engl Ed).* 2023;65(1):55–65. https://doi.org/10.1016/j.rxeng.2022.09.006
12. Zayyan M. Objective structured clinical examination: the assessment of choice. *Oman Med J.* 2011;26(4):219–222. https://doi.org/10.5001/omj.2011.55
13. Alamri S, Al Hashmi I, Shruba K, Jamaan S, Alrahbi Z, Al Kaabi T. Nursing students' perception and attitude towards objective structured clinical examination in Oman. *Sultan Qaboos Univ Med J.* 2022;22(3):343–350. https://doi.org/10.18295/squmj.2.2022.012
14. Nulty DD, Mitchell ML, Jeffrey CA, Henderson A, Groves M. Best practice guidelines for use of OSCEs: maximising value for student learning. *Nurse Educ Today.* 2011;31(2):145–151. https://doi.org/10.1016/j.nedt.2010.05.006
15. Johnston ANB, Weeks B, Shuker MA, Coyne E, Niall H, Mitchell M, et al. Nursing students' perceptions of the objective structured clinical examination: an integrative review. *Clin Simul Nurs.* 2017;13(3):127–142. https://doi.org/10.1016/j.ecns.2016.11.002
16. Bani-Issa W, Al Tamimi M, Fakhry R, Tawil HA. Experiences of nursing students and examiners with the objective structured clinical examination method in physical assessment education: a mixed methods study. *Nurse Educ Pract.* 2019;35:83–89. https://doi.org/10.1016/j.nepr.2019.01.006
17. Muldoon K, Biesty L, Smith V. 'I found the OSCE very stressful': student midwives' attitudes towards an objective structured clinical examination (OSCE). *Nurse Educ Today.* 2014;34(3):468–473. https://doi.org/10.1016/j.nedt.2013.04.022
18. Hunt L, Ramjan LM, Daly M, Lewis P, O'Reilly R, Willis S, et al. Development and psychometric testing of the 10-item satisfaction with Nursing Skill Examination: objective structured clinical assessment scale. *Nurse Educ Pract.* 2020;45:102779. https://doi.org/10.1016/j.nepr.2020.102779
19. Romero-Saldaña M, Sánchez-Thevenet P, Almodóvar-Fernández I, González-Moret R, Salas-Medina P, Ranchal-Sánchez A, et al. Development and validation of a new satisfaction scale for objective structured clinical assessments (S-OSCA): a multicenter cross-sectional study. *Nurse Educ Today.* 2024;141:106308. https://doi.org/10.1016/j.nedt.2024.106308
20. Sengul T, Semerci R, Güney S, Karakaya Çataldaş S. Objective structured clinical examination perception scale (OSCEPS) for health sciences students: a psychometric evaluation study. *Nurs Health Sci.* 2024;26(4):e13188. https://doi.org/10.1111/nhs.13188
21. Beiranvand S, Hosseinabadi R, Ghasemi F, Anbari K. An assessment of nursing and midwifery students viewpoint, performance and feedback with an objective structured clinical examination (OSCE). *J Nurs Educ.* 2017;6(1):63–70. https://doi.org/10.21859/JNE-06019
22. Hosseinabadi R, Gholami M, Biranvand S, Anbari K, Tarverdian A. The comparison of perfomance and feedback of nursing students on Objective structured clinical examination (OSCE) and traditional methods. *J Yafte.* 2019;20(4):51–62. https://yafte.lums.ac.ir/browse.php?a_code=A-10-182-3&slc_lang=en&sid=1
23. Fisseha H, Desalegn H. Perception of students and examiners about objective structured clinical examination in a teaching hospital in Ethiopia. *Adv*

