

MODEL OF TEACHING COMPETENCE IN TEACHERS OF MEDICINE AT UNAM

[*Modelo de competencia docente del profesor de medicina en la UNAM*]

by/por

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Abstract

The study presents a model of teaching competence in teachers of medicine. It was generated from an existing conceptual model: a) it was referred to the opinion of experts who selected the competencies of greater impact; b) a reference profile was constructed; c) an instrument was generated based on student opinion, and another for self-assessment; d) the instruments were validated by 18 experts in evaluation; e) they were applied to 2,281 students and 107 teachers, obtaining adequate psychometric characteristics, establishing a model according to current trends in teacher performance assessment.

Keywords

Teachers, Assessment, Competence, Model, Performance.

Resumen

El estudio presenta un modelo de competencia docente del profesor de medicina. Fue generado a partir de un modelo conceptual preexistente: a) dicho modelo se sometió al juicio de expertos quienes seleccionaron las competencias de mayor impacto; b) se construyó un perfil de competencias; c) se generó un instrumento basado en la opinión de los estudiantes y otro de autoevaluación; d) ambos fueron validados por 18 expertos en evaluación; e) se aplicó a 2,281 estudiantes y 107 profesores, obteniendo un comportamiento psicométrico adecuado que permitió establecer un modelo acorde a las tendencias actuales en evaluación del desempeño docente.

Descriptores

Docencia, Evaluación, Competencias, Modelo, Desempeño.

Introduction

According to the Mexican Association of Colleges and Schools of Medicine (AMFEM) Mexican medical education consists in a heterogeneous set of public and private institutions, which target satisfying the healthcare needs of the population. Existing diversity can be considered to come from sources such as budgets, teaching staff and student's profile,

among other things that produce differential performance of schools (Mexican Association of Colleges and Schools of Medicine [AM-FEM], 2009).

At present there is not a survey that expresses in truth the exact number of medical schools in the country. However, it is estimated that there are just over 90 institutions which impart the career in the country, of

which around 15 are located in the Federal District, with the National Autonomous University of Mexico (UNAM) concentrating more than 50% of the demand for the first admission in the institution, considering its three campuses: Ciudad Universitaria (CU), Faculties of Higher Studies Iztacala and Zaragoza, also highlighting that CU receives itself a little more than 5% of students nationwide (National Association of Universities and Institutions of Higher Education [ANUIES], 2007)

The Faculty of Medicine, UNAM (2010), recently modified the curriculum of its surgical degree, being integrated as plan assignments with a competence approach, which is organized considering two formative years of basic sciences, two and a half years of clinical sciences plus one year of internship and another in social services. The general objective of the plan is to form doctors capable and competent of practicing quality general medicine in complex and changing environments through:

- The knowledge, skills, attitudes and values ethically and professionally in order to solve health problems, appropriately integrating biomedical, clinical and socio-medical disciplines.
- The clinical aptitude for the promotion, preservation and effective and efficient recovery of health in individuals and populations.
- The critical thought, reflective practice and continuing education for the solution of health problems applying the best scientific evidence for making clinical decisions.
- Information and communication technologies for the effective management of health problems.

A central element for the achievement of the objectives of the curriculum, considering its direct impact on students' learning, is the teaching in their educational practice, which according to Zabala (2002) can be understood as a dynamic and reflective activity, one that is not susceptible to being restricted to educational processes inherent in the classroom but that spans the pedagogical intervention that occurs before and after class sessions.

From the framework exposed, a second element that plays a crucial role to determinate the achievement of the objectives of the curriculum is educational evaluation. This evaluation aims to evaluate in general terms the diverse components that influence the teaching-learning process, in order to make judgments about their merit or value and support decision-making, considering factors such as quality, effectiveness and relevance of various components such as the evaluation of institutions, plans and programs, school trajectories, learning and teaching. The teaching evaluation that takes places in several institutions of higher education values the performance, skills, use of psychopedagogical resources, learning strategies, and adherence to institutional policies, among others.

From the review of different authors it can be observed that the concept of evaluation has taken on different shades of meaning (Castillo, 2002; Devo, 1997; Joint Committee, 1981; Nirenberg, Brawerman and Ruiz, 2000; Ruiz, 1998; Scriven 1967 quoted in Worthen, Sanders and Fizpatrick, 1997; Stufflebeam, 1987 and Tyler, 1977):

- Contrasting results against targets.
- Identify and apply criteria to determine the value or merit of an evaluated object.
- Incorporate the rendering of value judgments about the evaluated object.
- Respond to the needs of the audience, considering the value of all the agents involved.

According to those definitions and for purposes of the present work, evaluation is defined as the systematic process that allows the integration of information both qualitatively and quantitatively, to determine the value or merit of an object, from which judgments of the collected information are made that guide decision-making with purposes of improvement.

By focusing directly on the evaluation of teachers' performance, performance itself can in a broad sense be defined as the situation developed in an educational context, starting from the interaction established between teachers and students in the school environment, which is governed by a set of explicit and implicit rules determined by the institu-

tions and individuals in interaction (Rueda and Torquemada, 2004).

The above definition can be supplemented considering teaching as a professional, specialized and systematic discipline that requires a high responsibility for its execution, being susceptible to adapt to the specific variations of each disciplinary field and the context of educational psychology in which the teaching-learning process is developed, involving different competences for their exercise. The assessment of teachers in each university is individual but can be based on general statements made previously, without being governed by rigid preconceived schemes (Rueda and Diaz Barriga, 2000).

Importantly, the evaluation of teacher performance must at all times be considered as an improvement strategy for education, that among its functions intends to feed back to reality, delimit different processes and actions, offering a complementary view of the performance that favors continuous reflection and promotes its members' development (Montenegro, 2003).

