

Reliability and Validity of the Persian Version of Dental Student Learning Education Questionnaire and a Researcher Made Questionnaire about Interest of Dental Students in Their Field of Study

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Abstract

Background and Aim: Improving the quality of dental education significantly enhances the quality of services and promotes public health. The purpose of this study was to assess the reliability and validity of the Persian version of dental student learning education questionnaire (DSLES) and a researcher made questionnaire about interest of dental students in their field of study.

Materials and Methods: A questionnaire composed of two major components was designed in this study. The first part, was a researcher made questionnaire related to students' interest in their field of study and the second part was the Persian translation of the DSLES. Delphi approach was used for content validation. Cronbach's Alpha and the Kappa coefficients were determined by SPSS for assessing reliability.

Results: All indicators of content validity (except for 6 items in the second part) and the inter-rater agreement were higher than %75. The Cronbach's alpha for all subscales was higher than %75 and the Kappa for all items was higher than %73. According to the results of 375 questionnaires, Cronbach's alpha for the first part was 79%, for the second part was 85% and for the entire questionnaire was 86%.

Conclusion: The designed questionnaire can serve as an acceptable instrument in the Iranian educational settings.

Key Words: Interest, Dental students, Educational environment, Validity, Reliability

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Introduction

One of the main responsibilities of the health system is to educate responsible clinicians. Considering the importance of dentistry and its effect on dental and public health of a community, improving the quality of education is a major goal that would improve the quality of services. Several tools have been recommended for the assessment of the educational systems such as the

College and University Environment Scale (CUES) introduced in 1963 by Pace that evaluates practicality, community, awareness, propriety, and scholarship [1].

Several previous studies have also assessed the educational environments. In a scientific review by Hutchinson, factors affecting the educational environment of the clinical departments and the environmental factors were discussed [2]. A tool

for quantitative measurement of educational environments was proposed in 1997 by Roff in Dundee University in Scotland known as the Dundee Ready Educational Environment Measure (DREEM) [3]. This measure is used as a diagnostic tool to solve educational problems and improve the efficacy of education. It can provide the authorities with valuable information. Its main characteristics include its scientific content, practicality, awareness, sociality and optimality [4]. The DREEM has been used in many universities worldwide due to its optimal validity and reliability [5, 6].

In 2005, another tool was introduced by Henzi for quantitative measurement of the dental education environment known as the Dental Student Learning Environment Survey (DSLES). It evaluates the students' perspectives in 7 areas of flexibility, student-to-student interaction, emotional climate, supportiveness, meaningful experience, organization, and breadth of interest. It is among the few tools particularly assessing the dental education environment [7].

Many previous studies have assessed the attitude and interest of students in their medical and paramedical fields of education [8]. However, number of similar studies on dental students is scarce and there is no standard questionnaire available for this purpose [9].

Considering the fact that the educational environment is a possible influential factor on the students' interest in their field of study [10], the educational environments of dental schools in Iran should be evaluated to find factors that can influence the interest of students in their field of study. This study aimed to design a questionnaire and assess its reliability and validity for evaluation of the interest of dental students in their field of study and its possible relationship with the educational environment.

Materials and Methods

In this analytical study, a questionnaire was designed comprising of two parts. The first part related to assessing the interest of dental students in their field of study while the second part related to the assessment of the educational environment of dental schools from the students' perspectives. The content validity measure was used to assess

the validity of the questionnaire. To generate and collect data in this qualitative study, Delphi's approach was used.

Since no standard questionnaire was available regarding the interest of students in dentistry, we designed a preliminary questionnaire. For this purpose, first the respective objectives of the study were specified and then questions related to the goals were extracted using the questionnaires of similar studies and via phone interviews with some dental students and instructors. A draft of the questionnaire comprising of questions regarding demographics and 10 questions related to interest was prepared. For the assessment of factors related to the educational environment, online databases were searched and DSLES questionnaire, a comprehensive questionnaire for assessment of dental education environment, was considered as the reference tool based on the opinions of experts. This questionnaire was introduced by Henzi et al, in 2005 and contains 55 questions in 7 domains.

