

Learning strategies of medical students in the surgery department, Jeddah, Saudi Arabia

Hasan A Alzahrani¹

Owiss H Alzahrani²

¹Department of Surgery, ²Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

Objectives: To identify medical students' perceptions of their learning strategies including, learning habits, resources, and preferred teaching methods, in the Department of Surgery (DOS) of the King Abdulaziz University-Faculty of Medicine (KAU-FoM), in Jeddah, Saudi Arabia.

Methods: A cross-sectional descriptive study which was designed to identify students' perceptions of their learning in the DOS of the KAU-FoM. A questionnaire was administered to a random group of 549 medical students, to explore student perceptions of their learning strategies including methods of learning and learning resources.

Results: The majority believed that clinical session attendance is always important compared with lectures (88.9% vs 21.9%). Nevertheless, clinical sessions were selected as the third source of learning after learning from assigned textbooks and previous examination model answers. The majority (74.1%) believed that self-instruction at home is the preferred method of learning.

Conclusion: Student perspectives should be taken into consideration prior to any future reforms of curriculum. Reforms should adopt a "think globally; act locally" educational strategy based on learner needs.

Keywords: education, medical, learning, surgery, developing countries

Background

Formal general education in Saudi Arabia is approximately 70 years old and medical education has not yet reached its 40th birthday in Saudi Arabia. The two types of education are linked. In 1975, the King Abdulaziz University Faculty of Medicine (KAU-FoM) started its first year with 30 students.¹ The annual intake of enrolled students increased over the years and eventually amounted to 500 students per year by 2008, divided equally between males and females.

In 2004, Al-Hazimi et al¹ found that a significant percentage of medical students were not satisfied with the educational environment of the King Abdulaziz University Medical College. This dissatisfaction was generalized, affecting all departments, irrespective of whether they were a basic science or a clinical department. The KAU-FoM was the first among the four medical colleges to change its traditional curriculum to a new three-phased, system-based, integrated curriculum based on the SPICES model developed by the University of Dundee.^{1,2} In 2009–2011, the new curriculum was applied, beginning with Phase III. In Phase III, students started their clinical rotations at clinical departments including surgery. Prior to this implementation, the Department of Surgery (DOS) had been requested by the College Deanship to revise its traditional curriculum. Therefore, this was an opportunity to review the existing curriculum,

Correspondence: Hasan Ali Alzahrani
Department of Surgery, Faculty of Medicine, King Abdulaziz University,
PO Box 53100, Jeddah 21583,
Saudi Arabia
Tel +966 26 408 209
Fax +966 26 298 871
Email haaz59@yahoo.com

and to redesign the whole educational process in the DOS, to better meet the learners' needs. This mission could not be achieved without basing itself on primary scientific research data, which explored the existing students' perceptions of their learning in the old curriculum and forecast the student learning needs in an updated curriculum.

The results of Al-Hazimi et al,¹ using the Dundee Ready Education Environment Measure (DREEM) inventory, were alarming: the mean total score was very low (102/200), and the mean score for perception of learning was 22/48. These rates were lower than similar reports from developed countries as well as from some less-developed countries, such as Nepal and Nigeria.³ These findings stimulated a search for the underlying causes, to avoid similar perceptions about the prospective curriculum, which was intended to offer a wide range of learning opportunities, and to facilitate student learning by shifting the emphasis from teacher to student.⁴ Prior to any reform of a curriculum plan, student perceptions of their existing learning and their future learning needs, had to be identified. This step was the reference point for future action plans of curriculum reform, as student perceptions of their learning environment influence both how they learn, and the quality of their learning outcomes.⁵

In the past decade, the teaching of surgery in the undergraduate curriculum has undergone considerable changes in quantity, mode, and method of delivery. This is a result of the radical reforms of higher education, the health service, as well as of the undergraduate medical curriculum.⁶ The effectiveness of traditional instructional tools/methods of learning such as lectures and bedside clinical sessions should be reviewed through the students' eyes, and modified accordingly. Previous researchers have reported that lectures are common in surgical courses/clerkships, although faculty members are rarely trained in this skill.^{7,8} Findings also suggest that students in surgery rotations can learn from their peers, senior students, and other health professionals, such as nurses, in addition to their teachers. These learning opportunities should not be underestimated.⁹⁻¹¹