The previous approach takes on a double relevance considering the implication of approaching it in multidimensional and multivariate terms, in line with recent proposals in the field that incorporate a focus clearly aimed at assessing by competence. In agreement with the Organization for Economic Cooperation and Development (OECD 2007), competence can be understood as the ability to dominate a particular area, developed in a particular field, upon learning to deal with well-defined tasks and providing effective responses to problem-solving in one's professional field that are accepted by many countries worldwide. In this sense, some of the teaching models developed in recent years that deserve special mention for proposing competency as a central axis, which serve as a framework for the development and proposal of different evaluation processes, are: Fernandez (2008); Garcia, Loredo, Luna and Rueda (2008); Montenegro (2003), Perrenoud (2007) and Zabalza (2007).

In the context of medical degrees there are some proposals that define the competencies of the doctor as outlined in the project Alfa Tuning Latin America (2009) or defined from the professional perspective on the model pro-

posed by CanMEDS of the competent doctor that integrates six dimensions; professional, communication, collaborative, administration, health promotion and training, (Royal College of Physicians and Surgeons of Canada [CAN-MEDS], 2006).

Although the evaluation of teachers in each Higher Education Institution (HEI) may adopt a particular shade of meaning, a common element is that beyond the professional profile of teachers in a field of knowledge, teacher performance involves professional, specialized and systematic training that requires a high responsibility to be carried out. Teacher evaluation must be capable of adapting to the variations of each disciplinary field and the context in which educational psychology develops the teaching-learning process, involving diverse competencies to be exercised, in order to provide students with the skills profile of the graduate.

This is where teacher evaluation is essential, relevant and of consequence for the HEI, constituting a fundamental element in providing the opportunity to assess the performance of its faculty and to generate feedback and establish processes for teacher training and updating appropriate to each institution.

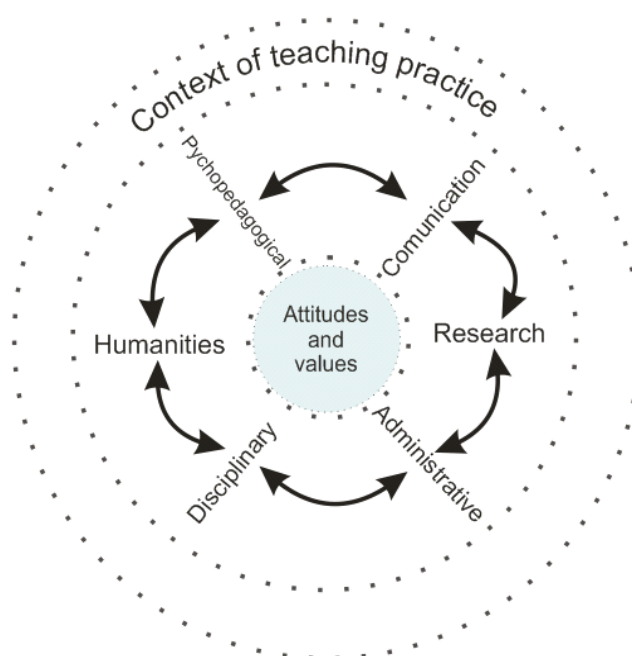
From this perspective, the evaluation processes developed at the Department of Medicine, UNAM—learning assessment, study plans and programs, institutional and teacher performance— are fundamentally relevant. Regarding the evaluation of teachers performance, since the start of the Unique Plan of Studies in the medical school course the main processes of evaluation in the entity developed since 1994 are mentioned. One first assessment instrument that was developed was called METEBQ-B, which was composed of 30 items, each with five Likert response options which evaluated three dimensions: strategies displayed by the teacher, respect shown for students and how learning was assessed (Valle, Alaminos, Contreras, Salas, Tomasini and Varela, 2004).

Later, in 2006, began the application of a second tool called (COED), which increased the number of dimensions employed to eight: punctuality and attendance, compliance with the academic program, teacher training methodology, use of materials and support activi-

ties, attitude toward students, how they are evaluated learning, practical or implementation activities and overall satisfaction of students. The instrument also used a Likert scale and was overall reliable ($\alpha = 0.98$) (Mazon, Martinez and Martinez, 2009). Importantly, to date, the Department of Medicine at UNAM applies only the assessment based on the students' opinions, which provides only a partial vision of teacher performance, so some authors recommend that a function as complex as this should be evaluated by several strategies (CANMEDS, 2006).

In 2008 a group of academics from the Department of Medicine, UNAM created the proposal for a competency model of professor of medicine (see Figure 1). In this theoretical model were defined six competencies or dimensions understood as "the body of knowledge, skills, attitudes and values held by a teacher and that together allow the successful performance of activities and functions of the educational process." As a distinctive feature of the model, attitudes and values are maintained as common elements in the context of teaching practice (Martinez, Lopez, Herrera, Ocampo, Petra, Uribe, Garcia and Morales, 2008).

Figure 1. Competency model of a professor of medicine (Martinez et al 2008).



As shown in figure 1, six types of skills are established: discipline, humanities, psychology, communication, research and administration as well as a common set of attitudes and values, which, as noted above, relate to each other and put into operation in various settings where the teacher develops the instructional practice of medicine. Each competency is broken down in the model by describing a set of activities or functions.

Given current trends and proposals of different authors, this study is part of a reinterpretation of the model proposed by Martinez et al. (2008), in the context of Curriculum

2010, Faculty of Medicine, UNAM. This reinterpretation is congruent with the context of recent proposals of the evaluation of teacher performance in higher education institutions to implement the proposed model through two complementary strategies of evaluation; one is based on feedback from students and the other teachers in their own self-assessment.