Despite having adequate validity and reliability, this questionnaire did not well comply with the cultural and educational environment in our country and thus, its translated version was not suitable for accurate assessments. Therefore, the authors decided to use the opinion of experts in the field of dental education and naturalize this questionnaire and assess its content validity.

All questions of this questionnaire were translated to Farsi by one of the authors fluent in English. The Farsi version was then back translated to English and compared with the original version. After applying final changes, both parts of the questionnaire were mailed/e-mailed to 8 dental specialists active in the field of dental education (member or manager of the development office) in different universities nationwide (Mashhad, Kerman, Shiraz, Isfahan, Tabriz and Tehran). The experts were requested to assess the questionnaire with respect to the understudy topics, correct the grammatical issues and add/remove questions. After collecting the experts' opinions (regarding some minor changes), the suggested changes were applied and the revised questionnaire was mailed/e-mailed to the experts for the second time. This time, they were requested to assess the clarity of questions one by one and score the comprehensiveness of the entire questionnaire

from 1 to 4. Since in the second round, the disagreement among experts was insignificant (no disagreement) and the inter-rater agreement (IRA) and content validity levels were above the acceptable limit, there was no need to re-send the questionnaire to experts after applying minor changes. Prior to content validity assessment, the IRA was calculated to be within the optimal range. To calculate this index, number of questions with optimal or excellent relevance reported by 100% of experts along with questions reported to be irrelevant or completely irrelevant by 100% of experts was divided by the total number of questions.

$$\text{IRA} = \frac{\text{Number of agreements observed}}{\text{Total number of questions}}$$

For content validation, the draft contained precise definitions of each index (clarity, relevance and comprehensiveness) along with their method of classification (from irrelevant to excellent). The experts were requested to assess each index separately and score it. Each expert determined the relevance of questions by scoring them from 1 to 4 (written in front of each question). Using the scores given to relevance and clarity of each question, Item Content Validity Index (I-CVI) was calculated to assess the relevance and clarity of each question. To determine the Scale Content Validity Index (S-CVI), the following formulas were used:

$$\text{I-CVI} = \frac{\text{Total number of experts believing the question had optimal relevance and clarity}}{\text{Total number of experts}}$$

$$\text{S-CVI} = \frac{\text{Total I-CVI of all questions}}{\text{Total number of questions}}$$

To calculate the overall comprehensiveness of this tool, the following formula was used:

$$\text{Comprehensiveness} = \frac{\text{Total number of experts believing the questionnaire had optimal comprehensiveness}}{\text{Total number of experts}}$$

After evaluating the experts' opinions and calculating the results, some small changes were applied to some questions. Next, the questionnaire was administered among 14 dental students. Based on the accurate definitions of indices provided at

the top of the draft form, students were requested to mark questions with inadequate clarity. To assess their opinions, inter-rater agreement was calculated and some changes were applied to questions accordingly.

After ensuring the content validity of the questionnaire, reliability was assessed. For this purpose, test-retest method was used for evaluation of the initial reliability. The questionnaire was administered among 10 dental students of Tehran University of Medical Sciences, School of Dentistry twice with a 2-week interval. The Cronbach's alpha (for assessment of reliability in terms of internal consistency) and the kappa statistic (for assessment of reliability in terms of reproducibility) were calculated. The final version of the questionnaire was then completed by 375 dental students in Tehran University of Medical Sciences, School of Dentistry (School of 2006 to School of 2011 selected via census sampling) and Cronbach's alpha coefficient was calculated for each domain and for the entire questionnaire. The questionnaire preparation steps are depicted in Diagram 1.

