2528-9705

Örgütsel Davranış Araştırmaları Dergisi
Journal Of Organizational Behavior Research
Cilt / Vol.: 3, Sayı / Is.: S2, Yıl/Year: 2018, Kod/ID: 81S2417

DEVELOPMENT OF EFFECTIVE TEACHING MODEL IN CONTINUOUS MEDICAL EDUCATION PROGRAMS AT MAZANDARAN UNIVERSITY OF MEDICAL SCIENCES

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ABSTRACT

The World Health Organization recognized continuous medical education as an immediate need and at the World Summit on Medical Education in 1993 in Edinburgh requested the member countries to put this issue as a necessity on the agenda and utilize it in order to maintain the professional competence of the graduates. This research was focused on developing an effective teaching model in continuous medical education programs at Mazandaran University of Medical Sciences. Moreover, this research is an applied research in terms of objectives and concerns a descriptive-analytical study as research method of survey types. The statistical population of this research includes 560 faculty members of medical universities of the country who participated as an instructor in continuous medical education program of Mazandaran University of Medical Sciences. According to participants' viewpoint, as a result, techniques such as lecture; question and answer; group discussion; round table discussion, and case method are effective are effective in coding techniques in continuous medical education.

Keywords: *Effective Teaching, Continuous Medical Education Programs, Group Discussion, Lecture.*

INTRODUCTION

Due to the dramatic and rapid transformation of human knowledge and information, everything is rapidly changing.(Rahimimand & Abbaspour, 2016) Every day, a large amount of scientific data and empirical evidences are added to the world of science, and health and medical systems are transforming quickly. (Haghjou et al., 2012) In addition, the preservation of the previous knowledge doubles the problem. In the meantime, continuous medical education is one of the best ways to update the information and knowledge of graduates(Pashandi et al., 2015). Continuous medical education is referred to educational activities used by the members of the medical community to maintain, develop and enhance knowledge, skills, and professional and communicational performances in providing services to patients of the society or n their profession. (Samiei Rad et al., 2012)The World Health Organization recognized continuous medical education as an immediate need and at the

Geliş tarihi/Recieved: 10.12.2017 – Kabul tarihi/Accepted: 09.02.2018 – Yayın tarihi/Published: 21.08.2018

World Summit on Medical Education in 1993 in Edinburgh requested the member countries to put this issue as a necessity on the agenda and utilize it in order to maintain the professional competence of the graduates.(Haghani et al., 2003)

Research Aim and Objectives

General Aim:

Identification of effective teaching techniques in continuous medical education programs at Mazandaran University of medical sciences in order to provide a model.

Specific Objectives:

1. Identifying effective teaching techniques in continuous medical education programs;
2. Developing an effective teaching model for continuous medical education program;
3. Assessing the suitability level of the proposed model.

METHOD

This is an applied research in terms of objectives; considered research method is descriptive-analytical research method of survey type; also, in terms of data collection, it can be considered as a field research. The statistical population of this study includes 560 faculty members of universities of medical sciences of the country who participated as an instructor in continuous medical education program of Mazandaran University of Medical Sciences. Stratified sampling method was used through Cochran formula and 229 subjects were randomly selected among the teachers. Each academic rank is considered as a class. The questionnaires distributed randomly in each class. According to this fact that collecting data method is survey research and a researcher-made questionnaire is used, the validity and reliability of the research was evaluated through interviews with the professors.

Literature Review

- Asgari (2014) concluded in a research entitled “The Effectiveness of Nurses' In-Service Training Using Combination of Open-Thought and Case-Based Learning Techniques” concluded that case-based learning approach is an effective method in continuous education programs for workers(Asgari, 2014).
- Bassir Shabestari, et al. (2014) in his study entitled “Evaluation of the Zanjan General Dentists attitudes regarding quantative and qualitative administration of continuing medical education (CME) programs” showed that dentists recognized experienced instructors as the most effective factor in increasing the efficiency of continuous education courses and considered clinical encounter as the best way in implementation of continuous education program. (Bassir Shabestari et al., 2014)
- Kakoei et al. (2014), in their study entitled “The Viewpoints of Dentists Toward Continuing Dental Education” stated that participants in the workshop preferred to observe practical work. They also concluded that the beneficial factor in improving quality of programs is using expert instructors. (Kakoei et al., 2014)
- Razavi et al. (2012) in a study entitled “Investigation of Faculties’ Knowledge and Application of Teaching Methods in Tehran University of Medical Sciences" showed that: lecture was the most frequently used technique; also, programmed lecture was the most appropriate technique from the participants’ viewpoint; and the lack of time in training

sessions was the most common reason so that they did not use the methods of group training and newer approaches of teaching.(Razavi et al., 2012)