This study aimed to design two instruments capable of assessing competencies derived from the above model, which is associated exclusively to teacher performance, and based on the results of performing the initial proposal of a model of teaching competency

of the professor of medicine. As a list of specific objectives:

- To determine the dimensions that integrate each of the proposed utilities.
- To measure with evaluation utilities based on the valid and reliable opinions of the students as well as self-evaluation.
- To identify the differences between the morphological, physiological, and socio-medical subjects from the obtained results.

Method

The proposed model validation was conducted in five phases:

First stage: the roles and activities defined by Martínez et al, (2008) were submitted to the trial of 74 experts assigned to the department of primary school subjects and the Department of Medical Education of the same authority who selected those considered most associated with teacher performance and ranked using the following criteria:

- a) Assess each function and activity in terms of frequency of use (Never, Sometimes, Often and Always).
- b) Ponder its relevance (Not relevant, slightly relevant, relevant and very relevant).
- c) Determine whether each activity should be evaluated (yes or no) and by whom (the same teacher or students).

Second stage: selected those functions that the average of responses indicated as “frequent” or “always” and if they were relevant or very relevant, integrating a first block which should be evaluated by students and a second block from those that were to be evaluated by teachers.

Third stage: from functions that met the criteria defined in the previous stage, a reference profile was built for the design of an assessment instrument with a Likert scale based on student opinion. This utility was named (OPINEST2010) in which 49 items were defined for selected functions associated with the competency model of the professor of medicine.

In this same stage, we built a second profile that supported another instrument called

(OPINAUT2010), integrated by 52 items, aimed at teachers who seek self-evaluation. Thus was formed the first version of both utilities.

Fourth stage: the 52 items were subjected to a validation process by 18 experts in educational assessment assigned to the UNAM and other national bodies related to assessment in higher education institutions. These experts were trained in medical, psychological, pedagogical, teaching, measurement and psychometrics, and provided recommendations in terms of writing and presentation of each item contained in both instruments, which were corrected.

Fifth stage: this was the pilot of 2,281 OPINEST2010 questionnaires to a sample of students from three different departments oriented toward subjects such as morphological, physiological and sociomedical first and second years of medical school. For its part, the OPINAUT2010 questionnaire was applied to a sample of 107 basic cycle teachers who voluntarily agreed to answer the questionnaire.

The application is developed through education coordinators in each department, who during one of the class sessions requested the subject teachers leave the classroom to apply the test to students anonymously, who responded by scanned sheets. With respect to teachers, the same teaching coordinator handed out the questionnaire and scanned sheet for completion and delivery.

Once the tests and sheets were compiled, they were delivered to the Department of Evaluation at the Ministry of Medical Education for scanning and integration with the corresponding database, for analysis of psychometric instruments. Analyses were performed using SPSS developed 18 and 18, SPSS Inc. AMOS

At the end of this document the latest version of the instruments used is attached, updated in May 2011 with details from a process for implementation and continuous improvement of teacher evaluation in the Faculty.

As for the ethical aspect, there was the invitation to participate in the study to the various departments of the basic cycle of the Faculty of Medicine, where it was the decision of the

same people to participate freely in the study. Similarly the response to the questionnaires was voluntary for both students and the faculty. In both cases the anonymity of the participants is maintained and is fed back to participating departments in general terms only on the results.

Results

The study was developed at the Faculty of Medicine, UNAM, managing to obtain the response of 2,281 students and 107 teachers from three departments responsible for physiological, morphological and socio-medical subject matter for the basic training cycle which focuses on the first two years of study prior to admission of students to the years for the medical internship. The study was carried out between October 2010 and May 2011.

Regarding the first instrument OPINEST2010, it was answered by students of the basic cycle of the first two years of study who evaluated their teachers. This discrimination was determined by OPINEST2010 instrument, cutting .33 and .66 percentiles, resulting in a lower group, which placed 757 records with an average of 143 ± 18.9 points on the raw score, and a high group consisting of 776 records with an average of 191 ± 5.4 . Both groups were compared by Student t test and found significant discrimination of the instrument [$t = -67.91$, $\rho < 0.01$] assuming that the variances are equal between groups. Upon analyzing discrimination for each of the 49 statements that formed the original version of the instrument significant discrimination was found with $\rho < 0.01$ for each one. Regarding the reliability of the instrument the Cronbach alpha coefficient was determined, which obtained a standardized value equal to $\alpha .956$.

Subsequently the structure of the instrument was identified based on an exploratory factor analysis of principal components with Varimax rotation. The use of orthogonal instead of oblique rotation is justified because, if we are evaluating the “teaching competency” as a construct, it is characterized by different dimensions, each one of the constituted and characterized by a group of functions and activities that theoretically are assumed to be independent. Additionally, in psychometric terms, when the samples are very large, a large difference does not exist between the results of using oblique and orthogonal rotations, which is consistent with our data. Some authors, such as Ruiz and Jiménez (2004), cite diverse studies in which very similar results have been found comparing orthogonal and oblique analyses in one collection of data, and the conclude:

When analyzing the correlation matrix only claims 35, 40 and 41 of the instrument present no significant correlations with other statements, and are not integrated in any factor, while the statements 1, 2 and 6 show correlations over .9, which might suggest colinearity among these reagents. The commonalities are that the proportion of variance explained for each reagent is higher than .40 except for claim 11 (.390), 26 (.379), and 35 and 36 which do not recover in any factor as discussed below.

The values of the correlation matrix reproduced, obtained from the factor solution, are an indicator that the resulting model is good and of the proper number of factors when reproducing 100% of the extraction results of each claim, giving zero residual. As for the variance explained, only the first six components or factors that explain 51.18% of variance are taken into account.