Diagram 1. Designing the questionnaire

Second part (educational environment).....First part (interest in the field)
 Translation of DSLES.....Designing researcher-made questionnaire
 Content validity assessment by Delphi's approach
 1. Determining the inter-rater agreement
 2. Determining content validity indicators (relevance, clarity, comprehensiveness)
 Test-retest for assessment of reliability
 1. Cronbach's alpha (internal consistency)
 2. Kappa coefficient (reproducibility)

Results

After data collection, the IRA, relevance and clarity of each question (I-CVI), the scale content validity of the questionnaire (S-CVI) and its comprehensiveness were determined (Table 1). The level of acceptance was set at 70% for all indices. Based on the results of test-retest done primarily among 10 students, in the first part, Cronbach's alpha was calculated to be 75% and the kappa coefficient was calculated to be over 82%

for all questions. In the second part, the Cronbach's alpha coefficient of all 7 domains was found to be over 75% and the Kappa coefficient of all questions was found to be over 73% (Tables 2-4). Thus, no change was required in questions at

this step. In the final step, the questionnaire was filled out by 375 students and the Cronbach's alpha was found to be 79% for interest questions, 85% for the educational environment questions and 86% for all questions.

Table 1. IRA, I-CVI, S-CVI and comprehensiveness of the questionnaire

Index/Questionnaire	Interest in the field	Educational environment
IRA for relevance	%83/3	%86/2
IRA for clarity	%91/6	%74/1
I-CVI for relevance	%75	* %75
I-CVI for clarity	%75	* %75
S-CVI for relevance	%95/8	%93/9
S-CVI for clarity	%97/9	%92/4
Comprehensiveness	%100	%87/5

In the second part of the questionnaire I-CVI, the relevance and clarity of 6 questions were less than 75% and according to the opinions of experts, the contents of all 6 questions were deleted

Table 2. Cronbach's alpha for each domain

Domain	Cronbach's alpha	Domain	Cronbach's alpha
Interest in the field	0/7549	Supportiveness	0/7896
Flexibility	0/7756	Meaningful experience	0/7549
Student-to-student interaction	0/7896	Organization	0/8096
Emotional climate	0/7957	Breadth of interest	0/8063

Table 3. Weighted kappa coefficient for the interest in the field questionnaire

Question #	1	2	3	4	5	6	7	8
Weighted kappa	0/954	0/963	0/963	0/957	0/948	0/931	0/884	0/821

Discussion

Based on the results, it appears that our attempts resulted in development of a reliable and valid questionnaire. The IRA obtained indicates optimal agreement among experts regarding the relevance and clarity of the questionnaire. Acceptable IRA level depends on the opinions of experts but most studies report a level of 70% and sometimes 80% to be acceptable [11]. In the current study, IRA for relevance and clarity of both parts of the question

naire was over 70%.

S-CVI is among the most important indexes reported in studies designing a tool [12]. This value was high in our study, which indicates optimal content validity of our designed questionnaire. Similar to previous studies, I-CVI was separately calculated for relevance and clarity using the experts' perspectives. Also, the clarity of questions was assessed from the students' points of view as respondents. This has been less commonly

Table 4. Weighted kappa coefficient for educational environment questionnaire

Question #	Weighted kappa	Question #	Weighted kappa	Question #	Weighted kappa	Question #	Weighted kappa
1	0/815	13	0/889	25	0/889	37	0/889
2	0/764	14	0/815	26	0/889	38	0/815
3	0/889	15	0/815	27	0/957	39	0/854
4	0/957	16	0/889	28	0/769	40	0/815
5	0/957	17	0/769	29	0/957	41	0/738
6	0/867	18	0/897	30	0/854	42	0/815
7	0/974	19	0/769	31	0/769	43	0/917
8	0/858	20	0/748	32	0/957	44	0/738
9	0/858	21	0/917	33	0/889	45	0/738
10	0/889	22	0/957	34	0/752	46	0/854
11	0/889	23	0/769	35	0/815	47	0/815
12	0/917	24	0/815	36	0/854	48	0/917

done in similar studies. By default, questions with clarity and relevance less than 70% were excluded or modified.