Novel methods of learning/teaching surgery need to be considered in view of the increasing student numbers, which indirectly means that medical students may have limited access to surgical patients. Newer technologies of learning, such as use of simulated patients, are widely used and have been found to be valued by both tutors and students.¹² In the high fidelity simulation era, a Web-enhanced interactive surgical module was introduced in an undergraduate surgery course,¹³ and claimed to successfully convey information and

understanding beyond the textbook. It has to be remembered that the change process is "the art of the possible".

This research was carried out to measure students' perspectives on their learning strategies and to identify areas for improvement at the departmental level, in a Saudi medical school. It demonstrates student preferences in learning as seen in a developing country and compares these to findings from similar studies in developed countries. Results will hopefully assist in a better understanding of learner needs, and subsequently lead to higher student satisfaction rates.

Methods

Objectives

Our objectives were to identify students' perceptions of their learning strategies, including learning habits, sources and preferred teaching methods in the DOS of the KAU-FoM, Jeddah, Saudi Arabia; and to identify areas for improvement, prior to the DOS curriculum reform.

Study setting

The current study was conducted in the KAU-FoM in Jeddah. This study was a cross-sectional descriptive study. The field work for the current study was conducted during the first week of the first semester of the academic year 2008–2009, to avoid any bias that might occur if this was done during the academic year, or after the final assessment.

Population of the study and sample size

The targeted population comprised medical students who had completed at least one rotation in the Department of Surgery ($n = 1196$ students). Students are usually subgrouped randomly by computer at the beginning of every academic year, at the office of the college vice deanship for clinical affairs. Accordingly, the selected students in the current study were considered to be a random sample.

The entire surgery course in the KAU-FoM is distributed over 3 successive years; therefore all students of each subgroup were invited to be enrolled in the study. Group 1 included all students in the subgroup allocated to the fifth-year surgery rotation (ie, students who had already completed an 8-week rotation), and accounted for 271 students, representing 54.3% of the targeted population (499 students) in the fifth year. Group 2 included all students who were allocated to the sixth-year surgery rotation (ie, students who had completed 13 weeks in surgery, including the fifth-year, 5-week rotation), and accounted for 205 students, representing 56.0% of the targeted population (366 students) in

the sixth year. Group 3 included all preregistration intern students who were allocated to an internship rotation in the King Abdulaziz University Hospital's surgery department (ie, those who had already completed 21 weeks, including the sixth-year, 8-week rotation), and was considered as the control group for the previous two groups.

Tool of the study

The questionnaire used in this study was a self-administered questionnaire designed to identify our students' perspectives about learning strategies, and was based on the author's 20-year educational experience as a teacher, and also on learning-related items in the popular inventory DREEM (a validated instrument).¹³ The DREEM inventory is more appropriate for assessing the educational environment at the college level. However, if used alone, the DREEM may not distinguish all the poorer aspects of the educational environment. As advised by Whittle et al,¹⁴ a combined methodology can be adopted, particularly when the goal is to outline a detailed improvement plan at the departmental level. Other special inventories, such as those used in the assessment of teaching in operating rooms, including the surgical theatre educational environment measure (STEEM) and mini-STEEM,¹⁵ were not used, as we were not emphasizing this method of teaching in our existing curriculum.

Our study questionnaire had two sections. The first section elicited student demographic data while the second section elicited student perceptions of their learning in the surgical rotation, including their specific perceptions of: the overall adequacy of the knowledge content of the course, the quality of the instructional methods used (ie, lectures, tutorials, clinical sessions), the quantity of learning sessions (ie, number of lectures and tutorials/clinical sessions), the methods of learning, and their preferred sources of learning. The questionnaire was piloted on 15 residents in the DOS. To assess the reliability of the questionnaire, the Cronbach's α test was used. This scored at 0.755 and was therefore considered reliable. The questionnaire was written in Arabic to avoid any possible ambiguity of wording and/or phrasing when administered to local students.

