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Prediction of Active Learning by Evaluating the Components of Competency and Teaching Quality in the Students of Mazandaran University of Medical Sciences

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Abstract

Background & Objective: Competency and teaching quality of professors play a key role in the quality of active learning in students. The present study aimed to predict the components of competency and teaching quality of professors regarding active learning in the students of Mazandaran University of Medical Sciences, Iran.

Materials and Methods: In this study, 359 students were selected via stratified random sampling, and Cochran's formula was used to determine the sample size. Validity of three questionnaires was assessed using content validity and face validity, and the reliability was determined at the Cronbach's alpha of 0.853 for the questionnaire of professors' competency, 0.894 for the questionnaire of teaching quality, and 0.938 for the questionnaire of active learning in students. Data analysis was performed using parametric tests.

Results: Variables of professors' competency, teaching quality, and active learning in students were estimated to be above average at the significance level of 0.001 in the affiliated schools. A significant association was observed between teaching quality and professors' competency at the significance of 0.001 and correlation-coefficient of 0.65. In addition, there was a significant association between teaching quality and active learning at the significance of 0.001 and correlation-coefficient of 0.61. Our findings indicated a linear correlation between the variables of competency and teaching quality compared to active learning (F=126.958; P=0.0001).

Conclusion: According to the results, there seems to be a significant correlation between teaching quality and professors' competency, which could predict the level of active learning in students

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Introduction

Nowadays, the competitive atmosphere of academic education environments has created new needs for the beneficiaries, including the students, employers, and community members. Academic education institutions must be able to address these needs by different approaches. One of the important methods for universities to address such needs involves increasing academic activities and recruiting competent professors and faculty members (1, 2). Eisler believes that the quality of teaching plays a pivotal role that should be taken into account as part educational objectives in universities, which is the result of optimal learning quality and is defined as promoting effective learning opportunities for students in educational centers (3).

According to Marsh et al., teaching quality refers to the effective teaching in the viewpoint of students and faculty members, which consists of overall components such as teaching and learning and mostly relates to higher education opportunities. Some scholars believe that evaluating the quality of education is in fact examining the efficacy of teaching activities, including teaching, designing a lesson plan, motivation, class management, evaluation of the students' personality and behaviors in class, and evaluation of professors' scientific efficiency (4). Competencies of faculty members are among the main influential factors in the teaching performance in universities (5).

In psychology, competency is defined as the incentive or prominent skills that result in the better professional performance. Mirabel and Richard state that to select the most competent individuals, attention must be paid to their abilities, behavioral indications, beliefs, personality traits, attitudes, and skills (6). In fact, competencies represent a pattern that shows the superior performance of the individual in the assigned job (7). In this regard, Angels Silva claims that the educational propaganda for the training of teachers and professors should create the necessary competencies on every level.

Academic institutions must play a more active role in developing the knowledge and skills of professors. Furthermore, these institutions should ensure that their professors acquire specialized knowledge, teaching skills, and methods of applying educational technology to determine educational strategies, while demonstrating adequate competency (8). Wong Ei states that the competencies of professors lead to rational thinking, effective communication, success, responsibility,

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creativity, and innovation, as well as encouraging learning in students (9).

In learning, it is of utmost importance to stimulate the ability of the profound understanding and analysis of the educational contents in students (10). Therefore, the behaviors and performance of professors as part of teaching quality could result in achieving educational goals and effective learning in students. In this regard, active learning has been a major concern among researchers.

Active learning refers to a broad spectrum of learning strategies for the active participation of the learners in the process of learning (12). In a learner-oriented approach, active learning could result in meaningful learning, through which learners would be able to construct new knowledge effectively (13). This approach stimulates the higher thinking levels in learners, so that they could be actively involved in the process of education. The aim of active learning is to lead learners toward the inner pleasure of learning, motivating them to discover truths and replace external thinking with rational thinking (14).