Kappa statistic is among the most suitable indexes for reliability assessment used for evaluation of agreement among variables. It also assesses the role of chance and possibility of accidental agreement between two variables. In the current study, kappa coefficient for all questions except for 11 questions was found to be over 80% indicative of excellent reliability. For the remaining 11 questions, the kappa coefficient was found to be over 70% indicative of moderate reliability.

Most reliability assessment methods are based on repeating a test or conduction of more than one test. However, the main problem is that the researcher in most cases cannot repeat the test or perform equal tests. Even twice conduction of a test or use of two tools is often impossible. Thus, internal consistency methods are preferred. With these methods, the researcher uses a tool (questionnaire in our study) once in a single group of subjects. Cronbach's alpha coefficient is calculated for this purpose. The reliability is acceptable if the Cronbach's alpha is over 70% [11]. In our study, Cronbach's alpha was separately calculated for each domain and for the entire questionnaire to assess the internal consistency of questions. As stated in the results section, Cronbach's alpha for interest, educational environment and the entire questionnaire both

during testing and at final execution was above the acceptable limit.

Studies on satisfaction of dental students are scarce. In contrast to our study, Fattahi et al, in 2004 used a researcher-made questionnaire instead of a standard questionnaire [9]. In our study, Delphi's approach was used for compilation and content validation of the questionnaire.

Delphi's approach is a systematic approach to extract the opinions of a group of experts regarding a particular topic. In other words, Delphi's approach is a method to achieve a consensus via sending a questionnaire to experts several times. The opinions of the respondents are fed-back to the panel members anonymously [13].

The professional opinions of experts are sought repeatedly until a consensus is reached on a particular topic [14].

In fact, Delphi's approach is a series of analytical rounds via questionnaires. Using a primary questionnaire, the questionnaires for the next rounds are designed. This is decided upon in the designing step of the study [15]. Delphi's method is extremely helpful to reach a consensus on an indefinite subject with inadequate experimental evidence especially when experts cannot be reached for conduction of focus group sessions. Thus, in the current study, Delphi's approach was used for designing the questionnaire.

Ghaderi et al, in their study in 2002 mentioned that educational regulations and curricula were among

the most important factors causing negative attitudes in medical students towards their field of study. However, they did not mention the details regarding educational programming [10]. In the current study, we analyzed both organization and other aspects of educational environment such as flexibility, student-to-student interaction, emotional climate, supportiveness, meaningful experience and breadth of interest. In contrast to previous studies, the educational environment was evaluated in detail in our study.

As stated earlier, DREEM is a famous and standard tool for assessment of educational environment and has been widely used in similar studies [3].

Since this model did not seem to be in complete compliance with the educational environment in our dental schools, we did not use it. The model used by Henzi (DSLES) is among the few models particularly made for assessment of dental education environment and was more suitable for our purpose. Thus, we used this model in our study [7].

To the best of our knowledge, no standard questionnaire is available to assess the students' interest in their field of study. Thus, similar to previous studies, we used a researcher-made questionnaire in the current study.

Based on the results, the questionnaire designed in our study was comprehensive and applicable for this purpose. Most previous studies on educational environment and interest of students have been conducted on medical, nursing and midwifery students and evidence was scarce in this regard on dental students. Considering the important role of such studies in promoting the quality of education and the importance of education in promotion of oral and dental health, future studies are required in this respect. In our study, the questionnaire was designed in such way that it can be used in other dental universities nationwide. Since the test-retest of this questionnaire was only done in Tehran University, School of Dentistry, test-retest of this questionnaire is recommended to be performed in other universities prior to implementation.

Conclusion

The designed questionnaire, as a reliable and valid questionnaire compatible with the Iranian culture,

can be used in dental schools of Iran to assess the dental students' interest in their field of study.

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