International Journal of Medical Education. 2012;3:103-106
ISSN: 2042-6372
DOI: 10.5116/ijme.4fcc.d2a6

Students' evaluation indicators of the curriculum

Wen Tang[1], Jianning Bai[2], Jinbuo Liu[3], Hui Wang[4], Qi Chen[4]

[1] Centre for Educational Research and Assessment, Nanjing Medical University, China
[2] Department of Epidemiology and Biostatistics, Nanjing Medical University, China
[3] Department of Histology and Embryology, Nanjing Medical University, China
[4] Department of Physiology and Pathophysiology, Nanjing Medical University, China

Correspondence: Wen Tang, Centre for Educational Evaluation and Assessment, Nanjing Medical University, China.
Email: wtang@njmu.edu.cn

Accepted: June 03, 2012

Abstract

Objectives: The purpose of this study was to examine indicators and methods that the allied health students use for evaluating the curriculum quality and teaching.

Methods: A cross sectional study was conducted. Questionnaires were developed and administered. A total of 383 students at the Nanjing Medical University participated in the first round to identify initial indicators. A total of 41 medical educators ranked the identified factors in order to construct the questionnaire for evaluating the curriculum. A total of 2148 students completed the questionnaire in the second round. To evaluate the psychometric properties of the questionnaire, factor analysis and the reliability coefficient were used.

Results: The initial indicators yielded in factor analysis constituted 16 factors in the first round and were reduced to 10 by medical educators with an internal consistency reliability of 0.79. The correlation coefficients of 10 indicators were found to be less than 0.45 with an average of 0.27. Students valued the autonomous learning ability as a key indicator for teaching and learning ($r = 0.65$; $p < 0.0005$).

Conclusions: The result shows that the identified indicators are valid and reliable to measure the quality of the curriculum. The importance Chinese students placed on autonomous learning may suggest new initiatives to new curriculum.

Keywords: Curriculum, evaluation, students, factor analysis

Introduction

Curriculum plays a key role in education. Since the late 20th century, along with the introduction of western curriculum theories and the reform of Chinese higher education curriculum, the importance of curriculum evaluation in improving the quality of education and training has been increasing. Medical schools across the world used different approaches in curriculum evaluation to make informed decisions regarding the effectiveness of the components of the curriculum and outcomes and any future actions related to revising it.[1,2] Curriculum evaluators collect reliable data in order to examine how well the curriculum is operating.[3]

Although medical education literature described the process of curriculum evaluation using quantitative and qualitative methods, most of them reported information obtained from educators' point of view and less attention paid to students' perspective. In addition, students normally evaluate the effectiveness of their own teachers and were given little opportunity to comment on the curriculum. Curriculum planners have a key role in the evaluation process and students input in evaluation of the curriculum have been overlooked.[4,5] In fact, students, as the direct learning agents and beneficiaries, are supposed to be more directly involved in the evaluation of curriculums. Ideally, monitoring and evaluating the curriculum should be based on students, teachers, and administrators input.[6] On the other hand, most of the available curriculum evaluation reports have focused on one subject area of interest and a comprehensive evaluations of all modules on the curriculum were rarely carried out.[7,8]

Therefore, the purpose of this study was to examine indicators and methods that the allied health students use for evaluating the curriculum quality and teaching. This study was based on a combination of 27 courses which can reflect the curriculum quality in a macro-level rather than a specific perspective. Considering students' perceptive in the evaluation process of the curriculum may improve the

© 2012 Wen Tang *et al.* This is an Open Access article distributed under the terms of the Creative Commons Attribution License which permits unrestricted use of work provided the original work is properly cited. http://creativecommons.org/licenses/by/3.0

quality of teaching and learning in our universities. Information provided by students can show how well they have achieved, the learning outcomes and their attitudes toward the curriculum and teaching.

Methods

Indicator generation and Participants

A cross sectional design was used for the study. The study was conducted in Nanjing Medical University, China. We produced a preliminary 34-item questionnaire using the literature review and consultation with experts and students to evaluate the curriculum quality and teaching. In the selected items for the questionnaire, the preliminary questionnaire was distributed to students and they were asked to rate the curriculum quality on 9 courses (Physiology, Biochemistry, Anatomy, Pathophysiology, Microbiology and Immunology, Diagnostics, General surgery, Internal Medicine, and Surgery). The questionnaire was returned by 383 students in the fourth and fifth year (284 fourth and 135 fifth years). Of these, 108 students were Clinical Medicine (seven-year program), 190 Clinical Medicine (five-year program), 28 Stomatological program and 57 Nursing program. Using factor analysis, the number of items was reduced from 34 to 16. These items are considered as performance indicators of the curriculum evaluation.

