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# Psychometric properties of the Persian version of System for Evaluation of Teaching Qualities by students: A tool for assessing clinical tutors from students' viewpoint

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## Abstract:

**BACKGROUND:** Effective clinical teaching is crucially important for patient care in future. Therefore, proper clinical training is essential to make physicians capable of delivering high-quality health care.

**MATERIALS AND METHODS:** The present study was a cross-sectional research. After translating the questionnaire into Persian, it was distributed among medical students in the clinical years of medical education in teaching hospitals affiliated to Ahvaz Jundishapur University of Medical Sciences in 2018. The System for Evaluation of Teaching Qualities (SETQ) has 25 questions in a 6-scale Likert scale that evaluates clinical tutors in five dimensions of teaching and learning environment, professional attitude toward students, transferring of goals, evaluation of students, feedback, and promoting self-directed learning. Instrument reliability was assessed by calculating the Cronbach's alpha coefficient, whereas questionnaire content validity was evaluated by relative content validity ratio (CVR) and content validity index (CVI). To evaluate the structural validity, an exploratory factor analysis was conducted.

**RESULTS:** The SETQ was completed by 127 medical students. Cronbach's alpha coefficient of the total questionnaire was estimated as 0.908. The factor analysis showed that the questionnaire was composed of six factors, explaining 66.14% of the total variance. The CVI and CVR indices of the individual items were also acceptable.

**CONCLUSION:** The findings of our study showed that the Persian version of SETQ questionnaire had the acceptable reliability and validity to be used in assessing clinical tutors in different hospitals in Iran.

## Keywords:

Clinical professors, clinical tutors, reliability, System for Evaluation of Teaching Qualities, validity

## Introduction

Clinical education is one of the sensitive areas of medical education that plays a major role in shaping learners' professional abilities as well as an important part of physician training as responsible for maintaining and promoting community health.<sup>[1,2]</sup> To achieve optimal clinical education, it is crucial to continuously

evaluate and monitor the performance of instructors' clinical education.<sup>[3]</sup>

Faculty member evaluation is the one which determines the level of faculty member achievements in the quality of education and leads to equity in academic setting.<sup>[4]</sup> According to a study conducted in 2011, high-ranked universities evaluated their educational system by involving students

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and academic staff by using the rating scale models.<sup>[5]</sup> Evaluation of instructors' educational performance can be helpful to professors themselves by recognizing the strengths and weaknesses of their jobs, and the results of such evaluations can rectify the organizations' educational performance and improve teachers' educational skills.<sup>[6,7]</sup> Many factors affect the faculty member evaluation that should be taken into account by educational policymakers to improve the quality of the education process.<sup>[8]</sup> Evaluation of clinical education competency in trainees and medical interns is a necessity, and students as the main clients of the education process believe that evaluation is vital to be done.<sup>[3]</sup> The use of student feedback in teacher performance appraisal is one of the common and accessible methods used by many major universities around the world.<sup>[6,9,10]</sup>

Various studies had shown that students can be a reliable source and reference for teacher evaluation.<sup>[11]</sup> Because students are the target group that directly receives the instructors "teaching product, the most relevant group is to comment on the quality of the teachers" performance.<sup>[12]</sup>

There are several questionnaires for assessing clinical instructor quality, but none of these are in student-led clinical settings and some of these tools are not valid.<sup>[1,13,14]</sup> The System for Evaluation of Teaching Qualities (SETQ) questionnaire is one of the specialized tools and the first questionnaire developed to evaluate different aspects of clinical professors' performance.<sup>[15]</sup>

It covers most of the criteria required for evaluation. In addition, a low number of evaluators is needed to achieve reliable results, indicating the high power of the SETQ tool. As a result, the SETQ as a valid and reliable tool can provide a good basis for the evaluation of clinical professors by medical students.<sup>[15,16]</sup>

The USA version of the SETQ questionnaire was presented in the USA, comprising 26 questions on the following 7 scales: Creating Learning Environments, Controlling Training Session, Goal Communication, Encouraging and Maintaining, Evaluating, Feedback, and Self-Learning.<sup>[17]</sup> The original version of the SETQ tool in the Netherlands<sup>[15]</sup> and the USA<sup>[17]</sup> had been widely used for the evaluation of clinical professors by medical students in various hospitals and is widely accepted and accredited by the academic community.