According to the literature, competency and teaching quality in professors are among the most significant influential factors in the learning of students (15-17). In a study by Keshavarz, teaching quality could predict educational progress in students (18). In another research, Piri and Ghobadi concluded that there are significant correlations between the active learning pragmatics, educational performance, and self-efficiency (19). According to the findings of Gheibi, strategies should be adopted to make the teaching styles and methods of professors suitable to the specific learning style of every major in order to achieve optimal education and enable students to acquire the basics of their educational field, thereby applying their knowledge in the future (20).

In another study, Ohelsen reported that the teaching quality of professors could improve the educational outputs of students. According to the researcher, efficiency is a qualitative feature in professors, which enhances the teaching ability of the professors and learning of students (21). Joe defines a framework for the competency of professors, which emphasizes on the significance of their capabilities and personality in their teaching quality. He believes that self-efficiency, interest, and beliefs and values are among the main personal features of professors, while teaching experience, proper academic education, and holding a relevant educational

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degree remarkably affect the quality of teaching in professors (22).

In their research, Darling Hammond et al. investigated the association of teaching quality of professors and students' progress, concluding that professors with poor teaching quality and competency cause academic failure in students (23). The aforementioned studies have assessed the correlations between the teaching quality and competency of professors with the educational outputs such as educational progress and learning. However, no studies have focused on the effects of these variables on the active learning of students. Active learning has attracted the attention of researchers as an essential output considering that most learners only attempt to memorize educational contents or extract them directly from texts due to the current teaching-learning approaches and evaluation systems. Consequently, most learners are not accustomed to interpret educational contents based on their personal creativity and intellectual reproduction through the combination, assessment, and organization of textual elements (24).

Considering the direct effects of the professors' teaching quality and competency on the learning efficiency of students, it is necessary to develop and apply proper standards to evaluate the competency of professors in universities accordingly. These standards could be used in the recruitment and promotion of professors with high competency, so teaching quality and quality of the outputs of the higher education institutions would improve. In addition, the quality of education could increase by paying attention to the quality of teaching, competency of professors, and active learning of students simultaneously.

For the first time in the University of Mazandaran (Iran), the present study aimed to assess whether the competency and teaching quality of professors could predict active learning in students.

Materials and Methods

This descriptive-correlational study was conducted on all the students at Mazandaran University of Medical Sciences in Mazandaran, Iran (n=5,461) in the second semester of the academic year 2014-2015. Participants were selected via stratified random sampling based on their school. Sample size was determined using the Cochrane's formula, with 95% confidence interval and error rate of 5%. Final sample size was determined at 354 students (25).

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Participants were selected from the students in the schools of medicine, dentistry, pharmacology, health, Sari School of Nursing and Midwifery, paraclinical sciences, Amol School of Nursing, Behshahr School of Nursing, and Ramsar Independent Campus.

Data collection tools were three questionnaires of professors' competency, teaching quality, and active learning of students.

Questionnaire of Professors' Competency

This questionnaire has been developed by Jafari et al. with 14 items, which are scored based on a five-point Likert scale (very much=5, a lot=4, moderately=3, slightly=2, very slightly=1) (26, 27). In addition, the questionnaire consists of three main components, including capabilities, communication skills, and professional ethics.

Questionnaire of Teaching Quality

This questionnaire has been developed by Seraj et al. with 20 items, which are scored based on a five-point Likert scale (very much=5, a lot=4, moderately=3, slightly=2, very slightly=1) (28). In addition, it consists of four main components, including lesson plan, teaching performance, teaching evaluation, and interpersonal relations.

Questionnaire of Active Learning

This questionnaire has een developed based on theoretical principles by researchers and used in the present study after the approval of the scholars. The questionnaire has 14 items, which are scored based on a five-point Likert scale (very much=5, a lot=4, moderately=3, slightly=2, very slightly=1) and includes the components of variety of educational opportunities, group participation, problem solving, and transfer of knowledge.

