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Student Course Evaluations: Common Themes across Courses and Years

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Abstract

Student course evaluations were analyzed for common themes across five different basic science, clinical, and innovative courses from the first and third years of medical school. Each course had both unique and common numerically scaled items including an overall quality rating item. A principal components analysis was conducted for each course to determine the items that loaded most heavily on the same component as the overall quality item. Across courses and years, the items that consistently loaded on the same component as the overall quality item were (1) administrative aspects including course organization, (2) clearly communicated goals and objectives, and (3) instructional staff responsiveness. These results concur with recent medical education literature in this area. Faculty interested in increasing student ratings of the overall quality of their courses might best attend primarily to carefully organizing course goals and objectives and clearly communicating them. The limitations of these conclusions are discussed.

In an age of accountability, student course evaluations of instructional practices and overall course quality are widely used in medical education. Administrators regularly employ the results of such evaluations to inform curriculum, design courses, and make decisions about instructional practices. Therefore, research on student evaluations is critical because it is important to establish just what it is that students respond to when they make summative judgments about the courses they take.

However, little such research has been done in medical education recently. A review of the literature in general higher education[1] found that most studies focused on teacher behaviors rather than course characteristics or overall course quality. Despite the widespread use of summative course evaluations in medical schools, research on course evaluation in medical education is scant.[2,3] We could find only one study that addressed this problem directly.[3]

In that study, first- and second-year medical students evaluated their basic science courses on sixteen common items; those items were then used to predict the variance of a common summative item that rated the overall quality of the course. The sixteen predictor items evaluated course attributes such as administrative organization, goal setting, coordination with other courses, testing practices, lectures, group activities, and so on. Ten of the sixteen predictor items were significant in a multiple regression analysis, but most of the variance was accounted for by administrative aspects, lecture quality,

goal setting, and the promotion of active learning. Different courses exhibited different weightings. These findings were found to be consistent with the literature from general higher education.[1,3]

While informative and helpful, this research was limited in several ways. Only basic science courses in years one and two were evaluated. Only items common to all course evaluations were used rather than unique items as well. We therefore extended this research in several important ways. We included clinical clerkships from year three as well as basic science courses from year one. We included innovative courses such as courses involving medical ethics and evidence based medicine. We investigated all items, both common and unique, from each course. We used a different statistical approach more appropriate to our data. The research questions in this study were as follows:

1. Which items are consistently related to the overall course quality item?
2. Is this relationship similar across a variety of courses in both basic science and clinical clerkships?

Method

Participants - The participants of this study were the first- and third-year medical students at the Texas A&M University Health Science Center College of Medicine during 2004-2005. The first-year class comprised 84 students and the third year class 64 students. The difference in class sizes was due to growth of the College during this

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period. All students were required to take all the courses and clerkships included in this study. The relatively small sizes of these classes combined with the admission and retention policies of the College result in generally comparable groups across years in terms of variation in ability and demographic characteristics. Summative course evaluations were required from every student in each course, so full data sets were used in all cases.

Procedures - The courses analyzed included Gross Anatomy (GA), a basic science course offered in year one, two innovative courses offered in year one - Leadership in Medicine (LIM), a course in current issues in medicine and medical ethics, and Evidence Based Medicine (EBM), a course in using biostatistics in medical practice, - and third year clerkships in Obstetrics and Gynecology (OB/GYN) and Internal Medicine (IMED). These courses were purposefully selected to include (1) courses differing widely in content and presentation format, (2) different years of medical school, and (3) courses that differed in their mean overall approval ratings. The mean overall approval ratings for these five courses ranged from neutral to very high. The year one courses were traditionally taught courses that primarily used textbook and lecture format with some small-group problem-based clinical applications and periodic paper-and-pencil tests. The year three clerkships were also traditionally taught using subgroup rotations and informal and formal feedback on history taking, physical examination, diagnosis, patient management, and patient education skills.

The course evaluation instruments used 1-5 Likert scales (i.e., strongly disagree, disagree, undecided, agree, strongly agree). The instruments used in all the courses included a number of items that were designed to be highly similar with highly similar wordings. Courses also had some unique items due to differing content and presentation formats. All five courses included as a final item "Rate the overall quality of this course (clerkship)." The rating choices for this item were poor, fair, good, outstanding (scaled as 1-4). All the questionnaire items for each course or clerkship are shown in the Appendix.