Ethical approval for the research proposal was obtained from the research ethical committee, and approved by the dean of the college.

Data collection

The principal investigator was present at the study setting and, after first explaining the purpose of the study to the students, he invited them to enroll in the study. On approval,

the researcher read the questionnaire item by item, explained it and asked the studied group to answer it privately in the same session. The completed questionnaires were collected by the researcher in the same interview, to guarantee a high return rate.

Data entry and analysis

SPSS software (version 16; SPSS Inc, Chicago, IL) was used for data entry with appropriate coding. Quality control of the data was ensured by verifying 25% of the entered data. Data analysis was performed using the same statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables. Qualitative variables were compared using the Chi-square test. Whenever the expected values in one or more of the cells in a 2×2 table was <5 , the Fisher's exact test was used instead. In larger than 2×2 cross-tables, no test could be applied when the expected value in 20% or more of the cells was <5 . Statistical significance was considered at P -value < 0.05 . A biostatistician's assistance was sought, to ensure the accuracy of results obtained and to verify their statistical significance.

Results

A random sample of 549 medical students was enrolled, including 271 students in the fifth year, 205 students in the sixth year, and 73 interns. The intern group was considered as a control group for the other two groups, as the interns had completed all surgical rotations. There was a slight preponderance of males 300 (54.6%) over females 249 (45.4%) in the different grades, but this difference was not statistically significant ($P > 0.05$). As expected, the percentage of married students significantly ($P < 0.05$) increased towards older grades, ranging between 4.8% in the fifth-year students to 21.9% among the interns. The majority of the students (89.3%) were living with their families, while the rest were either living in the university dormitory (4.4%), with friends (5.2%) or alone (1.1%).

The majority of the students and interns (78.8%) perceived that the scientific contents of the lectures were adequate; nevertheless, the percentage of those who indicated so, declined significantly from 84.4% among fifth-year students to 76.6% among sixth-year students, and to 64.4% for interns ($P < 0.05$) (Table 1). A significant percentage of the students and interns (14.8%) believed that the number of lectures was more than needed (by comparison, only 3.7% believed this to be the case with regard to clinical sessions (Table 2)). While 9.3% of the students

Table 1 Perspectives of the students and interns on the lectures in the surgery department

Characteristics of lectures	Years			Total	P*
	5th year	6th year	Intern		
Number of lectures					
Sufficient	140 (52.2%)	121 (60.5%)	48 (65.8%)	309 (57.1%)	0.000
More than needed	25 (9.3%)	36 (18.0%)	19 (26.0%)	80 (14.8%)	
Less than needed	103 (38.4%)	43 (21.5%)	6 (8.2%)	152 (28.1%)	
Importance of attendance					
Always	67 (24.8%)	37 (18.0%)	16 (21.9%)	120 (21.9%)	0.358
Sometimes	167 (61.9%)	131 (63.9%)	47 (64.4%)	345 (63.0%)	
Not important	36 (13.3%)	37 (18.0%)	10 (13.7%)	83 (15.1%)	

Note: *Based on Chi-square test.

in the fifth year perceived that the number of lectures was more than needed, fully 18.0% of the sixth-year students perceived so, compared with an even higher percentage of the interns (26.0%), and this difference in perspective was statistically significant ($P < 0.05$).

Almost two thirds of the students and interns (63%) indicated that attendance at lectures was sometimes important, while 21.9% said that it was always important to attend them. On the other hand, a minority (15.1%) indicated that attending lectures was not important (Table 1). In contrast, the great majority of the students and interns (88.9%) pointed out that attending the clinical sessions was always important (Table 2).