In order to establish the content validity of the questionnaire for evaluating the curriculum, we asked 41 experts to rank the 16-item questionnaire, graded as very necessary, quite necessary and not necessary. The questionnaire items were reduced from 16 to 10 based on medical educators input. Among experts, 15 were specialists either in clinical medicine or nursing, 14 in basic science, preventive medicine and pharmaceutics, 3 in humanistic medicine and 9 in medical education management. Sixteen experts were recruited from other universities.

Procedures

To collect data, the 10- item questionnaire was embedded in the university website. Medical students rated each item based on 27 courses on a 3-point scale ranging from 1 (disagree) to 3 (agree). These courses were Basic Chemistry, Physics, Cell Biology, Physiology, Systematic Anatomy, Histoembryology, Organic Chemistry, Pathology, Pathophysiology, Microbiology and Immunology, Morphological comprehensive experiment course, Functional Experimental Course, Pharmacology, Diagnostics, General Surgery, Surgery, Paediatrics, Gynemetrics, Bioethics, Medical Psychology, Hygiene Toxicology, Statistical Epidemiology, Medical Statistics, Epidemiology, and Occupational Hygiene. A total of 2270 students filled in the web-based survey (no student claimed about ethical issues or conflicts) and 2148 valid questionnaires were collected, however, 122 incompletely papers were considered invalid (effective returns-ratio is 94.63%). Of these, 187 students were Clinical Medicine (seven-year program), 1747 Clinical Medicine (five-year program) and 214 preventive program. Further demographic analysis showed that 305 of these were freshman, 232 sophomores, 689 juniors, 593 seniors and 329 students in their fifth year. On average each course was assessed by approximately 79 students.

Statistical analysis

Data were analyzed using the statistical software SAS, version 9.1.3 and STATA, version 9.2. The principle component analysis (PCA) was run on items to extract the number of factors. For factor rotation, the oblique Promax rotaton was employed. The correlation coefficient was run to investigate the relationships between the items. The reliability of the questionnaire was assessed using the Cronbach's alpha coefficient.

Results

Validity

Using factor analysis, 16 common factors were selected from the 34-item questionnaire that account for 88.64% of the variance. The common factors identified were in good agreement with our expectations.[10] Experts selected 10 factors out of 16 as key indicators for evaluating the quality of curriculum (Table 1). The PCA produced 9 factors that accounted for 95.29% of the variance (Table 2). From Table 2 we can see that each factor contains one item (indicator) with factor loadings greater than 0.9786. Table 2 also shows that there is no overlap of the significant factor loadings for the items, providing each factor measures one construct which is discriminant from other factors. Table 3 shows the correlation coefficients of 10-item questionnaire. Table 4 shows the item means, standard deviations and item-total correlations for students. Item-total correlations ranged from 0.52 to 0.73. Although the mean score for item 9 (training students' autonomous learning ability) was ranked second from the last (Mean = 7.20), its item-total correlation (the correlation between the item score and the overall assessment score) is quite high ($p < 0.0005$). Item 9 was also ranked second. It is of note that there was a statistically significance between item 9 and other items ($p < 0.0005$).

Reliability

The Cronbach coefficient alpha of the preliminary 34-item questionnaire and the 10-item questionnaire was 0.92 and 0.79 respectively, indicating a satisfactory reliability.

Discussion

The quality of curriculum teaching is essential in higher school education. It is of great theoretical and practical importance to improve the teaching outcome through the construction and implementation of scientific and specific curriculum evaluating system. The purpose of this study was to examine indicators and methods that students use for evaluating the curriculum quality and teaching. Since every aspect of teaching is involved in the design of Stu-

Table 1. The 10 - item questionnaire as indicators of students' evaluation indicators of the curriculum by experts