The SETQ tool was then developed based on the Stanford Faculty Development Program 26 and included 23 items on five scales of learning environments, professional attitudes toward resident support, goal communication, resident evaluation, and feedback.<sup>[15]</sup> A revised SETQ questionnaire (including 25 questions) was also

presented and validated in Bahrain with a scale added to this tool entitled self-directed learning improvement.<sup>[18]</sup>

There is no valid questionnaire which has been translated and used for the evaluation of clinical professors from Iranian students' perspective. Therefore, the purpose of this study was to evaluate the validity and reliability of a modified SETQ questionnaire for the evaluation of clinical professors by medical students in their clinical education years in Iran.

## Materials and Methods

### Study design and setting

The present study was a descriptive, cross-sectional study performed on medical students studying in clinical (external and internal) in Ahvaz Jundishapur University of Medical Sciences in 2019 to evaluate the psychometric properties of the Persian version of Clinical Teacher Evaluation Questionnaire.

### Study participants and sampling

Initially, 140 students were recruited by easy sampling due to the probability of sample loss. Thereupon, the questionnaires that were not completely filled or confused were excluded and finally 127 persons remained as the final study sample size.

### Data collection tool and technique

#### *SETQ questionnaire*

In this study, the SETQ questionnaire was translated into Persian by two professors, to ensure its validity and its construct validity, and reverse translation was performed and confirmed by five faculty members at the Research Development Center of Shiraz Medical Sciences University. Then, the researchers provided the questionnaire as a web-based online tool and shared to the participants to fulfil.

The SETQ questionnaire consists of 25 questions that assess clinical instructors in 6 dimensions as follows: teaching and learning environment (questions 1–6), professional attitude toward students (questions 7–10), relationship of goals (questions 11–13), student assessment (questions 14–18), feedback (questions 19–22), and promoting self-learning (questions 23–25). Each of the 5-point Likert scale questions is answered by one of the following options: completely disagree (1 score), disagree (2 points), neutral or no idea (3 points), agree (4 points), strongly agree (5 points), and an option titled "unable to evaluate" (6 points). The lowest and highest scores on the questionnaire were 25 and 150, respectively.<sup>[18]</sup> Demographic characteristics of the students including age, sex, school year, and marital status were also collected.

### Validity assessment of the questionnaire

The face validity of the Persian version of the questionnaire was evaluated by faculty members at the Medical Education Development Center of Shiraz University of Medical Sciences (at least five experts). To determine the face validity of the Persian version of the questionnaire, the sentences were examined in terms of their writing style, clarity, and fluency too.

Content validity index (CVI) 1 and relative content validity coefficient (CVR) were used to examine the content validity of the questionnaire's quantity. For this purpose, in the first stage, the questionnaire was distributed among thirty faculty members and experts were asked to claim their perspectives about the necessity and appropriateness of each of the three items on the Likert scale (this is a necessary question, a useful question but not necessary, or not necessary question). The CVI index for each item was calculated using the following formula:

CVI = Total agreed points for each question / total number of participants.

To calculate the CVR index, the following formula was used:

$$CVR = \frac{(\text{Total agreed points for each question}) - \text{total number of participants} / 2}{\text{Total number of participants} / 2}$$

### Statistical analysis

We conducted IBM SPSS Statistics 22.00 (IBM SPSS Statistics for Windows, version 22.0. Armonk, NY: IBM Corp, Chicago, USA, 2013) and LISREL (version 8.8, Jöreskog K, Sörbon D. Lisrel for Windows 8.80. 2006. Scientific Software International: Lincolnwood, IL.) for statistical analysis. Data were also analyzed by descriptive statistics including mean, standard deviation, frequency, and percentage of frequency. The data normalization was evaluated by Skewness1 and Kurtosis2 coefficients, and the coefficient values for all variables were estimated in the safe range (+2 and -2), indicating the normality of the data. Hence, parametric tests were employed for result analysis. Moreover, in the inferential statistics section, exploratory factor analysis (EFA) with KMO3 statistic and Bartlett's spherical test and confirmatory factor analysis (CFA) with covariance-based approach were used to assess the reliability, validity, and reliability of the questionnaire. The reliability of the questionnaire (internal consistency of questions) was assessed by Cronbach's alpha for the whole questionnaire and each of the six dimensions of the questionnaire. In addition, relative content validity coefficient (CVR) and CVI were used to assess content validity. Pearson's

correlation test (to examine the relationship between research variables) and independent two-sample *t*-test and analysis of variance (ANOVA) were used to examine the relationship between the subscales of the questionnaire and individual characteristics. The significance level of tests was considered equal and less than 0.05.