Self-learning at home was the preferred method of learning for the majority of the students (74.1%), but it was noted that dependence on self-learning at home decreased significantly in higher years (Table 3). Results ranged from 79% of students in the fifth year to only 49.3% of the interns ($P < 0.05$) who preferred self-learning. Meanwhile, it was observed that more than half of the students and interns (59%) preferred to learn with their friends, with a slight non-significant variation in the percentages of students in different years. It was found that more than half (54.6%) of the students in sixth year depended on the

academic staff, ie, specialists/consultants in their learning, compared with 41.7% of the fifth-year students and 50.7% of the interns; these differences were statistically significant ($P < 0.05$). The least preferred way of learning indicated by the students and interns was from private teachers (3.6%).

The great majority of the students and interns (82.7%) depended on the references assigned by the department as the main source of learning (Table 4), and there was no statistically significant difference between the students and interns ($P > 0.05$). The second main source of learning was the revision of previous exams (79.8%), and there was also no significant difference between students and interns in this. In addition, it was noted that there was no difference between students and interns regarding their views on attending clinical sessions as the third main source of learning (73.4%). Nevertheless, it was noted that the percentages of the fifth-year students (72.7%) and sixth-year students (71.7%) who depended on the short notes and summaries dispensed by the nearby shops of the university, were significantly higher than that of the interns (42.5%). Slightly less than half of the students and interns (46.6%) depended on the lectures in the department as a source of learning and there was

Table 2 Perspectives of students and interns on clinical sessions in the surgery department

Characteristics of clinical sessions	Years			Total	P*
	5th year	6th year	Intern		
Number of sessions					
Sufficient	150 (55.8%)	89 (43.4%)	22 (30.1%)	261 (47.7%)	0.000
More than needed	7 (2.6%)	2 (1.0%)	11 (15.1%)	20 (3.7%)	
Less than needed	112 (41.6%)	114 (55.6%)	40 (54.8%)	266 (48.6%)	
Importance of attendance					
Always	244 (90.0%)	188 (92.2%)	55 (75.3%)	487 (88.9%)	0.001
Sometimes	26 (9.6%)	16 (7.8%)	18 (24.7%)	60 (10.9%)	
Not important	1 (0.4%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	

Note: *Based on Chi-squared test.

Table 3 Preferred methods of learning adopted by the students and interns (in descending order)

Method of learning	Years			Total	P*
	5th year	6th year	Intern		
Self learning at home					
Yes	214 (79.0%)	157 (76.6%)	36 (49.3%)	407 (74.1%)	0.000
No	57 (21.0%)	48 (23.4%)	37 (50.7%)	142 (25.9%)	
With peers in groups					
Yes	172 (63.5%)	116 (56.6%)	36 (49.3%)	324 (59.0%)	0.062
No	99 (36.5%)	89 (43.4%)	37 (50.7%)	225 (41.0%)	
With residents					
Yes	130 (48.0%)	113 (55.1%)	49 (67.1%)	292 (53.2%)	0.011
No	141 (52.0%)	92 (44.9%)	24 (32.9%)	257 (46.8%)	
With academic staff					
Yes	113 (41.7%)	112 (54.6%)	37 (50.7%)	262 (47.7%)	0.017
No	158 (58.3%)	93 (45.4%)	36 (49.3%)	287 (52.3%)	
With older interns					
Yes	138 (50.9%)	65 (31.7%)	18 (24.7%)	221 (40.3%)	0.000
No	133 (49.1%)	140 (68.3%)	55 (75.3%)	328 (59.7%)	
With older colleagues					
Yes	116 (42.8%)	81 (39.5%)	22 (30.1%)	219 (39.9%)	0.145
No	155 (57.2%)	124 (60.5%)	51 (69.9%)	330 (60.1%)	
With nurses and technicians					
Yes	12 (4.4%)	18 (8.8%)	13 (17.8%)	43 (7.8%)	0.001
No	259 (95.6%)	187 (91.2%)	60 (82.2%)	506 (92.2%)	
With private teachers					
Yes	8 (3.0%)	5 (2.4%)	7 (9.6%)	20 (3.6%)	0.014
No	263 (97.0%)	200 (97.6%)	66 (90.4%)	529 (96.4%)	

Note: *Based on Chi-squared test.

no significant difference between students and interns. Similarly, it was found that 41.5% of the students and interns depended on the summaries prepared by their colleagues as a source of learning. On the other hand, it was noticed that textbooks other than those assigned by

the department, were the least likely to be preferred by the students and interns (27.3%); the fifth-year students were significantly the least likely (18.8%) to depend on these, compared with 37.6% of sixth-year students and 30.1% of the interns ($P < 0.05$).