Items that were similar across courses/clerkships addressed course organization, having and/or clearly communicating goals and objectives, the knowledgeability and preparation of the faculty, the availability of the faculty, the responsiveness and helpfulness of the instructors involved (primary faculty/residents/course coordinators), the appropriateness of the workload, student understanding of their responsibilities and their evaluation, and the fairness and consistency of examinations/performance evaluations. A wide variety of unique items also were included, encompassing items on textbooks and course

handouts, laboratory exercises, the quality of lectures, the quality of development of a variety of clinical skills, and faculty modeling of clinical skills.

Administration of the questionnaires differed between the year one courses and the year three clerkships. Questionnaires for year one courses were administered to all students at the end of the course. Questionnaires for year three clerkships were given at the end of each rotation. In order to determine if different clerkship rotations produced different overall ratings of the clerkship, two preliminary analyses were undertaken. First, the overall rating item for the OB/GYN clerkship was compared across the eight rotations of that clerkship. An analysis of variance (ANOVA) showed no significant differences ($p > .05$). Second, the overall rating item for the IMED clerkship was compared across the four rotations of that clerkship. This ANOVA likewise showed no significant differences ($p > .05$). Therefore, the summative ratings for each course and clerkship were treated similarly in all subsequent analyses.

All the items included in each course evaluation were inspected for simple correlations with all the other items. Those correlations were found to be positive and moderate to high in almost every case (i.e., highly multicollinear data). The simple correlations of each item with the respective overall rating item are given in the Appendix. Because high multicollinearity poses problems for multiple regression analysis, each correlation matrix for each course was subjected to a principal components analysis with varimax rotation.[4] Principal components analysis is a statistical technique using partial correlation to find different underlying dimensions in the data and the variables (items) that load, or correlate, most heavily with that dimension. The "rotation" of these components helps to find the mathematical solution where each variable has a high loading on one component and a low loading on all others. The purpose of these analyses was to (1) find the component for each course that received the highest loading from the overall quality item and (2) determine if any other items consistently shared that component across the five courses. The Texas A&M University IRB approved the study.

Results

Reliability - Alpha reliability coefficients were computed for the full set of items for each course. The reliabilities varied from .88-.97, indicating generally high measurement reliability. Individual reliabilities are pro-

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Table 1
Principal Component Loadings of Overall Quality Item and Other Course Evaluation
Items ≥ .65 by Course

Gross Anatomy (alpha reliability = .88)

Items	Loadings
The faculty were available in person or by e-mail and were willing to provide consultation and/ or answer questions	.76
The course coordinator(s) was/were appropriately responsive to student concerns	.74
The faculty were well prepared and knowledgeable about their subject	.71
Rate the overall quality of the course	.70
Examination results were provided promptly	.69
The course was well organized and was presented in a logical sequence	.68
The laboratory exercises were relevant and valuable	.65

Leadership in Medicine (alpha reliability = .89)

Items	Loadings
The course was well organized and was presented in a logical sequence	.87
What was presented in class (lectures) facilitated my learning of the material	.81
What was taught matched the goals and objectives of the course	.79
I understood the goals and objectives of the course	.78
Course handouts were well prepared, relevant to the course, available in a timely fashion, and understandable	.73
The length of the course was appropriate	.73
Rate the overall quality of the course	.72
The material in this course did not duplicate material covered in other courses	.71

Evidence Based Medicine (alpha reliability = .93)

Items	Loadings
I understood the goals and objectives of this course	.79
The course was well organized and was presented in a logical sequence	.79
What was taught matched the goals and objectives of the course	.77
Rate the overall quality of the course	.74
What was presented in class (lectures) facilitated my learning of the material	.70

OB/GYN Clerkship (alpha reliability = .96)

Items	Loadings
I understood my individual responsibilities for this clerkship	.82
The workload was appropriate	.80
The clerkship was well organized	.75
Rate the overall quality of the clerkship	.75
My experiences in this clerkship have been valuable in my career decision-making	.70
The residents helped me to develop my clinical skills	.67
The clerkship had clear goals and objectives	.65

IMED Clerkship (alpha reliability = .97)

Items	Loadings
Rate the overall quality of the clerkship	.76
I learned a great deal in this clerkship	.75
I understood my individual responsibilities for this clerkship	.74
The primary faculty actively involved me in learning experiences	.73
The workload was appropriate	.70
The clerkship had clear goals and objectives	.69
The performance evaluation was fair and consistent	.68
The residents helped me develop my clinical skills	.67

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vided in Table 1.

Principal Components Analyses - The results of the five principal components analyses concerning the overall quality item are presented in Table 1. Only the component that received the highest loading from the overall quality item ($\geq$ .65) is presented. The other items included are all those that had high loadings ($\geq$ .65) on the same component. An average of 6 other items loaded on the component with the overall quality item. These items were different for different courses, but some common items ran through all.

The most common item was that the course/clerkship was well organized. This item alone loaded highly on four of the five components.