### Ethical consideration

The protocol of the study was approved by the Research Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (Code: IR. SUMS. REC.1399.023). Moreover, the questionnaires were completed by the students, anonymously.

## Results

The surveyed demographic characteristics of the students are presented in Table 1. The results showed that the mean of all items in the questionnaire was more than 3. In addition, the tendency of most responses was toward "strongly agree" and "completely agree." The mean scores obtained for each of the subscales are presented in Table 2. The highest mean was related to professional attitude toward students and the lowest was related to self-directed learning promotion.

**Table 1: Demographic characteristics of the participants in the study of psychometric properties of the Persian version of System for Evaluation of Teaching Qualities tool**

| Variable                   | Group           | Frequency (%) |
|----------------------------|-----------------|---------------|
| Sex                        | Male            | 43 (34.1)     |
|                            | Female          | 83 (65.9)     |
| Age (years)                | 21-25           | 75 (59.5)     |
|                            | 26-30           | 45 (35.7)     |
|                            | 31-35           | 4 (3.2)       |
|                            | 36-40           | 2 (1.6)       |
| Marital status             | Single          | 94 (74.6)     |
|                            | Married         | 32 (25.4)     |
| Academic year <sup>a</sup> | 4 <sup>th</sup> | 16 (12.7)     |
|                            | 5 <sup>th</sup> | 31 (24.6)     |
|                            | 6 <sup>th</sup> | 35 (27.8)     |
|                            | 7 <sup>th</sup> | 44 (34.9)     |

<sup>a</sup>The Iranian medical students start their clinical courses since the 4<sup>th</sup> year of their educational period

**Table 2: Means and standard deviations of the scores obtained in the domains of the Persian version of System for Evaluation of Teaching Qualities tool**

| Domains                               | Mean | Variance | SD    |
|---------------------------------------|------|----------|-------|
| Learning and learning environment     | 3.91 | 0.45     | 0.67  |
| Professional attitude toward students | 4.03 | 0.53     | 0.73  |
| Goal transfer                         | 3.91 | 0.83     | 0.91  |
| Student assessment                    | 3.85 | 0.80     | 0.89  |
| Feedback                              | 3.98 | 0.72     | 0.85  |
| Promoting autonomous learning         | 3.83 | 1.003    | 1.001 |

SD=Standard deviation

EFA used to analyze 25 presented items was performed using PCM1 with vertical rotation<sup>2</sup> and Varimax 3 techniques. The KMO<sup>4</sup> index value was calculated to be 0.85, indicating the adequacy of sampling, and the value of this index should be between 0 and 1. In the case it is ascended 0.5 or more, the number of data is appropriate for factor analysis. The Bartlett's test was also statistically significant ( $P < 0.001$ ), indicating that the correlation matrix was proper for factor analysis of data. After Varimax rotation, the results of the extracted factor loaded of components showed that the factor's load between the items of each variable with variables themselves was higher than the factor's load with the other variables. In other words, the items of each variable demonstrated more correlation with their own variables than those with the other variables.

The characteristics of the factors extracted from the research questionnaire are presented in Table 3. As

shown in the table, the factor's loadings of all the questions were calculated to be  $>0.4$ , which indicated that the questions loaded well on their current variable and there was no need to modify or remove the questions from the questionnaire. Therefore, using the EFA technique, the 25-question questionnaire can be converted into 6 factors (present variable). These six factors totally accounted 66.14% of the variance of factors that was an acceptable value.