Table 1. OPINEST2010 Resultant competencies, obtained from the rotated component matrix and its reliability

Factor	Name	Affirmation	Charge	Alfa
1	Communication and evaluation (19 statements)	Assesses the progress of the group as a benchmark for progress with the course content.	.696	.925
		Employs assessment to identify those contents to strengthen in the group, to help improve performance.	.685	
		Listens to students as they discuss the results of evaluation.	.626	
		Clearly establishes the criteria that will be employed for learning evaluation.	.614	
		Uses assessment results as feedback of the progress made by students.	.589	
		Informs students about their performance in the subject.	.573	
		Responds to both individual and group learning problems.	.551	
		Adapts the educational process to the progress of the group to achieve the desired objectives in the course.	.550	
		Uses different resources and procedures to evaluate the course.	.541	
		Establishes individual and group communication based on understanding, support and flexibility.	.531	
		Encourages the student to self-assess his or her participation as a means to improve his or her learning.	.510	
		Promotes good communication with students.	.510	
		Promotes interpersonal relationship in which students directly and appropriately express their feelings in making critical judgments about their own knowledge, skills and attitudes, and that of others.	.494	
		Encourages constructive criticism by students facing various problems.	.473	
		Encourages the use of the capabilities of the students themselves to interact in their environment, coping with various situations involving the physician-patient relationship in order to overcome them.	.459	
		Analyzes the principles of the physician-patient relationship in different situations.	.456	
		Favors the analysis of medical practice in the public and private sectors.	.451	
		Promotes interaction among students to foster self-criticism and constructive criticism.	.423	
		Guides the discussions held in the educational process, in an academic environment of tolerance, respect and equanimity.	.416	
Factor	Name	Affirmation	Charge	Alpha
2	Humanistic (6 statements)	Promotes a humanistic vision of the profession in the context of the discipline.	.844	.935
		Foster meaningful learning of the profession to analyze the qualities of the physician in a professional context.	.843	
		Includes in class content related to medicine as a humanistic profession.	.837	
		Emphasis on ethics related to medicine as a part of professional practice.	.823	
		Fosters an attitude of service in students as part of the physician's professional practice.	.816	
Promotes the development of interpersonal skills, as part of the physician's professional practice	.562			
Factor	Name	Affirmation	Charge	Alpha
3	Discipline (4 statements)	Relates within the subject different facts, conditions and problems associated with health and disease processes.	.933	.960
		Discusses the general characteristics of human structure and function associated with some of the most frequent problems in the country (clinical, health, family, community, etc.).	.928	
		Generates proposals aimed toward prevention, diagnosis, treatment and / or rehabilitation.	.917	
		Identifies health problems encouraging the analysis, synthesis and evaluation by students.	.788	
4	Psychopedagogical (6 statements)	Guides the student in academic-administrative problem-solving.	.817	.869
		Informs students of school administration procedures in the Faculty.	.791	
		Analyzes the educational process, and adjusts it using standard strategies (collaborative group work, simulation, evidence-based learning, E learning) and trends applicable in medical education.	.632	
		Uses different strategies for individual and group communication.	.553	
		Favors the recognition by students of the achievements and progress of the discipline, linked to real problems.	.449	
Links the goals of the subject with the general practitioner's professional profile.	.453			
5	Problem-solving (3 statements)	Directs the activities developed by students, to propose and make decisions based on a critical situations related to health problems most prevalent.	.790	.819
		Favors the analysis of the socioeconomic, political and cultural problems that confront the doctor in the world today.	.668	
		Encourages students to address, from a holistic perspective, different health problems, either individual or collective.	.571	
6	Intervention (3 statements)	Promotes in students making decisions related to problems inherent in the discipline.	.801	.862
		Implements activities to each situation or theme developed that are linked to problems in the subject.	.800	
		Shows flexibility to enable students to take an active role.	.800	

Confirmatory analysis was performed using a structural equation model to obtain a chi-square value of 4.37 with a $p < 0.01$. The reagents that integrate each dimension obtained significant standardized that comprise between 540 and 988.

The value of mean square error of approximation RMSEA should also be considered, which according to Hair (2007), corrects the tendency of the Chi square value for rejecting models to have a large sample, with a goodness of fit value of expected population and not only on the extracted sample is considered acceptable. The obtained value was .038 (values below .08 are considered acceptable) and the normal adjustment index obtained was 0.984 NFI (its value is assumed between 0 poor fit and 1 perfect fit).

With the exception of disciplinary competence that has a distinct behavior (students say that over 10% of the teachers always make use of this competency, 65.5% say sometimes or often, 19% never, and about 5% consider that it does not apply for their subject). The remaining competencies behave as follows: between 70% and 80% of students agreed that teachers apply the skills and roles within them frequently, about 20% agree that they are sometimes used and less than 1% considered that do not apply to their subject.

The distribution of response rates associated with each event is shown in Table 2.

Table 2. Distribution of response rates for each competency has the OPINEST2010

Factor	Not applicable	Never	Sometimes	Frequently	Always
Communication and evaluation	0%	2.8%	20.4%	73.6%	3.2%
Humanistic	.6%	3.8%	13.9%	78.6%	3.1%
Discipline	5.2%	19%	28.4%	37.1%	10.3%
Psycho pedagogical	.1%	3.6%	15.6%	76%	4.7%
Solving problems	.6%	5.6%	17.4%	74.2%	2.2%
Application	.5%	5.3%	16.2%	75.9%	2.1%

Operationally and in terms of the indicators proposed in the reagents, representations or statements that evaluate each competency the following conceptual definition is proposed for purposes of this project:

The first competency, *communication and evaluation*, is associated with teacher communication with students. They should be effective and open for both groups and individuals to identify their needs, to adapt their planning to the characteristics of the group, encourage the expression of ideas in an assertive manner, and issue of judgmental and self-criticism related to their performance and that of others in the context of various health problems. On the other hand, it also refers to the management of a comprehensive evaluation scheme aimed at qualitative and quantitative aspects. The teacher considers the follow-

ing as the axial elements: advancement of the group, the identification of the contents to be strengthened, the use of a transparent process with defined criteria and open evaluation, and the use of a variety of self-evaluation and assessment strategies that allow you to interact and feedback to students to improve their academic performance.

