

QUALITY ASSURANCE OF PHYSIOLOGY LABORATORY TEACHING AT UNIVERSITY OF DAMMAM BY STUDENTS' FEEDBACK

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Background: There is a great value of review of teaching and teachers for quality assurance of any curriculum used in medical education. Different types of reviews are used for this purpose. This study was carried out to get students' feedback about laboratory teaching at Department of Physiology, University of Dammam. **Methods:** All the second year medical students of session 2008 (Males: 95 and Females: 95) at College of Medicine, University of Dammam were given a questionnaire to fill voluntarily at the end of second semester of second year Physiology course (MDPL-203). The questionnaire contained 10 questions (to be responded on a 5 point Likert scale) about teaching and learning, effect of laboratory work, motivation and development of scientific approach. It also had open ended questions about strengths and weakness of laboratory teaching. **Results:** Eighty-eight female and 51 male students returned the filled questionnaire. Most of the students found the teaching and learning at Physiology laboratory of great use. They were happy with practical work, small groups learning opportunity and team work. However, they pointed out many weaknesses including less interaction, long teaching hours, less equipment, no lab manual, and less number of practicals. These results were presented at Departmental Board Meeting and steps were taken to ensure remedies for all short comings. **Conclusions:** Review through students' feedback is a valuable instrument for quality assurance and quality enhancement of Physiology curriculum.

Keywords: Physiology, Curriculum, Students evaluation, Quality Assurance, Laboratory

INTRODUCTION

Quality assurance (QA) is the systematic monitoring and evaluation of various aspects of a project, service or facility to maximize the probability that minimum standards of quality are being attained.^{1,2}

QA in education refers to a range of review procedures designed to safeguard academic standards and promote learning opportunities of acceptable quality for students. It is important to promote improvement of quality, not just to ensure that quality is maintained. This shifts the emphasis from quality assurance to quality enhancement (QE).³

Traditionally the field of curriculum has been a very compliant field where search for new and effective principles and methods has continued throughout the history of pedagogy. All educators agree that reliance only on teaching "theory" is inappropriate to achieve the objectives of any science curriculum. This led to an enormous effort to divert the bulk of curriculum from theoretical to practical.^{4,5}

Educational research has reported that there are significant educational benefits from using laboratory activities.^{6,7} Learning of skills in laboratory has a pivotal role in science education. The pedagogy has witnessed many changes in educational methodology and terminology, however laboratory has maintained its significance in one form or the other. The educational terminology kept on changing from "practicals" to "labs", then to performance based learning, activity based learning, skill lab and what not, however laboratory in one form or the other retained its importance in teaching. The distinct character of the

laboratory due to which laboratory retained its importance lies principally in providing students with opportunities to engage in processes of investigation and inquiry.^{8,9}

We carried out this quality assurance study of teaching at Physiology Laboratory of College of Medicine, University of Dammam with the help of students' feedback with an objective of quality enhancement.

MATERIAL AND METHODS

This study was carried out at Department of Physiology, College of Medicine, University of Dammam, Saudi Arabia. All the 2nd level Medical students of 2008 batch (Male: 95, Female: 95) were asked to evaluate Physiology laboratory teaching at the end of 2nd semester of their Physiology course (MDPL-203).

The questionnaire was prepared by keeping in mind the two basic principles of quality assurance, that are a) 'Fit for purpose' (the laboratory teaching must be compatible with the curriculum objectives); and b) 'Right first time' (mistakes should be identified to be eliminated). The questionnaire was tested before launching to avoid unorganised evaluation.¹⁰

The questionnaire (Table-1 & 2) contained 2 sets of questions to be responded on a 6 point *Likert scale*. The first set of 6 questions was about teaching and learning. These questions covered the role of instructor and lab report in achieving the objectives of curriculum. The second set of 4 questions was about the effect of the laboratory work in understanding the syllabus, motivation to study and linking laboratory work with classroom teaching. In addition there were 2

open ended questions about strengths and weaknesses of lab work, and space for remarks and comments.