The results of CFA for evaluating the validity of the indicators of a structure in the questionnaire and the standardized coefficients measurement model [Table 3 and Figure 1] also revealed that there was a significant correlation between the current variables and their corresponding indicators. As a result, T-values indicated the significance of each parameter, and if the value of T is greater than the absolute value of 1.96, the model parameters would be significant. Then, the structural

**Table 3: Factor analysis extracted of Persian version of (System for Evaluation of Teaching Qualities) tool**

| Domains                               | Questions  | Exploratory factor analysis |                        | Confirmatory agent analysis result |      |                  | Result    |       |
|---------------------------------------|--|-----------------------------|------------------------|------------------------------------|------|------------------|-----------|-------|
|                                       |  | Factor load value           | Percentage of variance | Standardized factor load value     | t    | Cronbach's alpha |           |       |
| Learning and learning environment     | 1. Encourages students to participate actively in discussions                                      | 0.787                       | 15.894                 | 0.73                               | 9.18 | 0.882            | Desirable |       |
|                                       | 2. Encourages students to discuss problems   | 0.794                       |                        | 0.76                               |      |                  |           | 9.74  |
|                                       | 3. Keeps to teaching goals and avoids digressions  | 0.717                       |                        | 0.74                               |      |                  |           | 9.35  |
|                                       | 4. Be prepared to teach and deliver lectures   | 0.811                       |                        | 0.80                               |      |                  |           | 10.39 |
|                                       | 5. In the department, train in clinics and operating rooms   | 0.646                       |                        | 0.68                               |      |                  |           | 8.28  |
|                                       | 6. Teaches all subjects in the curriculum and curriculum   | 0.757                       |                        | 0.76                               |      |                  |           | 9.68  |
| Professional attitude toward students | 7. Listen to students  | 0.717                       | 12.777                 | 0.64                               | 7.54 | 0.849            | Desirable |       |
|                                       | 8. Treats students with respect  | 0.753                       |                        | 0.79                               |      |                  |           | 10.15 |
|                                       | 9. Regularly available to students   | 0.791                       |                        | 0.81                               |      |                  |           | 10.49 |
|                                       | 10. Easily accessible for discussion   | 0.809                       |                        | 0.83                               |      |                  |           | 10.76 |
| Transfer of goals                     | 11. Explicitly states the learning objectives  | 0.786                       | 11.602                 | 0.51                               | 5.55 | 0.722            | Desirable |       |
|                                       | 12. Prioritize learning goals and topics   | 0.718                       |                        | 0.66                               |      |                  |           | 7.45  |
|                                       | 13. Periodically reviews learning goals  | 0.671                       |                        | 0.84                               |      |                  |           | 9.70  |
| Student assessment                    | 14. Expert knowledge evaluates students on a regular basis   | 0.726                       | 9.368                  | 0.67                               | 8.11 | 0.833            | Desirable |       |
|                                       | 15. Evaluates students' analytical abilities on a regular basis                                    | 0.815                       |                        | 0.67                               |      |                  |           | 8.02  |
|                                       | 16. Evaluates the application of knowledge to students in relation to patients                     | 0.731                       |                        | 0.80                               |      |                  |           | 10.35 |
|                                       | 17. Medical skills are regularly evaluated by students   | 0.680                       |                        | 0.75                               |      |                  |           | 9.41  |
|                                       | 18. Evaluates the communication skills and professionalism of students while dealing with patients | 0.520                       |                        | 0.63                               |      |                  |           | 7.48  |
| Feedback                              | 19. Regularly providing constructive feedback to students  | 0.778                       | 8.638                  | 0.48                               | 4.98 | 0.739            | Desirable |       |
|                                       | 20. Explains the mistakes of students  | 0.811                       |                        | 0.64                               |      |                  |           | 7     |
|                                       | 21. Offers suggestions for improving the work  | 0.498                       |                        | 0.64                               |      |                  |           | 7.01  |
|                                       | 22. Enables students to reflect on feedback  | 0.554                       |                        | 0.72                               |      |                  |           | 8.15  |
| Promoting autonomous learning         | 23. Provides students with sufficient motivation to study and study in depth                       | 0.670                       | 7.863                  | 0.61                               | 7.13 | 0.763            | Desirable |       |
|                                       | 24. Encourages students to study new research  | 0.774                       |                        | 0.92                               |      |                  |           | 11.70 |
|                                       | 25. Encourages students to learn independently   | 0.744                       |                        | 0.65                               |      |                  |           | 7.57  |