The second race, *humanities*, characterizes that the teacher promotes the generation of a humanistic vision and ethics in the context of medical practice in the discipline, based on meaningful learning and development of interpersonal skills.

The third competition, *discipline*, states that the teacher refers to the relationship established between the subject matter and various problems and situations in the medical con-

text: aspects related to health and disease processes, the structure and functions of humans, aimed at different levels of care.

The fourth competition, *psycho pedagogical*, is characterized by teacher-student communication on two levels, individual and group, oriented to solving academic problems, the adequacy of planning experience to the group's needs, linking and updating the progress of discipline, teaching strategies and the relationship of content to the profiles of the category.

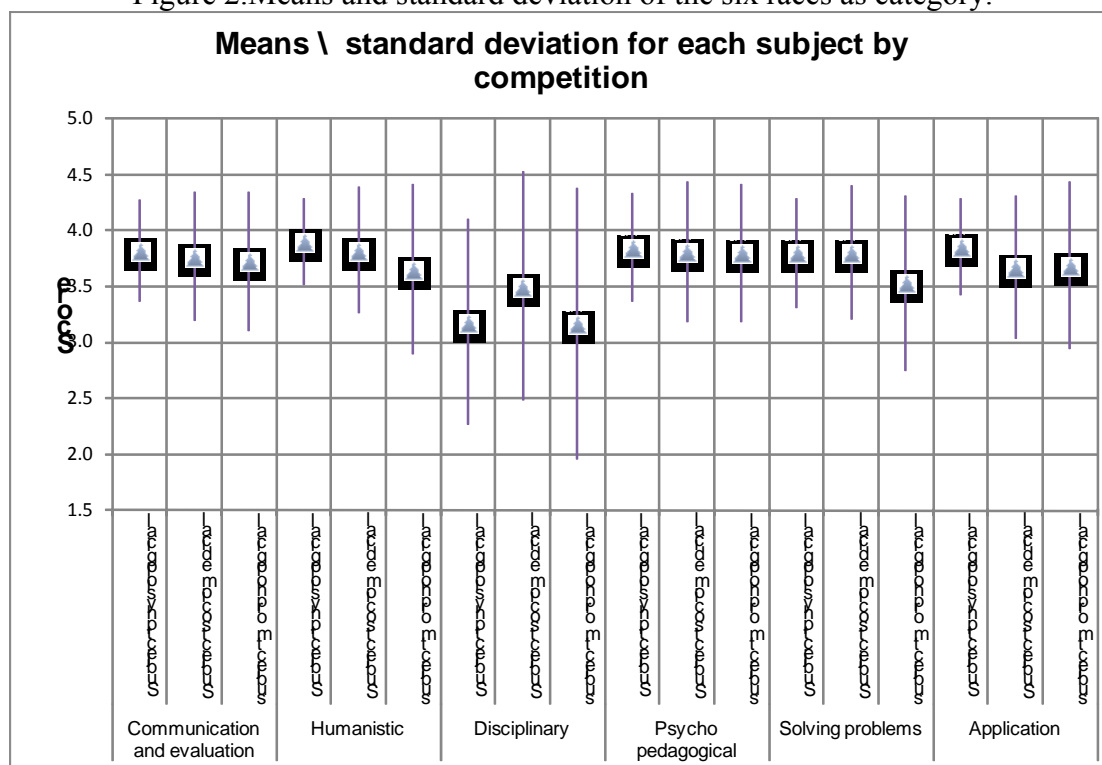
The fifth competition, *problem-solving*, notes that the teacher promotes an integrated approach to various health problems, direct-

ing students' activities analysis, clinical trial, development of proposals for addressing the situation and decision-making based on evidence.

The sixth competition, *application*, refers to the teaching as geared towards an active role by the students through the various problems inherent approach to discipline to encourage the use of the contents in clinical practice for decision-making.

In relation to the three academic departments involved, it was observed that the pattern of response is virtually the same in the middle of the six races plus or minus one or two tenths in the values obtained (Figure 2).

Figure 2. Means and standard deviation of the six races as category.



In the communication and evaluation skills, arts, disciplinary, problem solving and application with a significant difference [$p < 0.01$] by applying an ANOVA with Tukey test as post-hoc (Table 3), finding not only a result

significant competition in psychology, showing a mean equal in the three groups (3.8 points) as shown in Figure 1.

Table 3. *Subjects with significant differences by Tukey HSD test OPINEST2010 dl*

Dependent variable	Multiple comparison						
	(I) Subject	(J) Subject	Mean differences (I-J)	Standard error	Sig.	95% Confidence interval	
						Low limit	High limit
Communication and evaluation	physiological	morphological	0.101	.028	.001	.034	.168
Humanistic	physiological	sociomedical	0.076	.028	.019	.010	.142
		morphological	0.245	.030	.000	.176	.315
Discipline	sociomedical	morphological	0.170	.030	.000	.098	.241
		physiological	sociomedical	-0.317	.051	.000	-.438
Solving problems	sociomedical	morphological	0.332	.055	.000	.202	.462
		physiological	morphological	0.267	.032	.000	.192
Application	sociomedical	morphological	0.272	.033	.000	.195	.349
		physiological	sociomedical	0.184	.030	.000	.114
		morphological	0.168	.031	.000	.095	.242

The mean difference is significant at the 0.05 level for the data presented.