- Moosavi et al. (2011), in a study entitled "Assessment of Continuous Medical Education Programs from Viewpoints of Eligible Physicians" showed that the most appropriate way of conducting continuous education programs is group discussion, patient introduction and lecture.(Moosavi et al., 2011)
- Sadeghi and Bakhshi (2010) in a study entitled "The Viewpoints of General Practitioners of Rafsanjan Towards the Performance Quality and Methods of Teaching and Accomplishment of Continuing Education Programs: A Short Report " showed that the participants consider practical work in the workshop, empirical observations and lectures with presenting film as suitable techniques in teaching scientific books and journals, and watching educational films at seminars and congresses as more appropriate in implementation of continuous education programs for restorative dentists.
- Haghani et al. (2003), in a study entitled "Teaching Methods Used by General Practitioners' Continuing Education Programs in Isfahan University of Medical Sciences" stated that the predominant teaching technique in all continuous education programs is lecture; and in some cases, questions and answers, case presentation and demonstration are also used. Several studies have also emphasized the importance of teaching methods in continuous medical education programs. In this research, the necessity of using other teaching methods was emphasized.(Haghani et al., 2003)

  Halal Al-Ezi and Savi Thierry Retnapalan (2014) in a study entitled: Problem-based learning in continuing medical education: review of randomized controlled trials stated that Online PBL is a useful method of delivering continuing medical education. There is limited evidence that PBL in continuing education would enhance physicians' performance or improve health outcomes.(Al-Azri & Ratnapalan, 2014)

  Karg et al. (2013) in a study entitled: "Integrating continuing medical education and faculty development into a single course: effects on participants' behaviour", revealed that Integrating continuing medical education (CME) and faculty development (FD) into a single course is highly effective in changing physicians' medical practice as well as teaching practice. Although all course items were effective, participants choose more FD items than CME, so future research has to focus on which variables determine those choices.(Karg et al. , 2013)
- Pal et al. (2012), in a study entitled: "Assessment of impact of small group teaching among students in community medicine" that all forms of small group teaching (SGT) were on the positive appraisal by the students on their learning experience and were considered as a comprehensive tool for in-depth teacher-student interaction. (Pal et al., 2012)

  Telner et al. (2010), in a study entitled "Game-based versus traditional case-based learning: comparing effectiveness in stroke continuing medical education" concluded that Games provide a novel way of organizing CME events. They might provide more group interaction and discussion, as well as improve recruitment to continuing medical education (CME) events. They might also provide a forum for interdisciplinary CME. Using games in future CME events appears to be a promising approach to facilitate participant learning. (Telner et al., 2010)

- Feingold et al. (2008), in a study entitled: "Student perceptions of team learning in nursing education" verified that team learning predominantly promotes learner-to-learner engagement and indicated that students struggled with application problems that had several plausible answers yet recognized the relevance to clinical practice. Students appreciated the need for increased individual accountability for learning and identified value in learning through discussion, both characteristics inherent to team learning. Students were concerned about their team learning grade and its dependence on group performance. (Feingold et al., 2008)
- Marinopoulos et al (2007) in s study entitled: "Effectiveness of continuing medical education" concluded that despite the low quality of the evidence, CME appears to be effective at the acquisition and retention of knowledge, attitudes, skills, behaviors and clinical outcomes. More research is needed to determine with any degree of certainty which types of media, techniques, and exposure volumes as well as what internal and external audience characteristics are associated with improvements in outcomes.(Marinopoulos et al., 2007)
- Pamela et al. (2002) conducted a study entitled: "A Comparison of Student-Centered Versus Traditional Methods of Teaching Basic Nursing Skills in a Learning Laboratory "concluded that The student-centered group was significantly more satisfied with their learning.