Table 4 Preferred sources of learning adopted by the group studied (in descending order)

Sources of learning	Years			Total	P*
	5th year	6th year	Intern		
Assigned textbooks					
Yes	223 (82.3%)	175 (85.4%)	56 (76.7%)	454 (82.7%)	0.237
No	48 (17.7%)	30 (14.6%)	17 (23.3%)	95 (17.3%)	
Previous exams					
Yes	222 (81.9%)	164 (80.0%)	52 (71.2%)	438 (79.8%)	0.130
No	49 (18.1%)	41 (20.0%)	21 (28.8%)	111 (20.2%)	
Attendance at clinical sessions					
Yes	193 (71.2%)	159 (77.6%)	51 (69.9%)	403 (73.4%)	0.229
No	78 (28.8%)	46 (22.4%)	22 (30.1%)	146 (26.6%)	
Notes and summaries sold in bookshops					
Yes	197 (72.7%)	147 (71.7%)	31 (42.5%)	375 (68.3%)	0.000
No	74 (27.3%)	58 (28.3%)	42 (57.5%)	174 (31.7%)	
Department's lectures					
Yes	123 (45.4%)	103 (50.2%)	30 (41.1%)	256 (46.6%)	0.343
No	148 (54.6%)	102 (49.8%)	43 (58.9%)	293 (53.4%)	
Summaries prepared by colleagues					
Yes	110 (40.6%)	94 (45.9%)	24 (32.9%)	228 (41.5%)	0.140
No	161 (59.4%)	111 (54.1%)	49 (67.1%)	321 (58.5%)	
Other textbooks					
Yes	51 (18.8%)	77 (37.6%)	22 (30.1%)	150 (27.3%)	0.000
No	220 (81.2%)	128 (62.4%)	51 (69.9%)	399 (72.7%)	

Note: *Based on Chi-squared test.

Discussion

In the past decade, the teaching of surgery in the undergraduate curriculum has undergone considerable changes in quantity, mode, and method of delivery. This is a result of the radical reforms of higher education, the health service, and the undergraduate medical curriculum.⁶ Any development plan for surgery education rotations, programs or curriculum should be based on the same concepts, principles, and strategies of developing courses/curricula applied in more general medical education.^{16–18} Although medical student education is a core departmental mission, the departmental plan should be linked to the medical school curriculum and should contribute to the outcomes of the school. It should also take into account the available resources and local circumstances.¹⁹ Therefore, the aims and objectives of any surgery course should be defined from the very beginning, and linked to the expected outcomes. Teaching methods and learning resources should be carefully selected by course administrators aiming to fulfill the intended outcomes and also, to meet the learners' needs.

The current study demonstrated the need to probe the students' perceptions of their learning strategies prior to any curriculum reform, be it at a college, or medical-school departmental level. The current study aimed to explore these perceptions and identify students' views about the intended curriculum reforms.

The results were somewhat encouraging with regard to the didactic teaching represented by lectures, as the majority (78.8%) of the studied group believed that the scientific content of our lectures was adequate. This impression was reflected in their perceptions of the importance of attendance at these lectures, as only 15.1% of the studied group believed that lecture attendance was not important. In spite of this, lectures as a learning tool should still be considered as an area for improvement. The dislike of formal lectures by medical students has already been addressed by Al-Gindan et al,²⁰ in their review of 10 publications about medical education in Saudi Arabia. Elsewhere, it has been reported that the most effective educational methods were the most interactive.²¹ Electronic Voting Systems may help in this regard, as they are used for education in a variety of disciplines and claim to encourage student participation in lectures. However, Duggan et al²² did not find that the use of electronic voting system technology in large group lectures offered significant advantages over the more conventional lecture format. Recently, Khan et al⁸ found significantly better retention of knowledge with the game format lecture when compared with the formal lecture, as the former was more enjoyed by students. The lecture, with its

greater development of content and methods of presentation, had its proponents as a learning tool for medical students of the 21st century. However, the respondents preferred reducing the current class size and replacing these with small group clinical teaching sessions. A similar trend was noticed in American medical students.²³