As for the second instrument OPINAUT2010, which was answered by 107 teachers in the first instance of discrimination was determined, obtaining a group where they were located less than 35 teachers with an average of 67.02 ± 7.49 points on the raw score in the high group and 36 records with an average of 95.52 ± 11.84 .

By subjecting the instrument to the Student t test, there is a significant discrimination of the instrument [$t = -33.33$, $\rho < 0.01$] assuming that the variances are equal between groups. Regarding the reliability, it was determined by Cronbach's alpha coefficient, obtaining a value equal to α standardized .978.

Subsequently they identified the structure of the instrument, based on an exploratory factor analysis of principal components with Varimax rotation. Given the small sample size, it is important to consider some additional indicators on the analysis, specifically, the value of Kaiser-Meyer-Olkin (KMO), that allows for the estimation of the feasibility of conducting a factor analysis to compare the val-

ues of correlation coefficients observed with partial correlation coefficients. In this case, the value obtained is 0.911. There are no correlations greater than 0.9 that could suggest co-linearity between the items that constitute the instrument.

The obtained communalities explained variances were obtained for each reagent at 0.601-0.851 and values of the correlation matrix reproduced, adjusted to communalities obtained as an indicator of the resulting model is good and the proper number of factors at play 100% of the extraction results of each phrase, giving the same residual zero. In relation to the explained variance yielded only two factors that explain 46.55% of variance.

The instrument was composed of 40 statements, the factors or competencies are integrated resulting in *Table 4*, which presents the competition number, your name and reagents that comprise the range of the factorial charges associated with the reagents and the value of Cronbach's alpha.

Table4. *OPINAUT2010 competition resulting from*, obtained from the rotated component matrix and reliability

Factor	Name	Number	Affirmation	Charge	Alpha
1	Teaching (35 statements)	R16	Orients academic discussions with students in an atmosphere of tolerance, respect and fairness.	0.867	0.984
		R11	Promotes motivation and interest of the group.	0.863	
		R39	Participates in processes assigned for teacher evaluation and performs the appropriate corrective actions.	0.845	
		R19	Stimulates the search for valid and reliable information in both English and Spanish and its integration	0.833	
		R34	Considers it essential to provide options that foster the self-regulated learning of students.	0.828	
		R43	Plans, develops and evaluates their teaching practice, adjusting their strategies to the learning conditions of the individual and the group in their subject	0.826	
		R32	Promotes learning through questions, so the student to identifies their needs and problems as a teaching resource.	0.809	
		R40	Maintains their knowledge in the discipline and teacher training.	0.798	
		R12	Employs various teaching strategies and resources aimed at achieving the competencies of the subject.	0.785	
		R38	Works in front of the students and reflects with them, maintaining impartiality to ideologies, beliefs and preferences of ethnic, gender and age in medical practice.	0.782	
		R42	Analyzes and recognizes their teaching strengths and weaknesses in the same.	0.772	
		R14	Encourages the use of and search for formal information, of leading sources in various medias, by students.	0.771	
		R18	Prefers students base their assertions and defend their positions, beginning with exposure to critical judgments from different sources.	0.768	
		R28	Moderates their teaching in terms of management and group characteristics.	0.755	
		R36	Shows flexibility in thinking with the students about various problems and situations involving ethical issues.	0.751	
		R41	Integrates new psycho-educational trends, applicable to medical education, in their teaching.	0.743	
		R33	Encourages active student work, serving as an advisor and guide in the development of the course.	0.743	
		R31	Promotes self-regulated learning of students by working in collaborative groups and use of psycho-educational resources.	0.742	
		R13	Rate their teaching, the characteristics of each group and the competencies achieved by the student, as an element of improvement.	0.715	
		R35	Promotes the ethical and reflective attitudes of students in situations that provide elements to better manage their emotions in their professional practice.	0.703	
		R37	Analyze different situations of doctor-patient relationship involving the humanist vision and ethics in professional practice.	0.674	
		R17	When a specific problem is determined, encourages students to make decisions based on a critical assessment.	0.667	
		R48	Takes account of the inherent responsibilities in the professional profile of a career in medicine.	0.666	
		R10	Promotes self-knowledge of the student, to suit their learning styles.	0.660	
		R7	Use tools and evaluation methods to measure the level of student achievement in relation to the proposed activities in the course.	0.657	
		R45	Manages various communication strategies that allow for interaction with students, peers, and / or patients, etc.	0.649	
		R24	Promotes reflection on the current reality of the medical field	0.644	
		R27	Stimulates scientific curiosity with emphasis on the benefits of inter-and transdisciplinary knowledge in a national and international context.	0.643	
		R15	Encourages the student to express his critical opinion with respect to the knowledge, skills and attitudes, of both himself and others, in an assertive and constructive way.	0.618	
		R23	Appropriates class sessions throughout the course, incorporating psycho-educational resources, that stimulate knowledge of the discipline	0.605	
		R25	Emphasizes for students the approach of certain medical problems according to their academic level and context of the profession.	0.575	
		R9	Qualitatively assesses the skills displayed by students as an element of the training process.	0.561	
		R30	Promotes participation in education, knowledge dissemination and management of sources of scientific information.	0.539	
		R49	Maintains updated knowledge of the institutional context of a university career in medicine.	0.538	
		R20	Encourages the use of the scientific method, clinical and / or epidemiology, as a foundation to find and interpret information about medical problems.	0.496	
2	Solving problems (5 statements)	R5	Highlights the collection and management of different clinical and epidemiological findings, to propose actions aimed at solving different health problems.	0.795	0.847
		R1	Guides students in identifying and solving problems related to diseases of major importance and relevance in the country.	0.782	
		R4	Establishes a holistic view of medicine that promotes the selection of strategies and actions to address the health problems of high importance and prevalence.	0.743	
		R3	Poses health-related issues, promoting the students' use of analysis, synthesis and evaluation for the implementation of various strategies and actions for prevention, diagnosis, treatment and / or rehabilitation.	0.718	
		R2	Relates features and functions of the human being as an important element to propose solutions to various health problems.	0.647	

The distribution of response rates associated with each event is shown in Table 5, which shows that 63.5% of teachers said that they

make use of the competence of teaching skills and frequently or always does the 54.2% competition with troubleshooting, 20.6% and

14% respectively, claim they never make use of those powers.