RESEARCH FINDINGS

Inferential Analysis

Determining the content domain of the questionnaire

First, the content domain of the questionnaire is determined. From 63 initial items for the model, 40 items are considered as the final items of the questionnaire and have been approved by the experts in terms of validity and reliability. Construct Validity was determined using exploratory factor analysis. Therefore, the main question of this section is as follows: Main question: What are the dimensions, factors and indexes of the effective teaching techniques in continuous medical education programs at Mazandaran University of Medical Sciences? To answer this research question, a questionnaire with 40 items were prepared and distributed among 229 subjects. First, we used the exploratory factor analysis to investigate whether the proposed construct has the ability to measure the desired target or not? The Kaiser-Meyer test and Bartlett test were used to determine whether the number of the items is adequate for the factor analysis or not?

Table 1: KMO Index and Bartlett Test for the Model of Effective Teaching Techniques

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Teaching process	KMO	0.877
	Bartlett	7817.132
	DF	780
	Sig.	0.0009

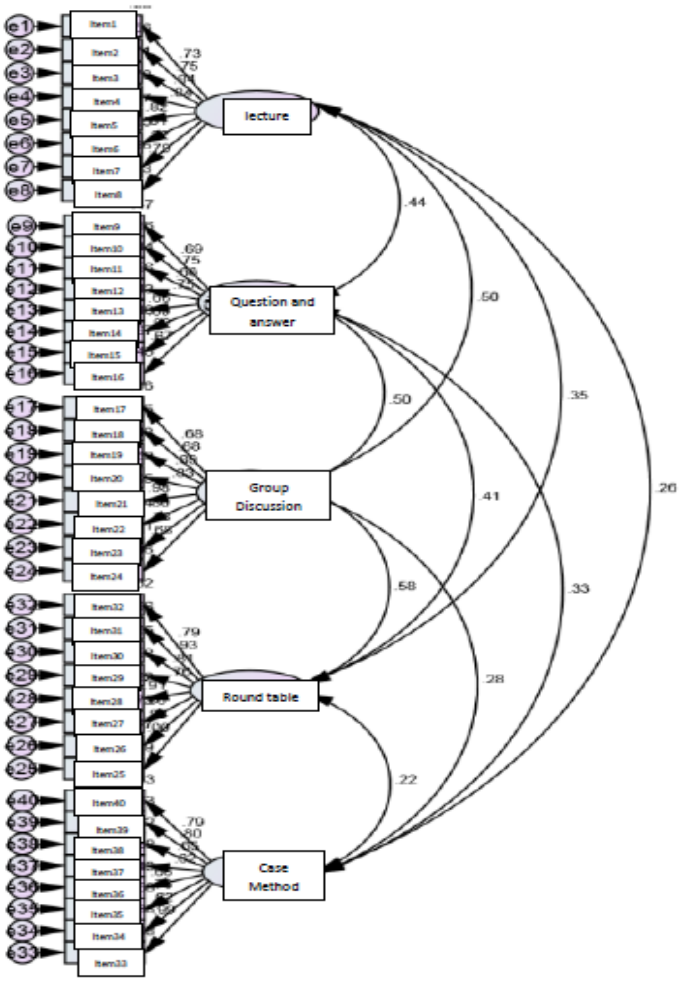
The Kaiser-Meyer-Olkin and Bartlett testing value is 0.877 and the significance level of Bartlett's spherical test is 0.0009. (Table 1) Therefore, in addition to adequate sampling, the conduction of factor analysis based on the correlation matrix under investigation can also be justifiable. The preliminary statistical characteristics that obtained the analysis of the main components are shown in the table below.

Table 2: Factors and Percentage Variance Explained by the constructs of the Model for Effective Teaching Techniques

factor	Initial Eigen values			Sum of the squared factor of extracted loadings			Sum of the squared factor loadings after varimax rotation		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	12.67	31.67	31.67	12.67	31.67	31.67	6.41	16.02	16.02
2	4.92	12.31	43.98	4.92	12.31	43.98	5.69	14.24	30.25
3	4.06	10.14	54.12	4.06	10.14	54.12	4.88	12.20	42.45
4	2.90	7.24	61.36	2.90	7.24	61.36	4.87	12.18	54.64
5	2.15	5.37	66.73	2.15	5.37	66.73	4.84	12.09	66.73

As it is represented, the Eigen values of the five factors under investigation are more than two and in sum, it accounts for approximately 66.73% of the total variation. The Eigen value of the first factor equals 12.67, the Eigen value of the second factor equals 4.92, the third factor equals 4.06, the fourth factor equals 2.90 and the fifth factor equals 2.15.

