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Evaluating The Quality of Medicine Curriculum Based on the Kano Model

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Introduction: Over the past years, the evaluation and accountability of universities and higher education institutions in regard to the realization of their goals and the implementation of the expected performance have turned into a major issue, and those who benefit from or are relevant to the higher education system have placed a special emphasis on the use of evaluation mechanisms. The current study aimed to determine the quality of the medical curriculum approved in 2017 based on the Kano model.

Methods: The study used cross-sectional and descriptive survey designs. The statistical population included all students of medicine at Tabriz University of Medical Sciences in the academic year 2022/2023. Based on Morgan's table, 240 students were selected using convenience sampling method. Field data collection and researcher-made questionnaires were used to collect data. The questionnaires were presented to interested and available students in person and online through a link. To analyze the data, paired one-sample t test was used with the help of SPSS 16.0 software and Kano's matrix.

Results: The findings of the study showed that students' expectations in the elements of Aker were more than their perceptions, and this difference was more in the elements of logic with the Mean±Standard Deviation of (16,09±2,02; 8,53±2,18), content with Mean±SD (19,62±2,46; 9,47±2,00), teaching and learning strategies with Mean±SD of (15,85±2,14; 7,36±1,89), teaching and learning activities with Mean±SD of (23,38±3,10; 11,50±2,68), and time and place of learning with Mean±SD (12,09±1,53; 5,46±1,43). Also, after examining the Kano matrix, it was found that the most felt needs of the students in the classification of the Kano model were among the mandatory needs.

Conclusion: Therefore, it can be concluded that the curriculum of medicine in implementation (perception) stage does not accord with the expectations of the students, and it is necessary to pay attention to the needs and expectations of the students.

Keywords: Curriculum, Qualitative, Evaluation, Perceptions, Expectations

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Introduction

Universities and higher education institutions, as instances of social systems, provide the context and possibility to improve and promote their performance by evaluating their functioning and providing necessary feedback in order to persist and continue in today's fast-paced world which is replete with change and transformation (1). Regarding the necessity and significance of higher education evaluation, it can be stated that the faculty members and students within each institution/program and the scientific community outside it need to be aware of the quality of scientific and educational activities and university norms, and the assistants of the institution/program can increase the chance of consistent improvement of quality with self-evaluation and volunteering for external evaluation by academic and professional peers (2).

The rapid growth of science and technology has caused major changes in all dimensions of society and has brought about numerous challenges. Obviously, medical science is also one of the sciences that have witnessed a significant progress in the last few decades (1). The dramatic expansion of human knowledge, the increase of human abilities in diagnosing and treating various diseases, and the promotion of new biomedical technologies have made doctors and scholars of ethics face challenging issues and have undoubtedly influenced all human beings in one way or another.

If universities want to perform their missions optimally, their beneficiaries must be assured that university efforts are of good quality and they use the necessary mechanisms to improve quality (3). Naturally, evaluating the internal quality of curriculum and educational programs presented in the universities is of great importance in this regard.

As higher education institutions should continuously monitor the quality of their programs from an academic viewpoint, students' perception of the quality of educational programs and their satisfaction with them will also be essential (4). Students can improve the quality of teaching and learning in universities in the curriculum evaluation process, which shows how students achieve learning goals and determines their attitudes toward teaching and the curriculum. As the beneficiaries and direct agents of learning, students should be more involved in the evaluation of curricula (5).

The curriculum is a key factor influencing the quality of medical education from the students' point of view. Feng and Zhou (2023) found that students highly evaluate the existing condition and quality of medical education in China. They stated that quality improvement programs for medical education should be designed in a hierarchical and definite manner and that different measures should be taken for different types of medical faculties to improve the quality of education (6). In a study examining the traditional curriculum of medicine from the students' point of view, Mohammadi-Mehr (2013) found that the overall situation of the medicine curriculum with lifelong learning approach is somehow unfavorable. The elements of objectives, content, teaching methods, evaluation methods, teacher role, educational atmosphere, facilities, and tools were relatively inconvenient in the existing curriculum (7).