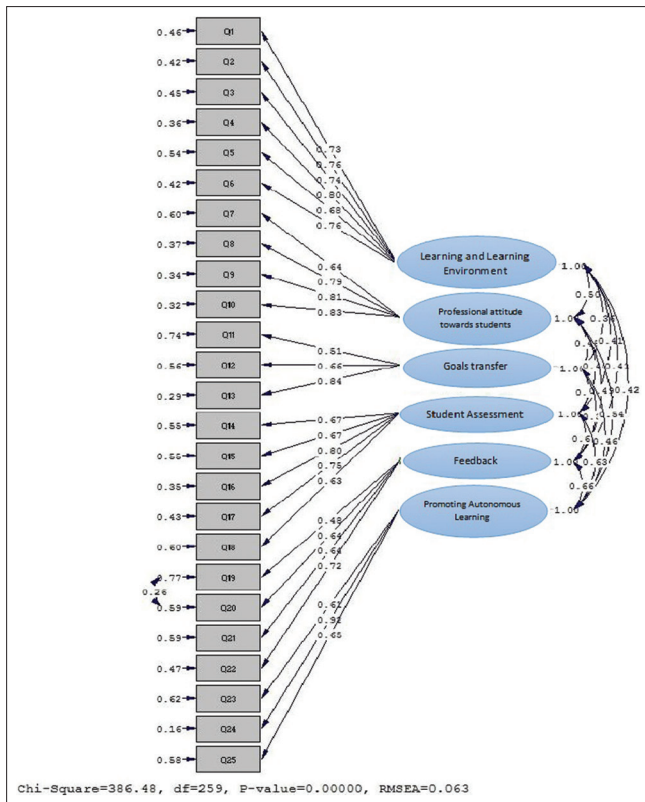


Figure 1: Standardized path coefficients of factor analysis model of the Persian version of the System for Evaluation of Teaching Qualities tool

validity of the relevant variables was approved at the significant level (0.05).<sup>[1]</sup> The value of Cronbach’s alpha coefficients in the questionnaire is shown in Table 3, which indicates that the value of Cronbach’s alpha coefficients for all items was at the desirable and reliable level. In addition, Cronbach’s alpha for the whole questionnaire with 25 questions and sample of 127 was calculated to be 0.908.

To evaluate the content validity quantitatively, relative content validity ratio (CVR) and CVI were used, the results of which are presented in Table 4. Accordingly, it proved that the CVI and CVR indices of the individual items were at acceptable levels; therefore, the content validity of the questionnaire was statistically confirmed and there was no need to remove an item from the questionnaire.

Pearson’s correlation coefficient was used to examine the relationship between variables [Table 5]. As shown in the table, a significant positive and meaningful relationship between all the studied variables was observed, which implies that changing one of the variables causes change to other variables.

The results of the relationship between the questionnaire scores and demographic characteristics are presented in Table 6. It clearly shows that the mean scores of the

Table 4: Validity of the questionnaire and content validity ratio and content validity index indices of Persian version of the System for Evaluation of Teaching Qualities tool

| Variables                             | Questionnaire | Necessary | Useful but not necessary | Not needed | CVI | CVR  | Optimal results |
|---------------------------------------|---------------|-----------|--------------------------|------------|-----|------|-----------------|
| Learning and learning environment     | Q1            | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q2            | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q3            | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q4            | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q5            | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
| Professional attitude toward students | Q6            | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q7            | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q8            | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q9            | 5         | -                        | -          | 1   | 1    | Desirable       |
| Goal transfer                         | Q10           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q11           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q12           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q13           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
| Student evaluation                    | Q14           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q15           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q16           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q17           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q18           | 5         | -                        | -          | 1   | 1    | Desirable       |
| Feedback                              | Q19           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q20           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q21           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q22           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
| Promoting self-learning               | Q23           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |
|                                       | Q24           | 5         | -                        | -          | 1   | 1    | Desirable       |
|                                       | Q25           | 4         | 1                        | -          | 1   | 0.60 | Desirable       |

CVI=Content validity index, CVR=Content validity ratio

subscales were similar among students with different gender, marital status, and school year, and there was no significant difference as well as no significant relationship between age and subscales of the questionnaire (except for goal transfer), and those aged 31–35 years had the lowest mean score.