According to the results obtained from the table of extracted factors based on varimax rotation, it is clear that the five factors are considered as follows: lecture with eight items, question and answer with eight items, group discussion with eight items, round table with eight items, and case method with eight items.



Chi_square=1533.630; DF=730; P-VALUE=.000; GFI=.859;CFI=.893;RMSEA=.069

Figure 1: Measurement Model of Effective Teaching Techniques at Standardized Coefficient status

The figure 1 represents the measurement of structure model at the state of the standardized coefficients, with the CFI, GFI values of 0.893 and 0.859, respectively, and the ratio of x^2 to the degree of freedom is a value less than 3. As a result, the designed structure seems to be appropriate in order to evaluate the model of effective teaching techniques in continuous medical education programs.

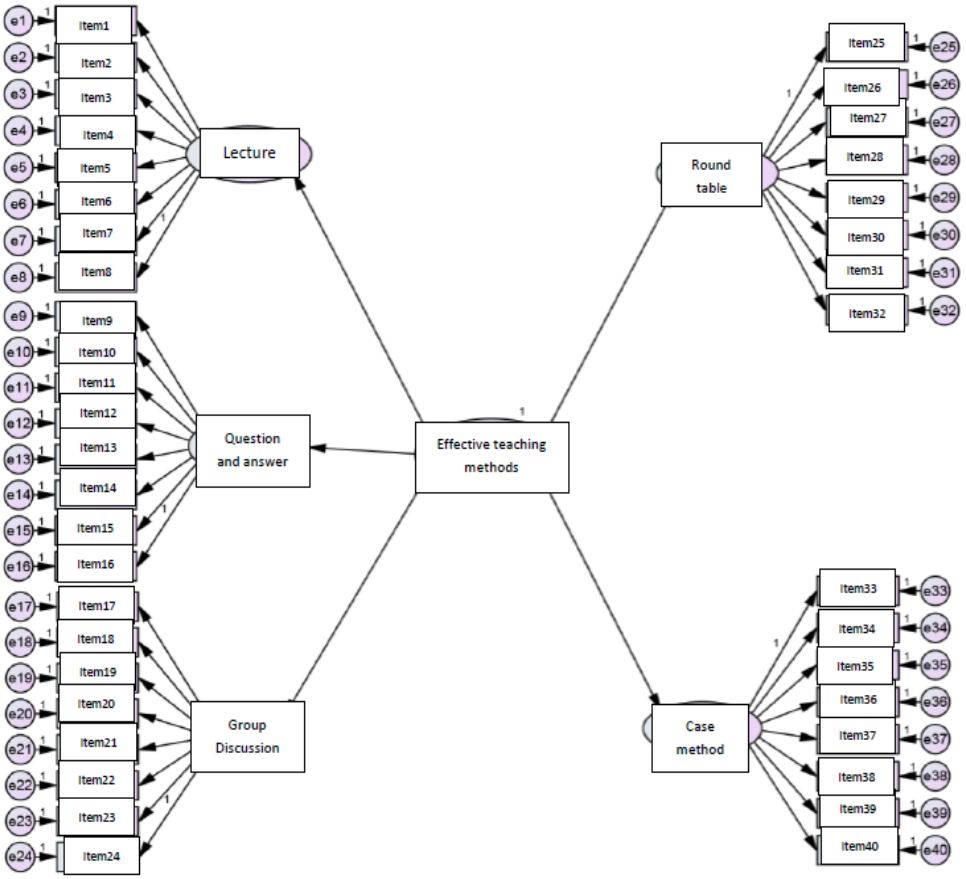


Figure 2: Pattern relevant to the Model of Effective Teaching Techniques in Continuous Medical Education

Before examination of the model through second-order confirmatory factor analysis in AMOS software, we assessed the suitability of the research structure with the questionnaire through exploratory and confirmatory factor analysis.