In evaluating the quality of the medical curriculum at Baqiyatallah University of Medical Sciences based on national and international standards (WFME), Khajehazad et al. (2009) found that the quality of curriculum was evaluated as suitable by professors and weak by students based on national standards; on the other hand, the quality of curriculum was evaluated between "basic and quality level" by professors and "under basic level" by students based on the standards of WFME. Although there was a significant quantitative difference in the scoring level ($P<0.001$), there were similarities in the viewpoint of professors and students in "identifying weak indicators such as the use of new educational strategies, relevance with medical practice and health care system, and curriculum structure, contents, and duration and also strong indicators such as curriculum models, basic biomedical sciences, and educational program compilation and announcement " (8:3).

Quality evaluation forms an essential part of the program of any university, where the authorities seek to improve the quality of education of that university. Knowing the opinions of the university's customers (students) is important as one of the helping factors to find out what problems the students have and how to overcome such problems in the best way possible. This is an important step towards improving the educational quality of the university. "Quality in educational centers is a measure of how much the service provided meets the expectations of students" (9:2). If the quality of higher education in the general medical courses are not favorable, it can be said that the graduates with scientific certificates will not be able to carry out their specialized programs and tasks well. In this case, the scientific future of this field of study will not be reassuring. The programs of the Ministry of Health face serious problems in Iran.

When the authorities seek to improve the quality of education in a university, quality evaluation will be an essential part of the program.

In this study, in order to check the quality of the curriculum adopted for medicine, the Kano model was used so that its results can be used for policy making, designing, and implementation of its processes. The Kano model is one of the methods that can be used to check the quality of the research subject from the customers' point of view and, if necessary, to make corrections in order to improve its quality. This model is presented to estimate the level of quality expectations. Kano makes it possible to define quality by putting the functional parameters of quality and satisfaction together in a two-dimensional diagram (10).

The process of evaluating the quality of the curriculum with the Kano model includes identifying the strengths and weaknesses of the program, a result of which is that it can be used to determine in which ways the curricula are effective and in which ways they need to be modified, changed, or completed. Checking the quality of the curriculum clarifies to what extent each of the elements of the program is appropriate and implementable based on the conditions of the learner, limitations, and other possibilities. On the other hand, considering the continuous and accelerated changes in medical sciences and the introduction of new ideas and tools, the extent to which the current curriculum of this field is able to cover these areas and gain the satisfaction of the beneficiaries of the field of medical sciences is a matter of consideration as overlooking it will turn the field into an outdated program over time. It is obvious that implementing such a program without checking its quality can lead to the waste of a large amount of human and financial costs; moreover, the ultimate goal of this curriculum, which is to train efficient specialists in medical sciences, will not be achieved. Therefore, the current study seeks to investigate the quality of medical curriculum using the Kano model in order to reveal the distance between the perceptions and expectations of the students of medicine in terms of curriculum elements, as well as the distance between the current state and the desired state, and also the need to prioritize the four mandatory, attractive, one-dimensional, and indifferent categories.

Methods

Study Design & Participants

The present study used cross-sectional and descriptive survey designs. The statistical population included all 650 students of medicine at Tabriz University of Medical Sciences of whom 240 students were selected as the statistical sample using convenience sampling method. The data collection tools were two researcher-made questionnaires, which were provided to the students both via an online link and in person. For the in-person method, the students who went to the university to follow up on their educational affairs were asked if they were willing to participate in the study and were provided with the questionnaires if they agreed, and they completed and delivered them on the spot. Additionally, a link to the online questionnaires was sent electronically to all students; a few of the participants completed and submitted them the first time it was sent, and most of the participants completed and sent them in the second and third follow-ups. After the number of questionnaires reached the quorum of 260 questionnaires, of which 20 questionnaires were considered outliers as they were distorted, they were no longer followed up and data analysis started.

To develop the first questionnaire that measures the expectations and perceptions of the medical sciences students, the theoretical foundations and literature of medicine were studied with regard to the curriculum elements, and potential questions that might rise around each element were presented in a list. Considering the Kano model, the questions for each curriculum element were designed based on its nature in two dimensions, one of which measured expectations and the other measured perceptions. In both dimensions, a 5-point Likert scale was used for scoring (1 rated as very low, 2 as low, 3 as medium, 4 as high, and 5 as very high). The minimum score in each questionnaire was 41 and the maximum score was 205. The second questionnaire was to measure what medical students need from the curriculum considering its curriculum elements. The questions were to measure perceptions and expectations as needs, and the students were asked to imagine the stated feeling and express their perception so that the type and level of their needs could be measured. This questionnaire also had 41 questions, the options of which were: I like this situation (attractive need), it must be like this (mandatory need), I can tolerate this situation (one-dimensional need), and I don't like this situation (indifferent). In order to check the validity of the questionnaires with a qualitative method and using content validity, both questionnaires were reviewed by 3 professors from the Department of Educational Sciences of University of Tabriz and 2 from the Medical School of Tabriz University of Medical Sciences and the necessary corrections were applied to them. To determine the reliability of the questionnaires with a quantitative method,

the designed questionnaires were implemented as a test among 25 students; and using Cronbach's alpha, the reliability rate was obtained as 0.82.