Med Educ Pract. 2021;12:1439–1448. https://doi.org/10.2147/AMEP.S342582
24. Lawshe CH. A quantitative approach to content validity. *Pers Psychol.* 1975;28(4):563–575. https://doi.org/10.1111/j.1744-6570.1975.tb01393.x
25. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? appraisal and recommendations. *Res Nurs Health.* 2007;30(4):459–467. https://doi.org/10.1002/nur.20199
26. Kyriazos TA. Applied psychometrics: sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology.* 2018;9:2207–2230. https://doi.org/10.4236/psych.2018.98126
27. Brown TA. *Confirmatory factor analysis for applied research.* 2nd ed. New York: Guilford Press; 2015.
28. Wolf EJ, Harrington KM, Clark SL, Miller MW. Sample size requirements for structural equation models: an evaluation of power, bias, and solution propriety. *Educ Psychol Meas.* 2013;76(6):913–934. https://doi.org/10.1177/0013164413495237
29. Flora DB, Curran PJ. An empirical evaluation of alternative methods of estimation for confirmatory factor analysis with ordinal data. *Psychol Methods.* 2004;9(4):466–491. https://doi.org/10.1037/1082-989X.9.4.466
30. Li CH. Confirmatory factor analysis with ordinal data: comparing robust maximum likelihood and diagonally weighted least squares. *Behav Res Methods.* 2016;48(3):936–949. https://doi.org/10.3758/s13428-015-0619-7
31. Hair JF Jr, Black WC, Babin BJ, Anderson RE. *Multivariate data analysis.* 8th ed. Andover: Cengage Learning; 2022.
32. Rahmatpour P, Marôco J, Amaral A, Apóstolo J. Structural equation modeling in nursing research: challenges, strategies, and practical recommendations. *Health Serv Outcomes Res Method.* 2026;1–19. https://doi.org/10.1007/s10742-026-00376-x
33. Norouzinia R, Aghabarary M, Rahmatpour P. Psychometric evaluation of the Persian version of emergency medical services-safety attitudes questionnaire (EMS-SAQ). *BMC Emerg Med.* 2024;24(1):24. https://doi.org/10.1186/s12873-024-00941-y
34. Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. *J Mark Res.* 1981;18(1):39–50. https://doi.org/10.1177/002224378101800104
35. Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J Acad Mark Sci.* 2015;43:115–135. https://doi.org/10.1007/s11747-014-0403-8
36. Terwee CB, Bot SDM, de Boer MR, van der Windt DAWM, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol.* 2007;60(1):34–42. https://doi.org/10.1016/j.jclinepi.2006.03.012
37. Shrestha N. Factor analysis as a tool for survey analysis. *Am J Appl Math Stat.* 2021;9(1):4–11. https://doi.org/10.12691/ajams-9-1-2
38. Schreiber JB, Nora A, Stage FK, Barlow EA, King J. Reporting structural equation modeling and confirmatory factor analysis results: a review. *J Educ Res.* 2006;99(6):323–338. https://doi.org/10.3200/JOER.99.6.323-338
39. Ameh N, Abdul MA, Adesiyun GA, Avidime S. Objective structured clinical examination vs traditional clinical examination: an evaluation of students' perception and preference in a Nigerian medical school. *Niger Med J.* 2014;55(4):310–313. https://doi.org/10.4103/0300-1652.137191
40. Sharvan PM, Ullas A, Vasanth I. Attitude and level of satisfaction on objective structured practical examination and traditional practical examination among undergraduate nursing students. *J Educ Health Promot.* 2024;13:178. https://doi.org/10.4103/jehp.jehp_1511_23
41. Vincent SC, Arulappan J, Amirtharaj A, Matua GA, Al Hashmi I. Objective structured clinical examination vs traditional clinical examination to evaluate students' clinical competence: a systematic review of nursing faculty and students' perceptions and experiences. *Nurse Educ Today.* 2022;108:105170. https://doi.org/10.1016/j.nedt.2021.105170
42. Ha EH, Lim E. The effect of objective structured clinical examinations for nursing students. *PLoS One.* 2023;18(6):e0286787. https://doi.org/10.1371/journal.pone.0286787