The students were asked to answer the questions voluntarily without giving their names or identification. The filled in questionnaires were collected. The questionnaires where students did not answer all the 10 questions or where non serious attitude was evident were excluded. Percentages of responses were calculated by SPSS (version 14). Proportions were compared by chi square test to determine statistical significance of difference. All open remarks by students were edited only for language and grammatical mistake,

grouped based on the response and reported as such. The results were presented in faculty board meeting. Remedies for shortcomings were decided to ensure QE.

RESULTS

The results of this study are summarized in tables 1-4. Responses of students to the 10 items using *Likert* scale are summarised in tables 1 and 2. The responses to three open ended questions are presented (with editing of language/grammar only) in tables 3 and 4. Significance of difference is marked wherever applicable.

Table-1: Responses of female students to the Questionnaire (n=88)

	Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither agree nor disagree	Did Not Answer
A	Teaching & Learning						
1	The students were encouraged to ask questions	2 (2.3%)	10 (11.4%)	*63 (71.6%)	8 (9.1%)	4 (4.5%)	1 (1.1%)
2	The instructors satisfactorily answered the questions	2 (2.3%)	5 (5.7%)	*67 (76.1%)	13 (14.8%)	0 (0%)	1 (1.1%)
3	The pre lab demonstrations helped in carrying out the work assigned	4 (4.5%)	8 (9.1%)	*55 (62.5%)	19 (21.6%)	1 (1.1%)	1 (1.1%)
4	The instructors helped the students overcome difficulties	0 (0%)	10 (11.4%)	*61 (69.3%)	15 (17%)	1 (1.1%)	1 (1.1%)
5	The students were properly guided about preparing the lab reports	11 (12.5%)	25 (28.4%)	40 (45.5%)	4 (4.5%)	6 (6.8%)	2 (2.3%)
6	The lab reports covered the topic	2 (2.3%)	15 (17%)	*62 (70.5%)	6 (6.8%)	3 (3.4%)	0 (0%)
B	Curriculum (Objectives)						
1	The lab work enhanced learning of Physiological concepts	2 (2.3%)	10 (11.4%)	*56 (63.6%)	18 (20.5%)	2 (2.3%)	0 (0%)
2	The lab work was linked well with teaching in lectures	1 (1.1%)	7 (8%)	*60 (68.2%)	9 (10.2%)	1 (1.1%)	10 (11.4%)
3	The lab work motivated the students for creative & critical thinking	6 (6.8%)	24 (27.3%)	42 (53.4%)	5 (5.7%)	6 (6.8%)	0 (0%)
4	The lab work developed scientific approach in the students	2 (2.3%)	20 (22.7%)	*52 (59.1%)	11 (12.5%)	2 (2.3%)	1 (1.1%)

*Statistically significant when compared to the other responses using chi square test ($p < 0.05$)

Table-2: Responses of male students to the Questionnaire (n=51)

	Item	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither agree nor disagree	Did Not Answer
A	Teaching & Learning						
1	The students were encouraged to ask questions	4 (7.8%)	16 (31.4%)	27 (52.9%)	4 (7.8)	0 (0%)	0 (0%)
2	The instructors satisfactorily answered the questions	5 (9.8%)	5 (9.8%)	*32 (62.7%)	9 (17.6)	0 (0%)	0 (0%)
3	The pre lab demonstrations helped in carrying out the work assigned	3 (5.9%)	10 (19.6%)	*28 (54.9%)	7 (13.7)	3 (5.9%)	0 (0%)
4	The instructors helped the students overcome difficulties	2 (3.9%)	12 (23.5%)	25 (49%)	10 (19.6)	2 (3.9%)	0 (0%)
5	The students were properly guided about preparing the lab reports	7 (13.7%)	17 (33.3%)	21 (41.2%)	4 (7.8)	2 (3.9%)	0 (0%)
6	The lab reports covered the topic	5 (9.8%)	10 (19.6%)	26 (51%)	9 (17.6)	1 (2%)	0 (0%)
B	Curriculum (Objectives)						
1	The lab work enhanced learning of Physiological concepts	2 (3.9%)	5 (9.8%)	*33 (64.7%)	9 (17.6%)	2 (3.9%)	0 (0%)
2	The lab work was linked well with teaching in lectures	4 (7.8%)	6 (11.8%)	27 (52.9%)	10 (19.6%)	1 (2%)	3 (5.9%)
3	The lab work motivated the students for creative & critical thinking	4 (7.8%)	13 (25.5%)	23 (45.1%)	7 (13.7%)	3 (5.9%)	1 (2%)
4	The lab work developed scientific approach in the students	4 (7.8%)	9 (17.6%)	28 (54.9%)	6 (11.8%)	3 (5.9%)	1 (2%)