Confirmation Validity of Measurement Model Structure for Lecture Method

The table shows the results of KMO index and the Bartlett test.

Table 3: Results of KMO index and Bartlett's Test for the Construct of Lecture

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Lecture method	KMO	0.920
	Bartlett	1346.546
	DF	28
	Sig.	0.0009

As shown in the table above, the adequacy sampling coefficient value of KMO is about 0.920, which indicates the adequacy of the sample relevant to the construct of lecture to conduct factor analysis. Regarding Bartlett test with sig=0.0009, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of a factor analysis for the existing data is feasible.

Confirmation Validity of Measurement Model Structure for Question and Answer Method

The table shows the results of KMO index and Bartlett's test.

Table 4: Results of KMO index and Bartlett's Test for the Construct of Question-and-Answer

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Question & Answer	KMO	0.858
	Bartlett	927.232
	DF	28
	Sig.	0.0009

As it is represented, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of factor analysis for the existing data is feasible.

Confirmation Validity of Measurement Model Structure for Group Discussion

The table shows the results of KMO index and Bartlett's test.

Table 5: Results of KMO Index and Bartlett's Test for the Construct of Group Discussion

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Group Discussion	KMO	0.845
	Bartlett	1357.123
	DF	28
	Sig.	0.0009

The adequacy sampling coefficient value of KMO is about 0.845, which indicates the adequacy of the sample relevant to the construct of group discussion to perform the factor analysis. Regarding Bartlett test with sig=0.0009, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of a factor analysis for the existing data is feasible.

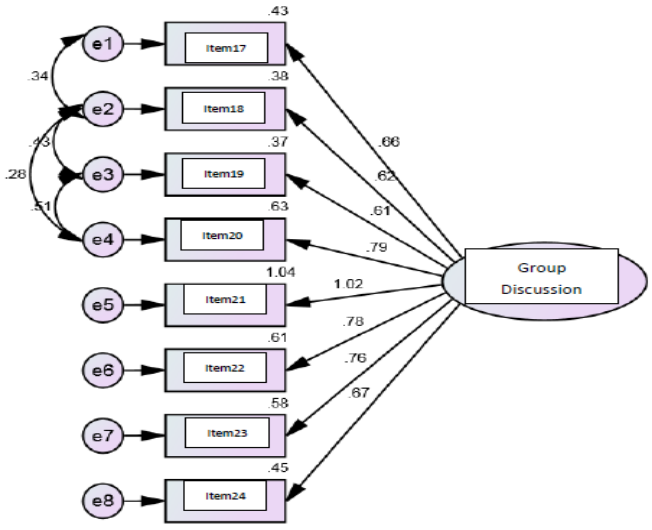


Figure 3: Measurement Model of Group Discussion at States of Standardized Coefficients

The above figure shows the measurement model of group discussion at the state of standard coefficients, which for all factors the values of standardized coefficient are more than 0.50 and, on the other hand, CFI, GFI is in a very good state and the ratio $X^2$to the degree of freedom is also less than 3.

Confirmation Validity of Measurement Model Structure for Round Table Discussion

The table shows the results of KMO index and Bartlett's test.

Table 6: Results of KMO index and Bartlett's test for the construct of Round Table

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Round Table	KMO	0.938
	Bartlett	2126.977
	DF	28
	Sig.	0.0009

As it is represented, the adequacy sampling coefficient value of KMO is about 0.938, which indicates the adequacy of the sample relevant to the construct of round table to perform the factor analysis. Taking into account Bartlett test with sig=0.0009, it is concluded that the considered variable is suitable to explore the factor analysis structure and conduction of factor analysis for the existing data is feasible.

Confirmation Validity of Measurement Model Structure for the Case Method

The table shows the results of KMO index and Bartlett's test.

Table 7: Results of KMO index and Bartlett's test for the construct of Case

Dimensions	The values of Kaiser-Meyer and Bartlett tests	
Round Table	KMO	0.938
	Bartlett	2126.977
	DF	28
	Sig.	0.0009

As it is shown, the considered variable is appropriate to explore the structure of the factor analysis and it is useful to conduct a factor analysis for the existing data.