Indicators of evaluation	Response		
1. The conformability of teaching content with our course syllabus	A. outstanding	B. good	C. poor
2. For my study, teaching schedule is	A. highly adjusted	B. adjusted	C. not adjusted
3. Text books can match teaching contents	A. excellent	B. good	C. poor
4. The whole quality of teacher and teaching level	A. excellent	B. good	C. poor
5. Teaching methods and skills	A. excellent	B. good	C. poor
6. Experimental (practice) teaching conditions	A. excellent	B. good	C. poor
7. Availability of references and online resources for the course	A. very rich	B. rich	C. not rich
8. learning has enhanced my autonomous learning abilities and interest in stud	A. excellent	B. good	C. poor
9. Learning has improved my thinking mode and analytical ability	A. excellent	B. good	C. poor
10. My global impression of the curriculum teaching quality	A. excellent	B. good	C. poor

Table 2. Loading factors of the Principle Component Analysis after oblique rotation

Item/indicator	Loading factors								
	factor1	factor2	factor3	factor 4	factor 5	factor 6	factor 7	factor 8	factor 9
Course syllabus	-0.0066	-0.0052	0.0008	0.0010	1.0037	-0.0045	0.0019	-0.0003	0.0012
Teaching schedule	-0.0243	-0.0262	1.0224	-0.0121	0.0007	-0.0183	0.0051	-0.0014	0.0027
Text books	0.0399	0.0406	-0.0120	1.0290	0.0007	-0.0269	0.0071	-0.0028	0.0038
Teaching level of teachers	-0.0899	1.0490	-0.0305	-0.0476	-0.0066	-0.0611	0.0196	-0.0061	0.0078
Teaching methods	0.0153	0.0183	0.0050	0.0072	0.0019	0.0126	0.9786	0.0017	-0.0003
Experimental conditions	-0.0488	-0.0518	-0.0176	-0.0264	-0.0043	1.0275	0.0118	-0.0029	0.0059
Resources for the course	0.0079	0.0066	0.0025	0.0037	0.0011	0.0058	-0.0003	0.0012	0.9928
Learning abilities	1.0474	0.0873	-0.0273	-0.0450	-0.0073	-0.0562	0.0166	0.0029	0.0091
Thinking mode	0.0029	-0.0049	-0.0014	-0.0028	-0.0003	-0.0029	0.0016	1.0011	0.0013
Teaching quality	0.3367	0.3696	0.0949	0.1405	0.0285	0.1737	-0.0334	0.0221	-0.0179

Table 3. Correlation coefficient of 10 items/indicators

Item	item 1	item 2	item 3	item 4	item 5	item 6	item 7	item 8	item 9	item10
item 1	1.00									
item 2	0.34	1.00								
item 3	0.37	0.31	1.00							
item 4	0.31	0.30	0.27	1.00						
item 5	0.24	0.24	0.23	0.35	1.00					
item 6	0.21	0.11	0.17	0.19	0.34	1.00				
item 7	0.21	0.19	0.19	0.17	0.23	0.26	1.00			
item 8	0.26	0.32	0.21	0.31	0.33	0.26	0.28	1.00		
item9	0.19	0.22	0.17	0.23	0.24	0.23	0.23	0.42	1.00	
item10	0.38	0.39	0.36	0.45	0.39	0.32	0.28	0.45	0.36	1.00

Table 4. Mean, standard deviation, item-total correlations and weights on the 10-item questionnaire

Indicators of evaluation	Mean	SD	r	Weight
1.The conformability of teaching content with our course syllabus	8.30	1.65	0.5813	0.10
2.The whole quality of teacher and teaching level are good	8.25	1.67	0.5896	0.10
3. Advanced teaching methods and skills	7.98	1.60	0.5939	0.10
4.Teaching contents are in agreement with textbooks	7.89	1.83	0.5512	0.09
5. Good experimental (practice)learning conditions of the course	7.74	1.91	0.5266	0.08
6. My global impression of the curriculum teaching effects are good	7.58	1.69	0.7321	0.12
7. Learning has improved my thinking mode and analytical ability	7.43	1.87	0.5621	0.09
8. Teaching plan is appropriately scheduled	7.37	1.85	0.5765	0.09
9. Learning has enhanced my autonomous learning abilities and interest in stud	7.20	1.97	0.6584	0.10
10. Availability of references for the course	6.96	2.03	0.5335	0.08

Correlation coefficients between Training of autonomous learning ability and other indicators were statistical significance ($p < 0.0005$)

dents' Evaluation Indicators of the curriculum quality, either quantitative or qualitative methods might go astray. In this study, however, we use both subjective (expert consultation) and objective methods (questionnaires) in order to obtain a collective picture of the phenomenon of interest. Both subjective and objective methods allow us to employ factor analysis for developing a preliminary but accurate analysis of the potential indicators. Experts make substantial contributions to our understanding and concepts of Students' evaluation indicators of the curriculum as they have different specialties and are involved in different universities.