Table 5. Distribution of response rates for each OPINAUT2010 obtained from competition

Factor	Never	Sometimes	Frequently	Always
Teaching skills	20.6%	15.9%	59.8%	3.7%
Solving problems	14%	31.8%	43.9%	10.3%

Operationally both competitions are defined as follows; *teaching skills* competency is associated with maintaining adequate teacher-student communication, individual and group counseling, guiding group discussion, motivating and maintaining the interest of the group, encouraging critical thinking and decision-making of students, participating and developing various assessment processes, guiding the search for valid and reliable information, promoting meaningful self-regulated learning and at both the individual and group level, making good use of didactic resources and strategies, self-evaluating their teaching performance, maintaining and fostering an ethical environment of tolerance and respect, providing advice to students and stimulating interest in the application of research methodology.

The second competency is associated with *problem-solving*, characterized by advising students to the collection and management of different clinical and epidemiological findings, the generation of a holistic approach that favors the selection of strategies and actions to address health problems, the promotion of analysis, synthesis and evaluation for the implementation of various strategies and actions of prevention, diagnosis, treatment and / or rehabilitation.

Confirmatory analysis was performed using a structural equation model to obtain a Chi square value 26.71 with $p < 0.01$. A .22 and the RMSEA fit index obtained normal NFI was .898.

Discussion

This work references the Competency Model of Professor of Medical Faculty and began with the selection of functions and activities relating exclusively to the practice of teaching by experts in the medical field, who could

find a role to assess which faculty and students. And the process of construction of instruments, validation by experts for evaluation of different levels and psychometric analysis shows the following discussion of the results obtained in this study.

In the revised literature, we can observe diverse models and proposals that exclusively deal with the teaching competencies like the proposals by (Perrenoud, 2007; Zabalza, 2007; Fernández, 2008; García et al, 2008) and others that focus exclusively on the clinical and professional competencies of the doctor. These include the proposals of the Tuning 2010 project and the Royal College of Physicians and Surgeons of Canada Model (2006). The first confirms what is considered a systematic revision of the literature in which they value the content and quality of various questionnaires used for the evaluation of clinical professors, that are aimed at identifying the strengths and weakness of professors. This revision presented itself in various databases, like MEDLINE, EMBASE, PsycINFO, and ERIC, from 1976 until March 2010, and was reported in 54 journals based on 32 distinct instruments, where they found references associated with the content, like teaching strategies, roles, opinions, learning activities, and good practices in a clinical context and some psychometric data of the same nature. (Fluit, Bolhuis, Grol, Laan y Wensing, 2010).

In relation to the model proposed by Martínez et al (2008), we can consider their contribution as fundamental a precedent and foundation of this study because it involves a substantial advance on having a prior definition of the functions and activities involved in the performance teacher of teachers, and expressly defined the circumstances in the Faculty of Medicine, UNAM. This definition permitted the generation of instruments OPINAUT2010 OPINEST2010 for the evaluation processes for teaching the same entity as part of the implementation of Curriculum 2010.

The results can be considered relevant in the short and middle term, as they allow the realization of an institutional study to expand the

scope of the assessment to teachers in the clinical phase, complementary to the subjects of primary school (biomedical and socio-medical) represented by the three participating departments, in order to extend the model to all faculty members.

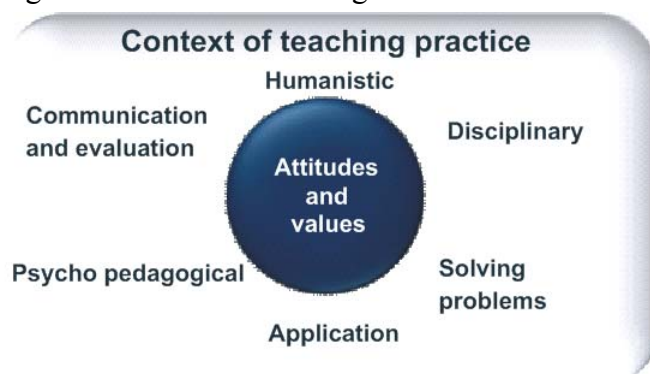
Derived from the development and results of this study, it can be concluded, in relation to the stated objective, that both instruments cover the criteria of reliability and validity for its application, and allow teachers to discriminate between high and low performance from the scores analyzed using Student's t test. With respect to OPINAUT2010, it is important to stress that the high values obtained in the Chi square and RMSEA in confirmatory analysis using structural equation models, this may be attributable to the size of the sample. Therefore, it is considered appropriate to reserve the given values for later analysis with a larger sample.

It is essential to continue this line of research to assess the consistency and gener-

alizability of the instrument in the context of other colleges and medical schools both domestically and abroad, based on the fact that the medical and teaching skills specific to various undergraduate programs maintain a common base, defined even in the clinical setting by authorities such as the Alfa Tuning and Tuning for Europe and Latin America respectively.