Content validity and face validity of the questionnaire of active learning were confirmed based on the opinions of experts. In the qualitative content analysis, the researchers asked five experts to evaluate this questionnaire in terms of the principles of the Persian language grammar, proper diction, essentiality, significance, and proper placement of the phrases, and the required feedback was obtained in this regard. In the quantitative analysis of content validity, we used CVR and CVI. Initially, to determine the CVR, 20 experts in the fields of educational sciences, higher education, and educational research were asked to assess each item within a three-part spectrum (essential, useful but not essential, and not essential).

Lawshe's tables was used to verify the minimum CVR, and the phrases with the CVR of >42% (as evaluated by 20 experts)

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were considered significant and included in the study (P<0.05).

In the next stage, CVI was assessed based on the CVI of Waltz and Basel (29). To do so, the researcher handed the questionnaire of active learning to the panel of experts and asked them to evaluate the relevancy, simplicity, and clarity of each item based on the CVI of Waltz and Basel. As such, these three indices were evaluated separately with a four-part Likert scale per each item.

In the present study, the score of CVI was calculated for each phrase by dividing the number of the experts in favor of the phrases (ranks of 3 and 4) by the total number of the experts. According to Heerkas et al., the CVI of the items is accepted with the scores of ≥0.79.

In the following stage, S-CVI/Ave was calculated for all the items of the questionnaire based on the mean CVI. Politvic (2006) has recommended the scores of ≥0.90 for the acceptance of S-CVI/Ave (29). To determine the reliability of the questionnaire, we used the Cronbach's alpha, which was estimated at 0.853 for the questionnaire of professors' competency, 0.894 for the questionnaire of teaching quality, and 0.938 for the questionnaire of active learning.

The objectives of the study were explained to all the participants, and their consent was obtained for participation. To comply with research ethics, the subjects were assured verbally (before the study) and in the written form (above the information items in the questionnaire) that all the data would be used for research purposes only.

Data analysis was performed in SPSS version 18 using the parametric tests such as one sample T-test, analysis of variance, Pearson's correlation-coefficient,andregression analysis.

Table 1: Demographic characteristics of the subjects studied in the research

	Medical college	Pharmaceutic college	Ramsar Based medical college	Dentistry college	Sari based nursing-midwifery college	Health college	Sari based paramedical college	Amol based Paramedical college	Amol based nursing college
College Grouping	52(17%)	30(9.8%)	40(13.1%)	13(4.2%)	33(10.8%)	30(9.8%)	68(22.2%)	21(6.9)	19(6.2)
Mean	<14		14-17		>17		Not specified		
	13(4.2%)		107(35%)		73(23.9%)		113(36.9%)		
Semester	2-4		5-7		8-10		Not specified		
	212(69.3%)		78(25.5%)		6(2%)		10(3.3)		
Gender	female			male			Not specified		
	216(70.6%)			85(27.8%)			5(1.6%)		

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Results

1. Evaluation of the professors' competency, teaching quality, and active learning of students in Mazandaran University of Medical Sciences

According to the results of one sample t-test and information in Table 2, mean competency was estimated at 3.15 (t=4.73; P=0.001). Therefore, the zero hypothesis was ruled out, indicating that the competency of the professors was above average. Mean teaching quality was estimated at 3.21 (t=7.24; P=0.0001). Therefore, the zero hypothesis was ruled out, indicating that the teaching quality of the professors was above average. Mean active learning was estimated at 3.11 (t=4.06; P=0.001). Therefore, the zero hypothesis was ruled out, showing that the active learning of the students was above average.

Table 2: Variables evaluation results using one sample t-test

Variables	Mean	t-statistics	Sig.level
Teachers' competency	3.15	4.73	0.0001
Teachers' teaching quality	4.21	7.24	0.0001
Students' active learning	3.11	4.06	0.0001

2. Comparison of the professors' competency, teaching quality, and active learning in the students of different schools

According to the information in Table 3, ANOVA was used to compare the viewpoints of the students toward the variables of professors' competency, teaching quality, and active learning in different schools of Mazandaran University of Medical Sciences. Our findings indicated a significant difference in the variable of competency in various schools (F=11.22; P=0.001). Furthermore, Tukey's test and evaluation of the mean variable in each school demonstrated that Sari School of Nursing and Midwifery, paraclinical sciences, and Amol medical and paraclinical schools were in the same group (P=0.055), while Sari medical school, Amol paraclinical school, health school, Ramsar medical school, and pharmacological school were grouped together (P=0.547). In this regard, school of health, Ramsar medical school, pharmacology school, and dentistry school were in the same group (P=0.358), and Amol nursing school and dentistry school were not placed in any groups in terms of the professors' competency.