Appendices

Appendix 1. Content analysis results

No	Items	CVR	I-CVI	K*
1	The OSCE assessed a broad range of my knowledge and information.	1	1	1
2	The OSCE assessed a wide range of clinical performance required in patient care.	1	1	1
3	The skills assessed in each station were consistent with the theoretical and practical training I had received during my four years of study at the university.	1	1	1
4	The OSCE included a variety of practical clinical scenarios.	1	1	1
5	Compared to other examinations, the OSCE provided me with greater opportunities to apply and analyze my theoretical and practical knowledge.	1	1	1
6	The OSCE identified my strengths.	1	1	1
7	The OSCE identified my weaknesses.	1	1	1
8	The OSCE offered me another learning opportunity.	1	1	1
9	The OSCE increased my motivation to learn more effectively and thoroughly before entering the nursing profession.	1	1	1
10	Compared to other practical and theoretical examinations I have taken, the OSCE caused me less stress.	1	1	1
11	The OSCE was a practical and valuable clinical experience for me.	1	1	1
12	The likelihood of passing the OSCE is higher than that of other practical and theoretical examinations.	1	1	1
13	Successfully completing the assigned tasks in each station enhanced my self-confidence.	1	1	1
14	By its very nature, the OSCE strengthens and enhances decision-making skills in critical situations.	1	1	1
15	Before the OSCE, I was provided with the necessary information regarding the procedures and stations, which gave me a general understanding of the nature of the examination.	1	1	1
16	Before the OSCE, the examiners specified the topics to be assessed, and I was given sufficient time to study.	1	1	1
17	Information regarding the time and venue of the OSCE was communicated to all target students in a timely and comprehensive manner by the faculty.	1	1	1
18	The OSCE organizers were available and responsive to my questions and concerns about the examination.	1	1	1
19	The environment and equipment in each station matched the clinical skill being assessed at that station.	1	1	1
20	The OSCE stations had acceptable conditions in terms of cleanliness, lighting, quietness, and ventilation.	1	1	1
21	The instruments, equipment, and simulators/mannequins available in each station were of satisfactory and acceptable quality.	1	1	1
22	The OSCE instructions for each station were clear and unambiguous.	1	1	1
23	The time allocated for performing the tasks in each station was sufficient and appropriate to the nature of the activities required.	1	1	1
24	The presence of some faculty members during the administration of the OSCE increased my self-confidence and reduced my test-related stress.	1	1	1
25	The OSCE was well organized and implemented in terms of the sequence and continuity of the stations.	1	1	1
26	Before the OSCE, suitable conditions were provided in the university practice unit to rehearse and repeat the correct performance of clinical procedures and interventions.	1	1	1

S-CVI/Ave = 1

Appendix 2. The initial version of the OSCE Perception Questionnaire (OSCEPQ) for Nursing Students, consisting of 26 items, before construct validity

No	Items	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1	The OSCE assessed a broad range of my knowledge and information.	☐	☐	☐	☐	☐
2	The OSCE assessed a wide range of clinical performance required in patient care.	☐	☐	☐	☐	☐
3	The skills assessed in each station were consistent with the theoretical and practical training I had received during my four years of study at the university.	☐	☐	☐	☐	☐
4	The OSCE included a variety of practical clinical scenarios.	☐	☐	☐	☐	☐
5	Compared to other examinations, the OSCE provided me with greater opportunities to apply and analyze my theoretical and practical knowledge.	☐	☐	☐	☐	☐
6	The OSCE identified my strengths.	☐	☐	☐	☐	☐
7	The OSCE identified my weaknesses.	☐	☐	☐	☐	☐
8	The OSCE offered me another learning opportunity.	☐	☐	☐	☐	☐
9	The OSCE increased my motivation to learn more effectively and thoroughly before entering the nursing profession.	☐	☐	☐	☐	☐
10	Compared to other practical and theoretical examinations I have taken, the OSCE caused me less stress.	☐	☐	☐	☐	☐
11	The OSCE was a practical and valuable clinical experience for me.	☐	☐	☐	☐	☐
12	The likelihood of passing the OSCE is higher than that of other practical and theoretical examinations.	☐	☐	☐	☐	☐
13	Successfully completing the assigned tasks in each station enhanced my self-confidence.	☐	☐	☐	☐	☐
14	By its very nature, the OSCE strengthens and enhances decision-making skills in critical situations.	☐	☐	☐	☐	☐
15	Before the OSCE, I was provided with the necessary information regarding the procedures and stations, which gave me a general understanding of the nature of the examination.	☐	☐	☐	☐	☐
16	Before the OSCE, the examiners specified the topics to be assessed, and I was given sufficient time to study.	☐	☐	☐	☐	☐
17	Information regarding the time and venue of the OSCE was communicated to all target students in a timely and comprehensive manner by the faculty.	☐	☐	☐	☐	☐
18	The OSCE organizers were available and responsive to my questions and concerns about the examination.	☐	☐	☐	☐	☐
19	The environment and equipment in each station matched the clinical skill being assessed at that station.	☐	☐	☐	☐	☐
20	The OSCE stations had acceptable conditions in terms of cleanliness, lighting, quietness, and ventilation.	☐	☐	☐	☐	☐
21	The instruments, equipment, and simulators/mannequins available in each station were of satisfactory and acceptable quality.	☐	☐	☐	☐	☐
22	The OSCE instructions for each station were clear and unambiguous.	☐	☐	☐	☐	☐
23	The time allocated for performing the tasks in each station was sufficient and appropriate to the nature of the activities required.	☐	☐	☐	☐	☐
24	The presence of some faculty members during the administration of the OSCE increased my self-confidence and reduced my test-related stress.	☐	☐	☐	☐	☐
25	The OSCE was well organized and implemented in terms of the sequence and continuity of the stations.	☐	☐	☐	☐	☐
26	Before the OSCE, suitable conditions were provided in the university practice unit to rehearse and repeat the correct performance of clinical procedures and interventions.	☐	☐	☐	☐	☐