Compared with the debatable role of lectures in student learning, there was a general consensus among students about the importance of attending clinical sessions, ie, bedside teaching in surgical wards. The attendance rates at clinical sessions compared with lectures indirectly demonstrated a higher satisfaction rate of students with this method of small group teaching compared with lectures (73.4% vs 46.6%). However, this valuable educational tool needs more structuring,²⁴ greater focus on testing students' clinical skills, and emphasis on team participation (by daily evaluation of the entire team).²⁵

The DOS's current formal curriculum does not include cooperative learning, peer tutoring, nor learning from other healthcare professionals, such as nurses and technicians. However, our students expressed their interest in learning with their peers, and 59.0% are actually practicing this, particularly junior students. These collaborative methods of learning are popular among medical students, not only face-to-face, but also online.²⁶ These methods of learning are welcomed by students and should therefore be introduced to any new curriculum. Learning from other health professionals was not a highly welcomed learning method by our group of students. In contrast, this method was found useful by Danish researchers, who postulated it strengthens the students' own professional identities, and at the same time increases their ability to understand other the professional roles in patient care.²⁷

Surprisingly, students ranked learning from academic staff as number four in their order of preference, following directed self-learning at home, learning in a group with peers of the same class (ie, classmates), and learning from residents and specialists. All the previous results indicate the need for these methods of learning/teaching in our college, and the importance of maintaining their role in the new curriculum. In spite of the stated curricular goals of promoting self-directed learning via problem-based learning, students in our medical school were driven by the nature of examinations,²⁸ and focused mainly on clinical content rather than the process of learning. Students in surgery rotations can learn from their peers, senior students, and other health professionals such as nurses, in addition to their teachers. These learning opportunities should not be underestimated.^{9,10,18}

The informal or “hidden” curriculum is always present in any medical school.²⁹ This was demonstrated in the previous students’ perceptions about their ways of learning, as 74.1% of the total studied group indicated that self-learning at home was their preferred method, followed by learning with peers in the same class (Table 3). This trend may be considered positive if one agrees that the curriculum must aim to facilitate student learning by shifting the emphasis from teacher to student.^{4,5,8} This hidden curriculum is also represented in Table 4 showing the sources of learning, where students ranked previous exams and unauthorized notes/summaries as sources of learning ahead of the department’s lectures. However, our group of students was not very different from other students, as they preferred learning from assigned textbooks and previous examination model answers over clinical sessions and lectures (Table 4). This trend was similar to other developing countries such as Malaysia, where Leong et al³⁰ found textbooks were still the primary source of their information. Interestingly, learning from the model answers to previous exam questions actually came ahead of learning from designated clinical sessions. Most students are exam-driven and learn topics which they think are practical and clinically relevant to topics in which they will be assessed. The findings of our study confirm the known concept that “students are exam-driven.”²⁸

In conclusion, the students’ learning strategies in a Saudi medical school indicated needs for the improvement of lectures, both in content and methods of delivery. Clinical bedside hospital-based learning was still very popular, and needs more structuring and expansion in the new curriculum, to include new strategies such as community-based education, operating theatre-based surgical education, outpatient-based education, and simulation. Collaborative learning methods, such as peer tutoring, and learning from older colleagues, were also popular among the studied sample and should be incorporated in the updated curriculum. To maintain any improvements achieved in the educational environment, continuous and early identification of problems based on students’ perspectives, is needed. This will ensure ownership by students, as clients of the educational process.