## Discussion

The findings of this study showed that the Persian version of the SETQ tool was a reliable, valid, and applicable method for evaluating the characteristics of clinical instructors' teaching. Evaluation of this tool

**Table 5: Correlation coefficients matrix between the domains of Persian version of the System for Evaluation of Teaching Qualities tool**

| Domains                               | Teaching and learning environment | Professional attitude toward students | Communication of goals | Evaluation of students | Feedback | Promoting self-directed learning |
|---------------------------------------|-----------------------------------|---------------------------------------|------------------------|------------------------|----------|----------------------------------|
| Learning and learning environment     |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 1                                 |                                       |                        |                        |          |                                  |
| <i>P</i>                              | -                                 |                                       |                        |                        |          |                                  |
| Professional attitude toward students |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 0.452                             | 1                                     |                        |                        |          |                                  |
| <i>P</i>                              | <0.001                            | -                                     |                        |                        |          |                                  |
| Goal transfer                         |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 0.0319                            | 0.365                                 | 1                      |                        |          |                                  |
| <i>P</i>                              | <0.001                            | <0.001                                | -                      |                        |          |                                  |
| Student evaluation                    |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 0.358                             | 0.374                                 | 0.480                  | 1                      |          |                                  |
| <i>P</i>                              | <0.001                            | <0.001                                | <0.001                 | -                      |          |                                  |
| Feedback                              |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 0.366                             | 0.376                                 | 0.277                  | 0.503                  | 1        |                                  |
| <i>P</i>                              | <0.001                            | <0.001                                | 0.002                  | <0.001                 | -        |                                  |
| Promoting self-learning               |                                   |                                       |                        |                        |          |                                  |
| Pearson's correlation coefficient     | 0.388                             | 0.415                                 | 0.338                  | 0.496                  | 0.504    | 1                                |
| <i>P</i>                              | <0.001                            | <0.001                                | <0.001                 | <0.001                 | <0.001   | -                                |

**Table 6: Results of the difference between the scores of the domains of the questionnaire and the demographic characteristics of the subjects (the numbers are significant or *P* value)**

| Domains/ variables | Frequency ( <i>n</i> ) | Mean±SD                           |                                       |               |                    |           |                         |
|--------------------|------------------------|-----------------------------------|---------------------------------------|---------------|--------------------|-----------|-------------------------|
|                    |                        | Learning and learning environment | Professional attitude toward students | Goal transfer | Student evaluation | Feedback  | Promoting self-learning |
| Sex                |                        |                                   |                                       |               |                    |           |                         |
| Male               | 43                     | 3.87±0.72                         | 3.97±0.81                             | 3.87±0.92     | 3.69±1.08          | 3.83±0.93 | 3.79±1.11               |
| Female             | 83                     | 3.93±0.65                         | 4.06±0.69                             | 3.93±0.91     | 3.93±0.78          | 4.06±0.80 | 3.85±0.95               |
| <i>P</i>           |                        | 0.606                             | 0.480                                 | 0.747         | 0.146              | 0.145     | 0.749                   |
| Marital status     |                        |                                   |                                       |               |                    |           |                         |
| Single             | 94                     | 3.92±0.69                         | 4.01±0.73                             | 3.90±0.94     | 3.89±0.85          | 4.04±0.80 | 3.79±0.98               |
| Married            | 32                     | 3.89±0.63                         | 4.09±0.76                             | 3.92±0.83     | 3.74±1.03          | 3.82±0.97 | 3.92±1.08               |
| <i>P</i>           |                        | 0.608                             | 0.608                                 | 0.919         | 0.419              | 0.206     | 0.532                   |
| Age group (years)  |                        |                                   |                                       |               |                    |           |                         |
| 21-25              | 75                     | 3.90±0.65                         | 4.04±0.68                             | 3.99±0.85     | 3.77±0.95          | 3.95±0.81 | 3.67±1.03               |
| 26-30              | 42                     | 3.95±0.66                         | 4.05±0.80                             | 3.88±0.90     | 4.05±0.72          | 4.15±0.81 | 4.11±0.88               |
| 31-35              | 4                      | 3.58±1.30                         | 3.56±1.08                             | 2.58±1.44     | 3.05±1.41          | 3.25±1.24 | 3.33±1.41               |
| 36-40              | 2                      | 4.16±0.23                         | 4.37±0.17                             | 4.16±0.23     | 4.10±0.14          | 3.00±0.81 | 4.16±0.23               |
| <i>P</i>           |                        | 0.701                             | 0.558                                 | 0.025*        | 0.104              | 0.056     | 0.081                   |
| Academic years**   |                        |                                   |                                       |               |                    |           |                         |
| 4 <sup>th</sup>    | 16                     | 3.71±0.70                         | 4.03±0.53                             | 3.729±1.17    | 4.22±0.52          | 4.10±0.39 | 3.87±0.59               |
| 5 <sup>th</sup>    | 31                     | 3.83±0.80                         | 4.04±0.77                             | 3.806±0.82    | 3.620±0.95         | 3.95±0.81 | 3.72±1.17               |
| 6 <sup>th</sup>    | 35                     | 3.96±0.63                         | 3.95±0.76                             | 4.028±0.76    | 3.75±0.97          | 3.87±0.85 | 3.70±1.00               |
| 7 <sup>th</sup>    | 44                     | 4.00±0.59                         | 4.09±0.77                             | 3.962±0.99    | 3.96±0.87          | 4.05±1.00 | 3.99±0.99               |
| <i>P</i>           |                        | 0.846                             | 0.857                                 | 0.632         | 0.122              | 0.732     | 0.559                   |