A second set of items defined a common theme regarding goals and objectives: (1) the course/clerkship had clear goals and objectives, (2) I understood the course goals and objectives, and (3) what was taught matched course goals and objectives. One or more of these items loaded on four of the five components.

A third set of items defined a common theme regarding the availability and helpfulness of the instructional staff: (1) the faculty was available and willing to provide consultation, (2) the residents helped me develop my clinical skills, and (3) the course coordinator was responsive to student concerns. One or more of these items loaded on three of the five components.

Most of the rest of the items loading on the components also dealt with careful course organization and delivery. Items common to two components included (1) what was presented in class facilitated learning, (2) I understood my individual responsibilities, and (3) the workload was appropriate.

Discussion

The two research questions in this study were both answered positively. (1) There were several items that were consistently related to overall quality ratings, and (2) these items tended to be similar across different courses in different years of medical school. The most general finding can be succinctly stated: We found that a course is highly rated largely to the extent that it is well organized with clearly communicated and delivered goals and objectives. A second finding was that a course tends to be highly rated when the instructional staff is available and helpful. Despite differences in courses, student populations, and statistical techniques, these findings are gener-

ally consistent with prior research with medical students' overall course evaluations.[3]

Course directors and faculty who are interested in more positive student evaluations might attend to these findings by offering courses that are well organized with clearly stated goals and objectives that are followed consistently. From the student perspective, a quality course or clerkship appears to be one that is well planned and communicated and carried out faithfully. Attention to these administrative aspects is especially important to students when large volumes of material are presented in a short time. This implies that quality course design may be a "front loaded" matter involving the in-depth planning and preparation of communicable content, coverage, and instructional application so that students are always aware of what they are responsible for learning and when.

Another implication is that instructional staff should be readily available to students for help and consultation. Personal connection with students, knowledgeability in answering their questions, and providing assistance in learning clinical skills are obviously important to students learning difficult new material. This applies whether these instructors are primary faculty, residents, or course coordinators.

We note that our findings are probably most generalizable to courses offered in a traditional style such as those in our study. We also note that our conclusions are limited because (1) different classes of medical students may respond to their courses somewhat differently, (2) we investigated only a small, selected sample of courses, and (3) some of the items for the year one courses were necessarily different from the items for the year three clerkships, making exact comparisons impossible.

We also recognize that student evaluations have their limitations. Although highly reliable, the quantitative ratings in this study were subjective.[2, 5] Another limitation is that courses may need to include material for which students may not see the immediate value, material that may not be rated highly even if well organized and delivered. Experienced educators need to include what is professionally valuable rather than automatically defer to student approval. However, there seems to be little question that well organized content and delivery is valuable in learning and is furthermore rewarded with high quality ratings by students.

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preparation of the course evaluation forms and access to the data.

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Appendix

Simple Correlations of Each Item with the Overall Quality Item by Course

(Items loading on the principal component with the overall quality item are in bold font.)

Gross Anatomy

Items	r =
The course was well organized and was presented in a logical sequence.	.70
I understood the goals and objectives of the course.	.44
The length of the course was appropriate.	.21
What was taught matched the goals and objectives.	.59
The material in this course did not duplicate material covered in other courses.	.02
I understood how I was to be evaluated in this course.	.54
What was presented in class (lectures) facilitated my learning of the material.	.50
Course handouts were well prepared, relevant to the course, available in a timely fashion, and understandable.	.36
Textbooks were readable and enhanced my understanding of course content.	.31
The laboratory exercises were relevant and valuable.	.54
The overall workload required for the course was appropriate.	.53
The examinations were fair and consistent.	.48
The number of examinations was appropriate.	.29
Examination results were provided promptly.	.40
The faculty were well prepared and knowledgeable about their subject.	.71
The faculty were available in person or by e-mail and were willing to provide consultation and/or answer questions.	.54
The course coordinator(s) was/were appropriately responsive to student concerns.	.45
The clinical correlations were valuable.	.17
Rate the overall quality of the course.	1.00

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Leadership in Medicine

Items	r =
The course was well organized and was presented in a logical sequence.	.62
I understood the goals and objectives of the course.	.59
The length of the course was appropriate.	.49
What was taught matched the goals and objectives of the course.	.57
The material in this course did not duplicate material covered in other courses.	.44
I understood how I was to be evaluated in this course.	.42
What was presented in class (lectures) facilitated my learning of the material.	.64
Course handouts were well prepared, relevant to the course, available in a timely fashion, and understandable.	.48
Textbooks were readable and enhanced my understanding of course content.	.39
Required small group discussions were valuable.	.56
The overall workload required for the course was appropriate.	.53
The faculty were well prepared and knowledgeable about their subject.	.60
The faculty were available in person or by e-mail and were willing to provide consultation and/or answer questions.	.53
The course coordinator(s) was/were appropriately responsive to student concerns.	.61
The Challenge Course was a valuable experience.	.37
The community agency visits were a valuable experience	.40
Rate the overall quality of the course.	1.00