Appendix 3. The final version of the OSCE Perception Questionnaire (OSCEPQ) for Nursing Students, consisting of 19 items, after construct validity

Factors	No	Items	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
Educational and Clinical Development	1	The OSCE assessed a broad range of my knowledge and information.	☐	☐	☐	☐	☐
	2	The OSCE included a variety of practical clinical scenarios.	☐	☐	☐	☐	☐
	3	Compared to other examinations, the OSCE provided me with greater opportunities to apply and analyze my theoretical and practical knowledge.	☐	☐	☐	☐	☐
	4	The OSCE identified my strengths.	☐	☐	☐	☐	☐
	5	The OSCE offered me another learning opportunity.	☐	☐	☐	☐	☐
	6	The OSCE increased my motivation to learn more effectively and thoroughly before entering the nursing profession.	☐	☐	☐	☐	☐
	7	The OSCE was a practical and valuable clinical experience for me.	☐	☐	☐	☐	☐
	8	Successfully completing the assigned tasks in each station enhanced my self-confidence.	☐	☐	☐	☐	☐
	9	By its very nature, the OSCE strengthens and enhances decision-making skills in critical situations.	☐	☐	☐	☐	☐
Organization and Administrative Support	10	Before the OSCE, I was provided with the necessary information regarding the procedures and stations, which gave me a general understanding of the nature of the examination.	☐	☐	☐	☐	☐
	11	Before the OSCE, the examiners specified the topics to be assessed, and I was given sufficient time to study.	☐	☐	☐	☐	☐
	12	Information regarding the time and venue of the OSCE was communicated to all target students in a timely and comprehensive manner by the faculty.	☐	☐	☐	☐	☐
	13	The OSCE organizers were available and responsive to my questions and concerns about the examination.	☐	☐	☐	☐	☐
	14	The environment and equipment in each station matched the clinical skill being assessed at that station.	☐	☐	☐	☐	☐
	15	The OSCE stations had acceptable conditions in terms of cleanliness, lighting, quietness, and ventilation.	☐	☐	☐	☐	☐
	16	The instruments, equipment, and simulators/mannequins available in each station were of satisfactory and acceptable quality.	☐	☐	☐	☐	☐
	17	The OSCE instructions for each station were clear and unambiguous.	☐	☐	☐	☐	☐
	18	The time allocated for performing the tasks in each station was sufficient and appropriate to the nature of the activities required.	☐	☐	☐	☐	☐
	19	The OSCE was well organized and implemented in terms of the sequence and continuity of the stations.	☐	☐	☐	☐	☐