Acknowledgments

We would like to express our thanks to Dr Adel Ibrahim for his assistance in checking the statistical analysis. HA was responsible for the concept, design, data collection, and the final drafting and submission of the manuscript. OA performed a literature review and wrote the first draft.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Al-Hazimi A, Al-Hyiani A, Roff S. Perceptions of the educational environment of the medical school in King Abdul Aziz University, Saudi Arabia. *Med Teach*. 2004;26(6):570–573.
2. Roff S. The Dundee Ready Educational Environment Measure (DREEM)-a generic instrument for measuring students’ perceptions of undergraduate health professions curricula. *Med Teach*. 2005;27(4):322–325.
3. Roff S, McAleer S, Ifere OS, Bhattacharya S. A global diagnostic tool for measuring educational environment: comparing Nigeria and Nepal. *Med Teach*. 2001;23(4):378–382.
4. Spencer JA, Jordan RK. Learner centred approaches in medical education. *BMJ*. 1999;318(7193):1280–1283.
5. Henning MA, Shulruf B, Hawken SJ, Pinnock R. Changing the learning environment: the medical student voice. *Clin Teach*. 2011;8(2):83–87.
6. Agha RA, Papanikitas A, Baum M, Benjamin IS. The teaching of surgery in the undergraduate curriculum – reforms and results. *Int J Surg*. 2004;2(2):74–76.
7. Hagen SS, Shaikh MJ, Rosenbaum ME, Ephgrave K. Are students learning what faculty are intending to teach? *J Surg Res*. 2008;147(2):225–228.
8. Khan MN, Telmesani A, Alkhotani A, Elzouki A, Edrees B, Alsulimani MH. Comparison of jeopardy game format versus traditional lecture format as a teaching methodology in medical education. *Saudi Med J*. 2011;32(11):1172–1176.
9. Ten Cate O, Durning S. Peer teaching in medical education: twelve reasons to move from theory to practice. *Med Teach*. 2007;29(6):591–599.
10. Ten Cate O, van de Vorst I, van den Broek S. Academic achievement of students tutored by near-peers. *Int J Med Educ* [serial on the Internet]. January 18, 2012. doi0.5116/ijme.4f0c.9ed2. <http://www.ijme.net/archive/3/academic-achievement-of-students-tutored-by-near-peers/>. Accessed July 26, 2012.
11. Weyrich P, Schrauth M, Kraus B, et al. Undergraduate technical skills training guided by student tutors – analysis of tutors’ attitudes, tutees’ acceptance and learning progress in an innovative teaching model. *BMC Med Educ* [serial on the Internet]. April 9, 2008. doi10.1186/1472-6920-8-18. <http://www.biomedcentral.com/1472-6920/8/18>. Accessed July 26, 2012.
12. Stewart F, Cleland J. The introduction of standardized clinical surgical teaching: students’ and tutors’ perceptions of new teaching and learning aids. *Med Teach*. 2008;30(5):508–512.
13. Corrigan M, Reardon M, Shields C, Redmond H. “SURGENT” – student e-learning for reality: the application of interactive visual images to problem-based learning in undergraduate surgery. *J Surg Educ*. 2008;65(2):120–125.
14. Whittle SR, Whelan B, Murdoch-Eaton DG. DREEM and beyond: studies of the educational environment as a means for its enhancement. *Educ Health (Abingdon)*. 2007;20(1):7.
15. Nagraj S, Wall D, Jones E. The development and validation of the mini-surgical theatre educational environment measure. *Med Teach*. 2007;29(6):e192–e197.
16. Harden RM. Approaches to curriculum planning. *Med Educ*. 1986;20(5):458–466.
17. Alanazi AF. Curriculum design of emergency medical services program at the College of Applied Medical Sciences, King Saud bin Abdulaziz University for Health Sciences. *Advances in Medical Education and Practice*. 2012;3(1):7–18.
18. Hassanien MA. Introduction to Evidence-Based Medicine: a student-selected component at the Faculty of Medicine, King Abdulaziz University. *Advances in Medical Education and Practice*. 2011;2(1):215–219.