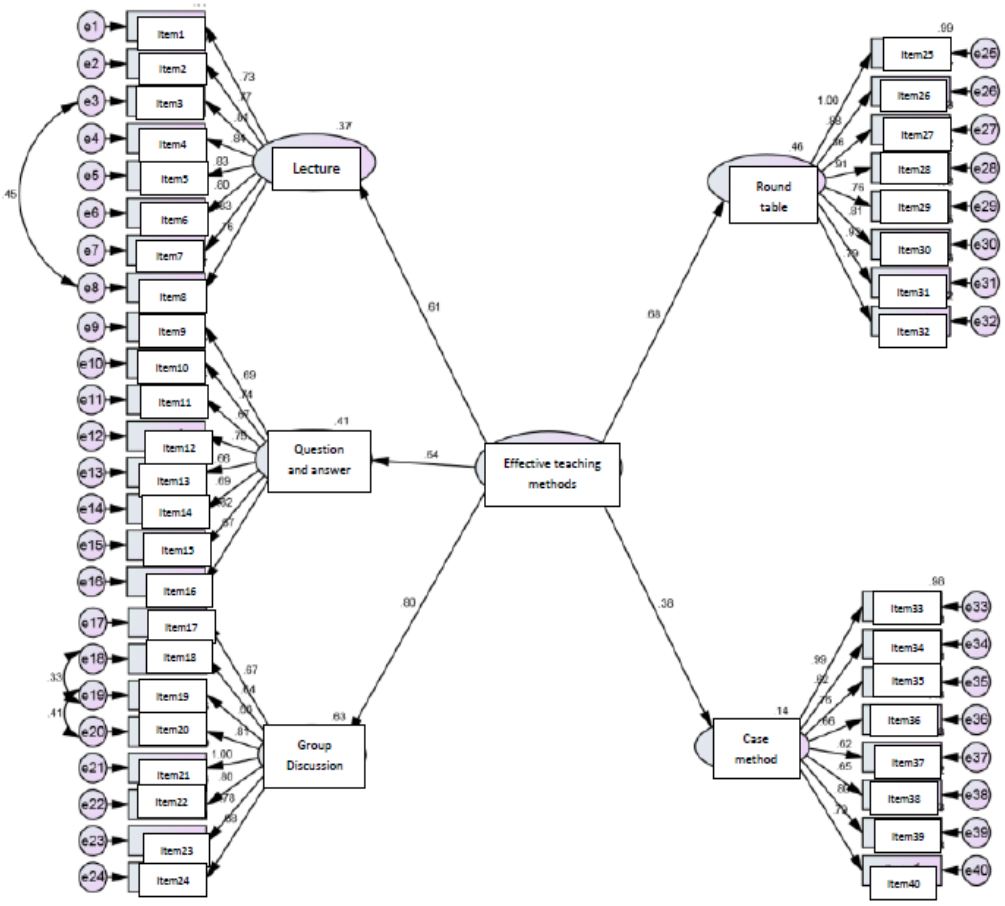


Figure 4: Modeling of effective teaching techniques in medical education in the form of standardized states

Table 8 provides information on unobservable variables (latent) of the research.

Table 8: Unobservable Variables of the Model for Effective Teaching Techniques in Continuous Medical Education

Variables	Number
Exogenous	5
Endogenous	1
Observations	229

Table 9: Confirmatory Factor Analysis of the Second Stage of Effective Teaching Techniques in Continuous Medical Education

Analysis of the direct relationship between the variables of the model	Standardized coefficient	t values	P-value	results	Priority by path coefficient
Lecture on Effective Teaching Techniques	0.61	7.706	0.0009	Significant	Fourth
Question & answer on Effective Teaching Techniques	0.64	7.438	0.0009	Significant	Third
Group discussion on Effective Teaching	0.80	9.155	0.0009	Significant	First

Techniques					
Round table on Effective Teaching Techniques	0.68	10.123	0.0009	Significant	Second
Case method on Effective Teaching Techniques	0.38	5.256	0.0009	Significant	Fifth

As shown in the table above, the standardized coefficient of lecture on effective teaching techniques in continuous medical education is equal to 0.61, t is equal to 7.706 and P-value is less than 0.05; as a result, from the participants' viewpoint, lecture is effective in explanation of the effective techniques in continuous medical education.