With respect to the variable of teaching quality, a significant difference was observed between the mentioned schools (f=7.59; P=0.001). According to Tukey's test and evaluation of the mean variables, it could be

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concluded that Amol school of nursing, Sari paraclinical school, Sari nursing and midwifery school, Amol paraclinical school, and Sari medical school were in the same group (p=0.142), while Sari paraclinical school, Sari nursing and midwifery school, Amol paraclinical school, medical and health schools, pharmacology school and Ramsar medical school were grouped together (P=0.054). Moreover, Ramsar medical school and dentistry school were in the same congruent group in this regard (P=0.078).

In terms of the active learning of students, a significant difference was observed between the selected schools (F=11.49; P=0.001). According to Tukey's test and evaluation of the mean variables, it could be concluded that Amol nursing school, Amol paraclinical school, Sari paraclinical school, Sari nursing and midwifery school, and medical school were in the same group (P=0.075), while Sari paraclinical school, Sari nursing and midwifery school, Sari medical school and Ramsar medical school were grouped together (P=0.171). Furthermore, Sari nursing and midwifery school, Sari medical school, Ramsar medical and health schools, and pharmacology schools were in the same group (P=0.955), while the schools of health, pharmacology,anddentistrywerein a congruent groupinthis regard (P=0.079) (Table 4).

Table 3: ANOVA test results in the variables

Variables	F-statistics	Sig.level
Teachers' competency	11.22	0.0001
Teachers' teaching quality	7.59	0.0001
Students' active learning	11.49	0.0001

Table 4: Tukey test results for setting congruent groups in the variables

College Grouping	Amol based nursing college	Sari based nursing-midwifery college	Sari based paramedical college	Medical college	Amol based Paramedical college	Health college	Ramsar Based medical college	Pharmaceutic college	Dentistry college
Mean Techers' Competency (group)	2.5(1)	2.93(2)	2.94(2,3)	3.17(2,3,4)	3.17(2,3,4)	3.36(3,4,5)	3.40(4,5)	3.44 (4,5)	3.67(5)
Mean Teaching Quality (group)	2.91(1)	3.03(1,2)	3.02(1,2)	3.27(1,2)	3.03(1,2)	3.33(2)	3.42(3,2)	3.39(2)	3.80(3)
Mean Active Learning (group)	2.87(1)	3.02(1,2,3)	2.95(2,1)	3.04(1,2,3)	2.87(1)	3.37(3,4,5)	3.26(2,3,4)	3.41(4,5)	3.72(5)

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3. Association of teaching quality and active learning

To evaluate the association between the predictive variables (competency and teaching quality of professors) with the determinant variable (active learning), we used the Pearson's correlation-coefficient test. A significant correlation was observed between the variables of teaching quality and active learning (P=0.001; coefficient: 0.61). Furthermore, there was a significant correlation between professors' competency and active learning (P=0.001; coefficient: 0.65). Also, a significant association was denoted between competency and teaching quality (predictive variables) (P=0.001; coefficient: 0.72).

Predictive value of competency and teaching quality for active learning

According to the information in Table 5, there was a significant linear regression between the variables of competency and teaching quality to predict active learning (F=126.958; P=0.001).

Table 5: Linear regression related ANOVA

Resources	Sum of square root	Freedom degree	Mean square root	F-statistics	Sig.level
Regression	33.564	2	16.782	126.958	0.0001
Residual	40.052	303	0.132		
Total	73.615	305			

According to the information in Table 6, evaluation of the regression coefficients in the research model indicated that professors competency (P=0.001; t=4.295) and teaching quality (P=0.001; t=6.447) had significant correlations with the variable of active learning in students.