\*According to the *post hoc* Tukey HSD test, this significant *P* value is related to the significant means of scores between the age groups of 21-25 and 31-35 years (*P*=0.014), as well 26-30 and 31-35 years (*P*=0.030), \*\*The Iranian medical students start their clinical courses since the 4<sup>th</sup> year of their educational period. SD=Standard deviation, Tukey HSD=Tukey's Honest Significant Difference test

was performed using standard procedures and factor analysis and expert evaluation. The short time required to complete the questionnaire and the low number of people needed for a reliable evaluation demonstrate the utility of this tool for evaluating clinical professors in medical universities. These findings were consistent with the number of evaluations required in the original SETQ tool for anesthesia and obstetrics and gynecology clinical departments as well as the modified questionnaire in Bahrain.<sup>[15,16]</sup>

In the present study, Cronbach's alpha coefficient of internal reliability of the questionnaire was estimated to be 0.908, which was excellent and confirmed. In addition, the Cronbach's alpha coefficient of the questionnaire was in a desirable and reliable level, which confirmed the possibility of using the questionnaire to evaluate all aspects of the questionnaire in the evaluation of clinical professors. Comparison of the results with the reliability of the original instrument version in Bahrain showed that Cronbach's alpha was 0.94.<sup>[18]</sup> Based on the results of this study, it can be confirmed that this questionnaire can be used for evaluation of clinical professors from students' point of view.

In this study, different methods were used to assess the validity of the questionnaire. To obtain qualitative validity, a large number of medical educational specialists were required to study the translation of the questionnaire, who provided the necessary feedback, and little change was made in the translation based on the experts' suggestions. Quantitative content validity was assessed using the CVR and CVI indices. Thereupon, the results showed that the CVI and CVR indices of the individual items were within acceptable level, and the questions were properly structured. Therefore, the content validity of the questionnaire was confirmed statistically and also there was no need to remove any item from the questionnaire.

Structural validity of the instrument was also investigated using EFA. The results of the EFA supported the structural validity of the tool such that the results indicated the adequacy of sampling and the appropriateness of the data for factor analysis. It was also found that the factor's load between the items of each variable with their own variables was higher than the factor's load with that of the other variables. In other words, the variables of each variable were highly correlated with their own variables than that of with the other variables. Furthermore, the factor loadings of all questions in the questionnaire were >0.4, indicating that all questions were well-aligned and there was no need to modify or omit any question from the questionnaire.

Moreover, the findings of the EFA showed six factors (present variable) of the questionnaire in total,

which accounted for 66.14% of the variance in factors. As a result, it indicated acceptable validity of the instrument. In the study of the validity of the original version tool in Bahrain, the results of factor analysis showed that the questionnaire consisted of six factors that showed 76.7% of the total variance.<sup>[18]</sup>

In the present study, the results of CFA showed that there was a significant correlation between each of the variables (dimensions of the questionnaire) and its questions afterward, and therefore the questions had the Persian translation was acceptable. Hence, the validity of the variables' structural measurement was confirmed, and there was no need to alter or delete any question from the research model and from the questionnaire.