Evidence Based Medicine

Items	r =
The course was well organized and was presented in a logical sequence.	.72
I understood the goals and objectives of the course.	.73
The length of the course was appropriate.	.50
What was taught matched the goals and objectives of the course.	.75
The material in this course did not duplicate material covered in other courses.	.25
I understood how I was to be evaluated in this course.	.51
What was presented in class (lectures) facilitated my learning of the material.	.73
Course handouts were well prepared, relevant to the course, available in a timely fashion, and understandable.	.60
The overall workload required for the course was appropriate.	.51
The examinations were fair and consistent.	.56
The number of examinations was appropriate.	.38
Examination results were provided promptly.	.51
The faculty were well prepared and knowledgeable about their subject.	.57
The faculty were available in person or by e-mail and were willing to provide consultation and/or answer questions.	.57
The course coordinator(s) was/were appropriately responsive to student concerns.	.47
Rate the overall quality of the course.	1.00

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OB/GYN Clerkship

Items	r =
The clerkship had clear goals and objectives.	.68
The clerkship was well organized.	.64
I understood my individual responsibilities for this clerkship.	.72
The workload was appropriate.	.74
The performance evaluation was fair and consistent.	.52
The residents helped me to develop my clinical skills.	.63
The primary faculty helped me to develop history taking skills.	.52
The primary faculty helped me to develop physical exam skills.	.61
The primary faculty helped me to develop differential diagnosis skills.	.45
The primary faculty helped me to develop patient management skills.	.58
The primary faculty helped me to develop patient education skills.	.58
The primary faculty gave me helpful informal feedback about my performance (during clinical duties) at least weekly.	.41
The primary faculty gave me helpful formal feedback about my performance (using an evaluation form) at least at the midpoint and the end of the rotation.	.49
The supervision provided by the primary faculty was appropriate.	.59
The primary faculty actively involved me in learning experiences.	.61
The primary faculty were well prepared and enthusiastic about teaching.	.63
The primary faculty modeled and encouraged self-directed and career-long learning.	.52
The primary faculty encouraged me to reflect on and improve my patient care practices.	.56
The primary faculty increased my understanding of different healthcare systems and how to use them in the best interest of my patients.	.42
The number and variety of patients seen in this clerkship were adequate for learning.	.37
I learned a great deal in this clerkship.	.65
I felt stimulated to learn more.	.58
The clerkship helped me to develop important professional attributes and attitudes like communication skills, leadership, compassion, and high ethical standards.	.68
My experiences in this clerkship have been valuable in my career decision-making.	.67
Rate the overall quality of the clerkship.	1.00

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IMED Clerkship

Items	r =
The clerkship had clear goals and objectives.	.74
The clerkship was well organized.	.59
I understood my individual responsibilities for this clerkship.	.84
The workload was appropriate.	.79
The performance evaluation was fair and consistent.	.74
The residents helped me to develop my clinical skills.	.74
The primary faculty helped me to develop history taking skills.	.75
The primary faculty helped me to develop physical exam skills.	.66
The primary faculty helped me to develop differential diagnosis skills.	.80
The primary faculty helped me to develop patient management skills.	.75
The primary faculty helped me to develop patient education skills.	.56
The primary faculty gave me helpful informal feedback about my performance (during clinical duties) at least weekly.	.76
The primary faculty gave me helpful formal feedback about my performance (using an evaluation form) at least at the midpoint and the end of the rotation.	.67
The supervision provided by the primary faculty was appropriate.	.79
The primary faculty actively involved me in learning experiences.	.82
The primary faculty were well prepared and enthusiastic about teaching.	.76
The primary faculty modeled and encouraged self-directed and career-long learning.	.68
The primary faculty encouraged me to reflect on and improve my patient care practices.	.66
The primary faculty increased my understanding of different healthcare systems and how to use them in the best interest of my patients.	.52
The number and variety of patients seen in this clerkship were adequate for learning.	.60
I learned a great deal in this clerkship.	.78
I felt stimulated to learn more.	.75
The clerkship helped me to develop important professional attributes and attitudes like communication skills, leadership, compassion, and high ethical standards.	.74
My experiences in this clerkship have been valuable in my career decision-making.	.28
Rate the overall quality of the clerkship.	1.00