Moreover, the results obtained allow the support a proposal, derived from the original model of competencies of a professor of medicine. This included all the activities and roles of teachers in the institution. This new proposal for a Model of Teaching Professor of Medicine maintains the disciplinary, psychopedagogical, and humanistic dimensions but they are exclusively orientated towards the teaching practice. It expands the dimensions associated with communication and evaluation, problem solving, and application, the latter replacing the originally proposed research and administrative matters, as shown in Figure 3.

Figure 3. Model of Teaching Professor of Medicine



This new model is consistent with the transition to the curriculum of the Faculty of Medicine (2010), where in terms of teacher evaluation notes that: "To evaluate the performance of teachers, various complementary strategies should be emphasized that include the assessment of teachers by the views of students, by competencies, by the learning achievements of students, and by self-assessment, and among others." In the short term, we intend to promote development of another line of research that involves the use of the results associated with each competency as predictors of the academic performance of students.

In accordance with current trends in the approach to assessing teacher performance from a multidimensional and multifactorial; of the competencies defined in the self-assessment tool (*Teaching Skills and Problem Solving*), it may suggest the proposal of a more integrated model, in which the processes of self-assessment and evaluation based on student opinion are fused together.

For the Faculty of Medicine, teacher assessment should contribute to achieving the generic skills and the intermediate and discharge profiles for the students. This should

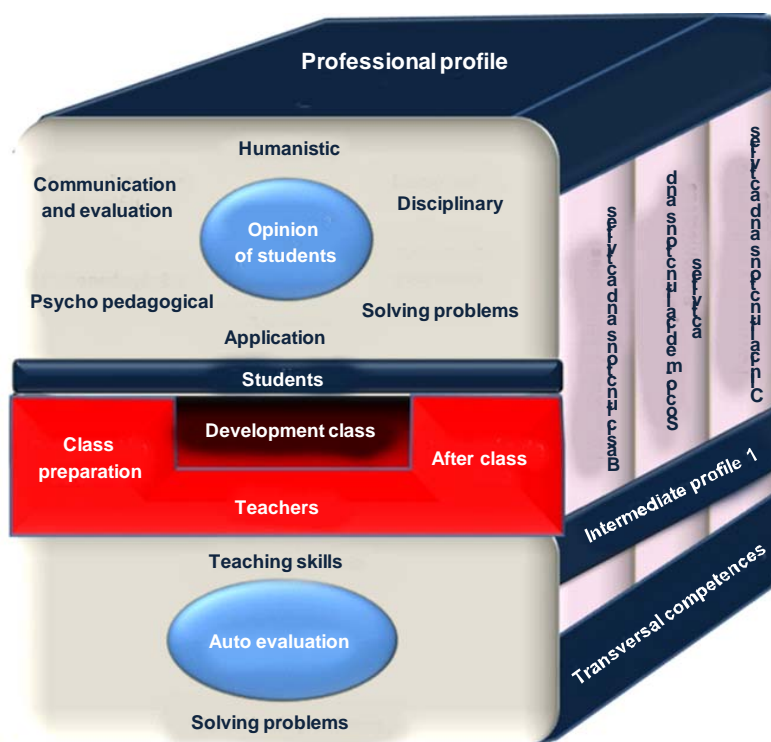
be supported in the acquisition and application of skills acquired in basic training, socio-medical and clinical, based on a satisfactory performance of the faculty as one of the central pillars in the formation of students.

Figure 4¹ presents a prospective vision in an integrated manner (the elements marked in red correspond with the vision of the model that incorporates teaching self-assessment). A line of future research could aim at the classification and assessment of proposed competencies in both instruments, according to the division of associated competencies into four large segments (and maintaining the first in 3 large blocks of functions and activities that involve the teaching practice in the areas of training the students and in the aforementioned profiles):

- Assessment of student who brings a unique vision of the developmental of the course in the educational process.
- The teaching self-assessment, in the same space of the class, is liable to correlate with student assessment.
- Self-evaluation of pre-class issues (linked to the preparation and planning of class)
- Self-evaluation linked to the time after the class (associated with reflection and self-assessment)

This supported the three main functions and activities involving the teaching practice in the areas of training of students and the profiles above.

Figure 4. Prospective teachers' competency model of professor of medicine



This proposal is a solid starting point for the faculty of the Department of Medical Education, in an effort to generate a process of continuous improvement that can incorporate some additional strategies to the process of evaluation and assessment in the future. In particular, it could incorporate

teacher performance, leading to feedback and improvement of teachers in the medical field.

A review of the literature shows various models and proposals that deal exclusively with teaching skills such as those proposed

by (Perrenoud, 2007; Zabalza, 2007, Fernandez 2008, Garcia et al, 2008) and others that focus exclusively on clinical skills and medical professionals such as Alfa project proposals for Latin America in Kunming (2010) and the model of the Royal College of Physicians and Surgeons of Canada (2006).

This is confirmed when considering a systematic review of the literature that assesses the content and quality of various questionnaires that are used to assess clinical teachers. They are designed to identify goals, strengths and weaknesses of teachers. This review was carried out in various databases such as MEDLINE, EMBASE, PsycINFO and ERIC, 1976 to March 2010. 54 papers reporting based on 32 different instruments. Findings concerning its content partners such as teaching strategies, roles, say, learning activities, best practices in clinical and psychometric data some of them as indicated, Fluit, Bolhuis, Grol, Laan and Wensing (2010).

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NOTES

1 Items marked in red are the prospective view of the model to incorporate self-teaching

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Keywords / Descriptores	<i>Teachers, Assessment, Competence, Model, Performance.</i> Docencia, Evaluación, Competencias, Modelo, Desempeño
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