Table 6: study model regression coefficients

Variables	R2 determination coefficient	Beta	Standard beta	T statistics	Sig.level	VIF
Intercept level	0.675	1.063		7.969	0.0001	
Teachers' teaching quality		0.271	0.286	4.295	0.0001	2.472
Teachers' competency		0.374	0.429	6.447	0.0001	2.472

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After fitting the model in the multivariate linear regression, efficiency of the estimated model was assessed. To do so, we used the Durbin-Watson test to assess the lack of autocorrelation between the remaining phrases and normality test.

Furthermore, we used the VIF to evaluate the linearity between the independent variables of the model, and the values of these indices are mentioned in the following table.

According to the information in Table 6, the VIF values show the linearity between the predictive variables in the model. Since VIF was higher than 2 and according to the correlations between the predictive variables, there is a significant association in this regard (coefficient: 0.7), and therefore, one of the variables of competency or teaching quality could be used in the predictive model of active learning. In the Durbin-Watson test, the statistic was equal to 1.631, which is close to 2, confirming the lack of autocorrelation between the remaining variables. On the other hand, the p-p diagram for the normality of the remaining variables also confirms their normality in this regard.

Discussion

According to the results of the present study, professors' competency, teaching quality, and active learning in students were above average in Mazandaran University of Medical Sciences. In addition, all these variables showed significant differences between various schools of this university. A correlation was observed between competency and teaching quality, and these variables could predict the active learning of the students in Mazandaran University of Medical Sciences.

Findings of the current research indicated that the quality of teaching was above average, and a significant difference was observed in the variable of teaching quality between various schools of medicine, pharmacology, dentistry, Sari nursing and midwifery school, Amol nursing school, sari paraclinical school, Amol paraclinical school, health school, Behshahr nursing school, and Ramsar independent campus. Jones believes that teaching quality is of paramount importance in universities and remarkably affects the learning process in students (11).

According to Marsh et al., teaching quality denotes effective teaching in the viewpoints of students and faculty members, which encompasses the overall components of teaching and learning, thereby influencing the process of learning (30). Findings of Pakmehr (16), Jafari et al. (26), Shahidi (31), Darling-

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Hammond (23), and Joe are consisted with the present study in this regard.

Findings of the current research showed that the competency of the professors in Mazandaran University of Medical Sciences was above average, and a significant difference was observed in this variable in the schools of medicine, pharmacology, dentistry, Sari nursing and midwifery school, Amol nursing school, sari paraclinical school, Amol paraclinical school, health school, Behshahr nursing school, and Ramsar independent campus. Competency of professors is a significant influential factor in teaching quality. Angels Silva (8) states that the competencies of professors are among the most important factors regarding their teaching quality in universities. Some scholars consider the following components essential to defining competency in professors: knowledge, behaviors, intellect, decision-making, personality, and effective control of the learning activities in students. Wong Ei (9) also claims that the competencies of professors lead to rational thinking, communication, success, responsibility, creativity, and innovation in the students.

Findings of the present study are consistent with the results obtained by Jafari et al. (27), Shahidi (31), Darling-Hammond (23), and Joe (22). Since competent professors could have effective communication and interaction with learners in the process of education, this could enhance the efficacy of teaching.

According to the present study, active learning was above average in Mazandaran University of Medical Sciences. With respect to the variable of active learning, a significant difference was denoted between the schools of medicine, pharmacology, dentistry, Sari nursing and midwifery school, Amol nursing school, sari paraclinical school, Amol paraclinical school, health school, Behshahr nursing school, and Ramsar independent campus. Active learning is a novel approach regarding the teaching methods in classes. Nelson (32) believes that by creating the conditions required for active learning and presenting new strategies, the necessary skills could be acquired more effectively by students. Moreover, Pishgahi et al. (33) have concluded that by making the students more active in the class while teaching and stimulating higher thinking levels in them, active learning could increase the permanence of information in the students' mind after the class. Another strength of this approach is the higher satisfaction of students with the academic outcome. The findings of Johnson

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(34) in this regard are in line with the current research. This consistency could be due to the fact that active learning is a more effective approach in the learning efficiency of students compared to the other methods (35).