A study by Hekmat *et al.* confirmed the validity and reliability of the 13-question questionnaire for evaluating assistants by their professors, which indicated that the questionnaire had appropriate internal consistency, but inappropriate and invalidity of the instrument. This means that the questionnaire' structure was fundamentally flawed and in no way a suitable scale to measure what it was designed to measure, and it additionally required a thorough basic review; correspondingly, the assistants seem to have met other criteria than these 13 items in assessing the educational instructors.<sup>[19]</sup> Although many studies conducted on the psychometric properties of student evaluation questionnaires on the evaluation of professors at different universities, it is necessary to repeat these assessment in different societies and cultures, especially by conducting more developed instrument.<sup>[7,20,21]</sup>

Consequently, various evidences supported the visual and conceptual validity of the tool. The evaluation of the validity of the structural instrument also showed that this questionnaire can examine different aspects of teaching clinical students by instructors. In this study, the highest mean was related to professional attitude toward students and the lowest mean belonged to promote self-directed learning. However, the study conducted in Bahrain revealed promoting self-directed learning and the two areas of student evaluation and also professional attitudes toward students received the highest score and the lowest score, respectively.<sup>[18]</sup>

Depending on the features that knowledge, thinking, and learning can have in a particular context, cultural differences and the educational system can differentiate the Persian version from the original version.

These contextual considerations may reflect viewpoint differences toward social participation in these two instruments. In El-Ansari *et al.*'s study,<sup>[18]</sup> the cutoff value based on the 1<sup>st</sup> quartile was set at 3.8 so that any

result below this value was considered at risk and in need of improvement. In the present study, scores of all domains were above 3.8. Furthermore, it showed that the mean scores of each domain of the questionnaire were not significantly different among students with different gender, marital status, age, and academic year, which indicated that students' characteristics were not correlated with their responses, hence it can be used among different groups of students.

Based on the results, the questionnaire used in this study can help develop the future of clinical education, to promote the quality of clinical education and to influence the teaching and learning of medical students. This tool provided both clinical professors and students the opportunity to review and improve the learning process. Clinical education improves when clinical teachers receive feedback from their students.<sup>[21]</sup> This leads to progress in teaching and training practices and can also help managers monitor the performance of the educational systems and faculty members. Furthermore, this tool lets educational systems identify the weak points and helps improve processing of the goals.<sup>[22]</sup>

The SETQ tool allows clinical educators to evaluate their performance and can in consequence improve the quality of teaching in poor-performing clinical teachers.<sup>[23]</sup> In order to improve teaching methods and performances, the results of student evaluation of clinical professors by using the present tool can be useful for professors in line of clinical course too. It can also help educational system administrators monitor clinical professors' performance and if necessary, design a program to improve faculty performance. What is more that allows students to identify and share the strengths and weaknesses of clinical professors to improve processes.

### Limitation and recommendation

It should be noted that the present study was the primary survey to prepare a Persian tool and to assess its validity for students' evaluation of clinical professors and consequently obtained valuable information. However, it would meet and are also facing potential limitations. Initially, an online method was used to complete the questionnaires. Although the online method provides students with the confidence to independently complete assessment forms whenever they desire to, it correspondingly faces some restrictions including low response rate, forgetting to complete the questionnaire, and uncertainty of completing the questionnaire by that desired person. Next, the researchers did not consider the potential confounding factors for this study, such as the students educational status (their ranks and grades), and their satisfaction with studying medicine. Therefore, it is recommended to evaluate the psychometric properties of this instrument by considering the potential confounding

factors. Finally, this study was a single center study. Therefore, it is recommended to repeat the same study at other medical universities of Iran, as well as use this questionnaire to assess clinical tutors of medical schools from students' viewpoint.

### Conclusion

According to the results, the validity and reliability (credibility and trust) of the research questionnaire were confirmed. Therefore, it is concluded that the Persian version of the SETQ questionnaire is a valid and reliable multidimensional tool for evaluation of clinical professors from students' viewpoint. Hence, the use of the Persian version of the SETQ questionnaire is recommended for the evaluation of clinical professors from the perspective of students in specialized clinics of Iranian physicians. Moreover, as this study focused on the psychometric properties of the modified SETQ tool, further studies should be conducted on the effectiveness of this tool in improving the quality of teaching and clinical education.

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### Conflicts of interest

There are no conflicts of interest.

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