Statistical Methods

Descriptive and inferential statistics were used to analyze the obtained data. In the descriptive statistics section, the mean and standard deviation were used, and in the inferential statistics paired one-sample t test was used with a confidence level of 0.95 and using SPSS 16.0 software. Also, as the study variables were two-dimensional and to determine the mandatory, attractive, one-dimensional, and indifference needs of the students in nine elements, Kano's matrix was used. The Kano model is a model, in which the quality of the curriculum is determined from the perspective of the students based on their expectations and perceptions of the curriculum, and the distance between the current situation and the desired situation is identified; the needs are prioritized in four categories: mandatory, attractive, one-dimensional, and indifferent. For this purpose, Professor Aki Kano has presented his two-dimensional model to estimate the level of quality expectations. By putting functional parameters of quality and satisfaction together in a two-dimensional diagram, Kano made it possible to define quality (11). Kolmogorov-Smirnov test was used to check the normality of the distribution of scores related to students' expectations and performance.

Ethical Consideration

This study was joint research between the Department of Educational Sciences, Faculty of Educational sciences and psychology, University of Tabriz, Faculty of Medicine, and Tabriz University of Medical Sciences. Ethics committee reference number: IR.TABZMED.REC.1400.1041.

Results

The results of the Kolmogorov-Smirnov test showed that significance level obtained for students' perception was (P=0.287) and for students' expectations was (P=0.167), which is not significant and therefore the distribution is normal.

To investigate the difference between the expectations of medical students and their perception of this field in the nine elements of the scale, the paired one-sample t test was used, the results of which are presented in Table 1.

In Table 1, there is a difference between students' perceptions and expectations in all elements of the curriculum. Also, the results of the table show that students' expectations of logic, time and place of learning, teaching and learning strategies, teaching and learning activities, goals, content, learning materials and resources, grouping learners, and evaluation are more than their perceptions. Therefore, there is a significant difference between the current situation and the desired situation of the medical field from the students' point of view.

Kano's matrix was used to determine the mandatory, attractive, one-dimensional, and indifferent needs of students in nine elements in medicine, the results of which are presented in Table 2.

The results of Table 2 show that students have separate attractive, one-dimensional, mandatory, and indifferent needs in each of the curriculum elements. Among the 41 identified needs, one need was classified as a one-dimensional need, one as an indifferent need, 14 as attractive needs, and 25 as mandatory needs. It can be said that most of the needs are considered mandatory.

Discussion

The current study aimed to determine the quality of the medical curriculum approved in 2017 based on the Kano model. The findings of the study showed that there is a difference between the expectations and perceptions of students in all nine elements of the curriculum, and these findings also showed that the average

Table 1: A comparison of students' perceptions and expectations of the curriculum elements

Elements	Number	Pre (Mean±SD)	Post (Mean±SD)	Change (Mean±SD)	T	P
Logic	240	16.09±2.02	8.53±2.18	7.55±2.93	39.84	0.001
Objectives	240	17.64±2.94	11.20±2.72	6.43±3.94	25.26	0.001
Content	240	19.62±2.46	9.47±2.00	10.14±3.17	49.54	0.001
Teaching and learning strategies	240	15.85±2.14	7.36±1.89	8.49±2.83	46.43	0.001
Teaching and learning activities	240	23.38±3.10	11.50±2.68	11.87±4.02	45.76	0.001
Materials and resources	240	13.92±2.60	8.73±2.07	5.19±3.40	23.59	0.001
Grouping learners	240	17.90±2.96	11.52±2.44	6.37±3.87	25.46	0.001
Time and place of learning	240	12.09±1.53	5.46±1.43	6.62±2.13	48.14	0.001
Evaluation	240	17.22±2.97	12.03±3.52	5.18±4.45	18.02	0.001

Table 2: Mandatory, attractive, one-dimensional and indifferent needs of students according to the Kano matrix