19. Alshehri MY. Medical curriculum in Saudi medical colleges: current and future perspectives. *Ann Saudi Med*. 2001;21(5–6):320–323.
20. Al-Gindan YM, Al-Sulaiman AA, Al-Faraidy A. Undergraduate curriculum reform in Saudi medical schools. Which direction to go? *Saudi Med J*. 2000;21(4):324–326.
21. Satterlee WG, Eggers RG, Grimes DA. Effective medical education: insights from the Cochrane Library. *Obstet Gynecol Surv*. 2008;63(5):329–333.
22. Duggan PM, Palmer E, Devitt P. Electronic voting to encourage interactive lectures: a randomised trial. *BMC Med Educ*. 2007;7:25.
23. Cendan JC, Silver M, Ben-David K. Changing the student clerkship from traditional lectures to small group case-based sessions benefits the student and the faculty. *J Surg Educ*. 2011;68(2):117–120.
24. Jones RW. Learning and teaching in small groups: characteristics, benefits, problems and approaches. *Anaesth Intensive Care*. 2007;35(4):587–592.
25. Karanth KV, Kumar MV. Implementation and evaluation by formal assessments and term end student feedback of a new methodology of clinical teaching in surgery in small group sessions. *Ann Acad Med Singapore*. 2008;37(12):1008–1011.
26. Salmoni AJ, Gonzalez ML. Online collaborative learning: quantifying how people learn together online. *Med Teach*. 2008;30(7):710–716.
27. Hansen TB, Jacobsen F. Medical students' periods at interprofessional training wards. *Ugeskr Laeger*. 2008;170(44):3515–3517. Danish.
28. Moffat M, Sinclair HK, Cleland JA, Smith WC, Taylor RJ. Epidemiology teaching: student and tutor perceptions. *Med Teach*. 2004;26(8):691–695.
29. Lempp H, Seale C. The hidden curriculum in undergraduate medical education: qualitative study of medical students' perceptions of teaching. *BMJ*. 2004;329(7469):770–773.
30. Leong KC, Teng CL, Ng CJ. Learning resources and activities: students' feedback from two Malaysian medical schools. *Med J Malaysia*. 2007;62(3):265–267.

Appendix

Questionnaire for surgical students in the clinic

I. Student's data

Name: (Optional)

Sex: ☐ Male ☐ Female

Age: Marital status: ☐ Single ☐ Married

If married, do you have any children? ☐ Yes ☐ No

Do you live in Jeddah? ☐ Yes ☐ No

Where do you live? ☐ University campus ☐ Private with peers ☐ Private with family

Year of study:

Last year grade:

Failure in previous years: ☐ Yes ☐ No

II. Student's perceptions of their learning in their surgery rotation

- What do you think about the adequacy of the knowledge content of the course?
☐ Adequate ☐ Inadequate
- What do you think about the quality of the instructional methods used, ie, lectures, tutorials, clinical sessions?
☐ Excellent ☐ Good ☐ Poor
- What do you think about the numbers of lectures delivered in the course?
☐ Just adequate ☐ Too many ☐ Insufficient
- Is attendance at lectures important?
☐ Yes, very important ☐ Somewhat important ☐ Not important

If not important, please give important reasons for not attending lectures

.....

- What do you think about the number of tutorials/clinical sessions?
☐ Just adequate ☐ Too many ☐ Insufficient
- Is attendance at tutorials/clinical sessions important for you?
☐ Yes, very important ☐ Somewhat important ☐ Not important

If not important, please give important reasons

.....

Advances in Medical Education and Practice

Dovepress

Publish your work in this journal

Advances in Medical Education and Practice is an international, peer-reviewed, open access journal that aims to present and publish research on Medical Education covering medical, dental, nursing and allied healthcare professional education. The journal covers undergraduate education, postgraduate training and continuing medical education

including emerging trends and innovative models linking education, research, and healthcare services. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <http://www.dovepress.com/advances-in-medical-education-and-practice-journal>