According to the results of the present study, there is a positive, significant association between the professors' competency and active learning of students, and competency could predict the variable of active learning. Competency is a fundamental characteristic in individuals, which is correlated with their success in professional performance. Kian and Keyvin (36) believe that competency affects the personal traits and characteristics of individuals. Therefore, in addition to the skills in their specialized fields, professors must acquire the necessary skills for fostering positive relations with students, as well as knowledge transfer, motivation, creativity in students, and encouraging them to think critically.

Findings of the present study are in line with the results obtained by Jafari et al. (27), Shahidi (31), and Kian and Keyvin (36). Shahidi (31) concluded that self-efficiency and competency of professors are directly and positively correlated with teaching quality. Furthermore, there is a positive, significant association between self-efficiency and competency. Therefore, it seems that the improvement of active learning could help students overcome their educational problems; to this end, the components of competency must be taken into account in the recruitment of faculty members in universities. Addition to the capabilities, specialty, and efficiency of professors, authorities must pay attention to their personal traits and competencies.

According to the results of the present study, there is significant, positive association between the teaching quality of professors and active learning of students, and teaching quality could predict the variable of active learning. Teaching encompasses a set of regular, predetermined and purposeful activities, which aims to create the optimal conditions for learning. These activities are in the form of interactions between the teacher and the learner, and therefore, the behaviors of the teacher influence learning.

Our findings are in line with the results obtained by Keshavarz (18), Gheibi (20), Talepasand (37), Jafari (26), Tomlinson, Kaplan, Purcell and Renzulli (38), Perry (39), Pacharez and Schank (40), and Ohlesen (21). Findings of Keshavarz (18) show that there is a significant correlation between the teaching quality of professors and educational progress

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of students, and teaching quality could predict progress. Gheibi states that strategies should be adopted to make the teaching styles and methods of professors proportionate to the exclusive learning style of each field, so that students could be trained on their field of specialty and apply their knowledge practically for becoming skilled individuals in the future (20). Regarding the self-efficiency and competencies of the faculty members, Jafari et al. denote an association between these variables and teaching quality (26). According to the literature, high teaching quality could enhance the educational outcomes of students, including profound learning and progress in education.

According to the present study, there is a significant correlation between competency and teaching quality of professors (predictive variables). Competencies of professors are among the significant influential factors in the quality of teaching. Angels Silva claims that the competencies of professors are among the most important factors involved in their teaching quality in universities (8). Some scholars believe the following components to be involved in defining competency in professors: knowledge, behavior thinking style, decision-making, personality traits and controlling the effective learning activities of students. In addition, Joe believes that the competency of professors, their capabilities and their personality play a key role in their teaching quality. Since competent professors are able to foster better interactions with learners in the process of learning, this could enhance the efficiency of teaching.

Conclusion

According to the results, competency, teaching quality and active learning were at an acceptable level in Mazandaran University of Medical Sciences, and significant differences were observed between these variables in the schools affiliated to this university. Furthermore, there is a correlation between competency and teaching quality of professors, and these variables could predict active learning in the students of this university.

Considering the mentioned findings, it is recommended that the managers and authorities of higher educational institutions hold training workshops and cultural courses to improve the competencies of university professors and their teaching quality. In the recruitment of faculty members, components such as competency and quality of educational subjects must be taken into account, so that the gap caused by the over-

concentration on quantitative factors in the educational system, which leads to the failure in performance, would be removed. In this regard, faculty members must pay attention to the active learning of students during the semesters, and students should provide their feedback to the heads of departments regarding the teaching ability of professors, their professional responsibilities, and their communication skills. In addition, students should complete the professors' evaluation forms carefully. It is also suggested that the findings of the current research and other related investigations be provided to the heads ofeducationaldepartmentsandfaculty members for proper discussions and problem-solving.

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