Elements	Characteristics	Frequency				Sum	Type of service
		Attractive	Mandatory	One-dimensional	Indifferent		
Logic	Paying attention to lifelong learning and learning how to learn.	88	112	16	24	240	One-dimensional
	Paying attention to the methods of learning up-to-date and new global issues.	115	104	8	13	240	Attractive
	Paying attention to different social, cultural, economic, political, etc. fields in the curriculum.	40	120	56	24	240	Mandatory
	Paying attention to the needs of students and society.	69	168	5	0	240	Mandatory
Objectives	Paying attention to the knowledge needed by students.	72	164	4	0	240	Mandatory
	Paying attention to the knowledge needed in society.	56	168	4	12	240	Mandatory
	Paying attention to the skills needed by students.	64	163	13	0	240	Mandatory
	Paying attention to the skills needed in society.	72	152	8	8	240	Mandatory
	Paying attention to developing emotional context in students.	100	116	18	2	240	Mandatory
Content	Up-to-datedness and conformity of course content with new global findings.	81	152	0	7	240	Mandatory
	Consistency of course content with students' abilities.	96	128	16	0	240	Mandatory
	Considering the relationship between the content of the fields with the contents of related scientific fields.	134	58	33	15	240	Attractive
	Focus on strengthening creative thinking.	112	88	40	0	240	Attractive
	Paying attention to the principle of strengthening critical thinking.	122	94	17	7	240	Attractive
Teaching and learning strategies	Paying attention to continuous interactions.	104	88	48	0	240	Attractive
	Paying attention to criticism and evaluation of theories.	78	130	25	7	240	Mandatory
	Paying attention to the inquiry-based principle.	125	75	24	16	240	Attractive
	Emphasis on learning specialized subjects through cooperation.	104	96	32	8	240	Attractive
Teaching and learning activities	Emphasis on active learning.	96	128	6	10	240	Mandatory
	Emphasis on group and collaborative learning.	112	80	48	0	240	Attractive
	Encouraging exploration and research.	96	88	40	16	240	Attractive
	Developing higher order thinking skills.	88	102	49	0	240	Mandatory
	Emphasis on various learning activities.	104	128	8	0	240	Mandatory
	Giving students the opportunity to develop critical thinking.	110	122	7	3	240	Mandatory

Materials and resources	The principle of making the learner active.	112	104	15	9	240	Mandatory
	Up-to-date resources.	96	136	8	0	240	Mandatory
	Ability to access multimedia learning materials and resources.	112	120	8	0	240	Mandatory
	Paying attention to various learning resources and materials.	80	136	16	8	240	Mandatory
Grouping learners	Emphasis on creative interaction with professors and students regarding specialized topics.	104	112				
	Understanding issues collectively.	96	88	24	0	240	Mandatory
	Forming student groups based on the issues and topics raised.	64	104	56	0	240	Attractive
	Forming groups to achieve goals in specialized field and educational subjects.	88	96	56	15	240	Mandatory
	Accountability and group and individual responsibility in relation to learning.	96	120	32	24	240	Mandatory
Time and place of learning	Paying attention to flexibility in learning time.	128	88	16	8	240	Attractive
	Taking advantage of diverse and flexible learning spaces.	120	86	23	11	240	Attractive
	Using the learning space to foster multiple interactions on specialized topics.	87	134	12	7	240	Mandatory
Evaluation	The principle of providing the opportunity for self-evaluation.	65	45	32	98	240	Indifferent
	Emphasis on continuous evaluation.	96	102	25	14	240	Mandatory
	Emphasis on problem solving as a part of evaluation.	65	143	17	15	240	Mandatory
	Balance between cognitive, emotional, and skill aspects in students.	58	123	45	14	240	Mandatory
	Paying attention to the evaluation of specialized subjects by classmates.	102	78	50	10	240	Attractive