Our results show that the students have a very good recognition and expectation of their teachers' teaching methods with regards to self-directed learning. Therefore, it might be argued, that the training of autonomous learning ability as an indicator for evaluating can be enhanced if we increase the weight of the indicator and urge its importance in modern education. In addition, we need to encourage medical educators to motivate students to work and learn by themselves.[12] At present, among all course evaluation related literature we haven't found any quantitative study of evaluation indicators aiming at fostering medical students' self-study capacity. For example, the authors searched MEDLINE (1970-December 2011) and PubMed to identify all studies of curriculum evaluation and self-study or autonomous study toward undergraduate medical students. Of the 163 studies identified initially about curriculum evaluation, only one concerned the student's attendance.[13] Therefore this study is a meaningful effort made in the research and practice of course evaluation.

Another survey of this study showed that students' evaluation of the curriculum quality varied with the experts', and that the national top-level courses, evaluated by experts, and the general curriculum showed no statistically significant difference in students' evaluation. (Mean score for national top-level courses = 75.53; for general curriculum = 76.41; $p > 0.05$). It is indicated that in the course evaluation, the evaluation indicators should be analyzed from the unique perspective of physical and psychological characteristics of college students, which is of important theoretical and practical significance to help us to obtain more comprehensive and valuable feedback from the teaching.

In conclusion, experimental results show the 10–item questionnaire is brief, easy to administer, valid and reliable and it can serve as students' evaluation indicators of curriculum. This selection of students' curriculum evaluation indicators illustrated essential factors related to the curriculum teaching process such as has been added curriculum planning, teaching effectiveness, and the quality of teaching material, teaching methods and etc. The most important feature of the above evaluation indicators is its facilitation on students' autonomous leaning ability. However, this study was conducted only in one medical college at present, and its widespread usability needs further validation.

Acknowledgments

This study was supported by Jiangsu Provincial Fund of Educational Plan of the 11th Five-Year Plan (B-a/2006/010).

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Kothari D, Gourevitch MN, Lee JD, Grossman E, Truncali A, Ark TK, et al. Undergraduate medical education in substance abuse: A review of the quality of the literature. Acad Med. 2011;86:98-112.
2. Mukhopadhyay S, Smith S. Curriculum evaluation from the trainees' perspective: application to the ALWP ATSM. J Obstet Gynaecol. 2010; 30:795-799.
3. Coles CR, Grant JG. Curriculum evaluation in medical and health-care education. Med Educ. 1985;19:405-422.
4. Jiangsu Education. National program of evaluating index for elaborate courses (undergraduate education). 2010 [cited 22 February 2010]; Available from: http://www.ec.js.edu.cn/art/2010/2/22/art_4267_30294.html.
5. Zhang J. Curriculum assessment: Australia, England teaching quality assurance of new trends. China Higher Education. 2007;22:62-63.
6. Sheets KJ, Anderson WA, Alguire PC. Curriculum development and evaluation in medical education. Gen Intern Med. 1992;7:538-543.
7. Lockwood MD, Tucker-Potter S, Sargentini NJ. Curricular analysis of competency-based osteopathic medical education: application of a matrix for quality enhancement to a standardized patient encounter example. Am Osteopath Assoc. 2009;109:486-500.
8. Bell K, Cole BA. Improving medical students' success in promoting health behavior change: a curriculum evaluation. Gen Intern Med. 2008;23:1503-1506.
9. Chenfeng. Medical multivariate statistical analysis. Beijing: China Statistics Press; 2000.
10. Zhong Q. Curriculum evaluation theory. M Shanghai: Shanghai education Press; 2002;2-4.
11. Qian C, Lidanqin L, Pan I. Teaching quality assessment of validity and reliability. Journal of China Institute of Metrology. 2004;15:164-167.
12. Wang li. China-US comparative study of student evaluation of teaching index. Education Review. 2007;4:130-132.
13. Vinceneux P, Carbon C, Pouchot J, Crickx B, Maillard D, Regnier B, et al. Undergraduate medical education. Students' perspective and medical school policy. Presse Med. 2000;14;29(30):1654-7.