The standardized coefficient of question and answer on effective teaching techniques in continuous medical education is equal to 0.64, t is equal to 7.438 and P-value is less than 0.05; as a result, from the participants' viewpoint, question and answer is effective in explanation of the effective techniques in continuous medical education.

The standardized coefficient of group discussion on effective teaching techniques in continuous medical education is equal to 0.80, t is equal to 9.155, and P-value is less than 0.05. The conclusion is that, from participants 'viewpoint, the group discussion is effective in explanation of the effective techniques in continuous medical education.

The standardized coefficient of round table on effective teaching techniques in continuous medical education is equal to 0.68, t is equal to 10.123 and P-value is less than 0.05, therefore, according to the participants in the research, round table is effective in explanation of the effective techniques in continuous medical education.

The standardized coefficient of case method on effective teaching techniques in continuing medical education is 0.38, t is equal to 5.256 and P-value is less than 0.05, therefore, from the participants' viewpoints, case method is effective in explanation of the effective techniques in continuous medical education.

• *Examining the Adequacy of Practical Model for Effective Teaching Techniques*

Table 10: Indexes of Practical Model Fitness for Effective Teaching Techniques in Continuing Medical Education

Indexes	Acceptable value	Research finding value	Utility
Chi-square (x^2)	-	1425.981	Model Approval
p-value	-	0.0000	Model Approval
DF (degree of freedom)	DF≥ 0	732	Model Approval
$\chi^2/_{df}$	$\chi^2/_{df}<3$	1.948	Model Approval
RMSEA	RMSEA<0.1	0.064	Model Approval
NFI	NFI>0.8	0.828	Model Approval
AGFI	AGFI>0.8	0.752	Model disapproval
GFI	GFI>0.8	0.778	Model disapproval
CFI	CFI>0.8	0.907	Model Approval
IFI	IFI>08	0.908	Model Approval
SRMR	The closer to the zero	0.122	Model Approval

DISCUSSION AND CONCLUSION

According to the results of this research, learners 'favorite and common technique at Mazandaran University of Medical Sciences (which can be generalized to the medical

community of the country) is lecture. However, this technique is neither favorable nor quite optimal in the advanced and developing countries. The main reasons for the preference of lecture in continuous education by the students at Mazandaran University of Medical Sciences and by the medical community of the country are the lack of familiarity with the new teaching methods, especially cooperative and interactive methods. In fact, new teaching methods must be taught to instructors. That is to say, through teacher training universities and researches about expert panels, a proper method of teaching to faculties are selected and the instructors are taught during several-month and even several-year courses so that the professors will be able to provide scientific workshop and demonstration in continuous medical education and create more opportunities for discussion and exchange point of views.

Education and its various methods of application is an indisputable and fundamental part of education in human societies. However, the time and the way of applying educational methods at any scientific field is part of the advanced technology in learners' education.

The results showed that lecture with KMO value of about 0.920 would be suitable to explore the factor analysis structure and conduction of a factor analysis for the existing data would be feasible.

In question and answer, the adequacy-sampling coefficient of KMO is about 0.885, which indicates the adequacy of the sample relevant to the construct of question and answer to conduct factor analysis. According to Bartlett's test with sig=0.0009, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of factor analysis for the existing data is feasible.

In confirmation of measurement model for the construct of group discussion, the adequacy-sampling coefficient of KMO is about 0.845, which indicates the adequacy of the sample for the construct of group discussion to conduct factor analysis. According to Bartlett's test with sig=0.0009, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of factor analysis for the existing data is feasible.

The conformation of measurement model for the construct of round table shows the adequacy of the sample relevant to the construct of round table to conduct factor analysis. According to the KMO value of about 0.938 and Bartlett's test with sig=0.0009, we conclude that the considered variable is suitable to explore the factor analysis structure and conduction of the factor analysis for the existing data is feasible.

Confirmation of measurement model for the construct of case method shows the adequacy of the sample relevant to the construct of case method to conduct factor analysis. According to the KMO value of about 0.892 and Bartlett's test with sig=0.0009, we conclude that the desired variable is suitable to explore the factor analysis structure and conduction of the factor analysis for the existing data is useful.

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