expectations of students from logic, goals, content, teaching and learning strategies, teaching and learning activities, learning materials and resources, grouping learners, time and place of learning, and evaluation is more than the average of their perceptions. In the elements of logic, content, teaching and learning strategies and activities, and time and place of learning, this distance was more than that in the rest of the elements, which requires special attention and necessary measures should be taken to fill or reduce this distance. Measures such as the use of learner-centered methods, new learning and teaching methods, new learning tools, and taking advantage of various places for learning can be beneficial in this regard. From the perspective of students, paying attention to lifelong learning and learning how to learn, paying attention to the skills needed by students, being up-to-date and matching the content of the courses with new global findings, matching the content of the courses with students' abilities, paying attention to the inquiry-based principle, giving students the opportunity to develop critical thinking, up-to-date resources, emphasizing problem solving as a part of evaluation, and paying attention to various social, cultural, economic, political, etc. fields in the curriculum are among the mandatory requirements. These findings are in line with the findings of Tahmasabzadeh Sheikhlar et al. (10), Shabiri and Shamsi (12), Piri et al. (13), Mohibi Amin et al. (14), Fathi Azar et al. (15), and Hermans (16).

The findings of the present study showed that from the perspective of students, paying attention to the needs of students and society, paying attention to the knowledge needed by students, paying attention to the knowledge

needed in society, paying attention to the skills needed by students, paying attention to the skills needed in society, paying attention to developing emotional context in students, being up-to-date and matching the content of the courses with new global findings, matching the content of the courses with students' abilities, considering the relationship between the content of the fields with the contents of related scientific fields, paying attention to the criticism and evaluation of theories, emphasizing active learning, developing higher order thinking skills, emphasizing various learning activities, giving students the opportunity to develop critical thinking, forming student groups based on the issues and topics raised, forming groups to achieve goals in the specialized fields and educational subjects, accountability and group and individual responsibility in relation to learning, using the learning space to foster multiple interactions on specialized topics, emphasis on continuous evaluation and emphasis on problem solving as a part of evaluation, and paying attention to various social, cultural, economic, political, etc. fields in the curriculum are considered among the mandatory requirements. These findings are in line with the results of Tahmasabzadeh Sheikhlar et al. (10), Piri et al. (13), and Mohammad Shafi et al. (17).

Conclusion

It is well known that universities and higher educational institutions function positively and effectively when their educational and curriculum programs have the necessary characteristics and qualities; they can provide the basis for the real participation of students in deep learning, pay attention to goal setting, and align the goals with the realities of the society and the requirements of the facilities of that society. However, it should be noted that, unfortunately, the goals set in our country are a little far from the reality of the society. Also, the content of the medical field should be taken seriously through focusing on up-to-dating and matching the content of the courses with new global findings, the suitability of the content of the courses with the students' abilities, the relationship between the content of the courses and the content of related scientific fields, the principle of strengthening creative and critical thinking.

In general, according to the findings of this study, it can be concluded that students' expectations from all nine elements of the curriculum is more than their perceptions; in other words, from the students' point of view, the existing situation (perceptions) of the curriculum elements is not suitable and should be changed to reach the desired situation (expectations). In examining the levels of their needs, there is also a difference in the nine elements of different types of needs (mandatory, attractive, one-dimensional, and indifferent) from the students' point of view, which indicates that some needs in the elements are one-dimensional and indifferent, and their absence or presence makes no difference for students; and it is necessary to change these goals to attractive and mandatory goals.

Based on the results obtained from this study, it is suggested that in regard to the element of logic, the curricula of medical field should pay special attention to the methods of learning recent global issues and different social, cultural, economic, political, etc. fields; in regard to the element of goals, the curricula of medicine should pay attention to the skills needed by students and also consider the needs of the society; in regard to the element of content, the curricula of medicine need to pay attention to the coherence and logical connection of the content and seek to strengthen creative and critical thinking in students; in regard to the element of teaching-learning strategies, attention should be paid to active or learner-centered methods in the curricula of medicine; in regard to the element of learning materials and resources, attention should be paid to new resources in accordance with modern technology and new educational facilities in the curricula of medicine; in regard to the time and place of learning, special attention should be paid to the appropriate time and place of education, especially mentally and emotionally, in the curricula of medicine; in regard to curriculum evaluation, attention should be paid to the methods of evaluation and their patterns, specifically in adopting process and clinical evaluations in the curricula of medical fields.

The current study faced two main limitations in the process: 1- Conducting the study with self-report questionnaires in which there is always a possibility that the answers are unrealistic or distorted. 2- Data collection coincided with the outbreak of Coronavirus; the courses were presented online and the students did not have a consistent and earnest presence at the university, and most of the data were collected electronically.

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Authors' Contribution

All authors contributed to the discussion, read and approved the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated resolved.

Conflict of Interest

The authors declare no conflicts of interest.

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