*Statistically significant when compared to the other responses using chi square test ($p < 0.05$)

Table-3: Typical responses to open ended questions by female students (n=95)

What are the strong Points of the lab work? (Total responses=26)	
1. "Some topics were fun to learn"	14. "More understanding and critical thinking"
2. "Some times the lab ideas and concepts were not clear enough"	15. "Applying the concepts we have learnt in the lecture help in fixing them in our minds"
3. "We come to know use of some medical machine"	16. "Learning new skills"
4. "Doing the experiments & explaining how the things work"	17. "Team work"
5. "It is the practical work"	18. "It helps us practice our skills"
6. "Practical work to fix the information in mind"	19. "The effort of instructors is really shown"
7. "To improve the understanding of the lecture"	20. "Sometimes it is interesting"
8. "The lab enhanced learning of Physiological concepts"	21. "Working as groups"
9. "The techniques which are used in the lab are excellent and the instructors and the doctors teach and explain the lab very well"	22. "Working personally using equipments of the lab"
10. "Encouraging the students to work and discuss"	23. "Develop skills & introduction to different machines"
11. "Doing the things ourselves"	24. "Help in learning and understanding the lectures better"
12. "I am very interested in subject during lab"	25. "Every student can learn and work with instruments"
13. "Make us understand & remember the lectures better"	26. "It teaches us the real medicine"

Table-3 Continued...

What are the weak points of the lab work? (Total responses=42)	
1. "Some machines do not work well, and less number of them"	10. "Long time, and no rest period" (8 responses)
2. "In exam of practical, test is like "test of speed", which is not good. Concerns only about time more than performance"	11. "Fast work"
3. "Sometimes refuse to answer questions"	12. "Not creative, does not depend on the mind"
4. The actual practical were in less weeks and other weeks were for tutorials" (5 responses)	13. "We need to do more experiments"
5. "The report sheet"	14. "The lab report" (2 responses)
6. "It takes long time" (04 responses)	15. "Lab report is not useful sometimes"
7. "It is less in time than the topics we learn it in the lecture. It should be more work than the tutorial"	16. "Being supervised by person who does not let us have the experience by our own selves in all its steps"
8. "Few Labs" (09 responses)	17. "The lab report should be in another way, specially that students just copy from each other not caring to know the content."
9. "The students do not participate, lab needs successful techniques and instruments"	18. Few equipments (04 responses)
Remarks & Additional comments (Total responses=7)	
1. "I think if you add some diseases with the result of the studying ECG, it is good for the medical student, not only the general ECG"	3. "When we have a tutorial, it is better to tell us everything about the quiz and help us to get marks"
2. "The lab and every staff in it to be trained to develop the thinking skills in the students"	4. "The report is not that important"
	5. "The tutorial is very good instead of labs"
	6. "I just love the Physiology lab work. Thank you for everything. I just hope it helps me to pass this course" (2 responses)

Table-4: Typical responses to open ended questions by male students (n=95)

What are the strong Points of the lab work? (Total response=14)	
1. "Demonstration by the Lab supervisors"	7. "Nothing" (2 responses)
2. "Less Students in the Lab"	8. "Thinking & group work"
3. "Better environment of learning"	9. "Logical Thinking"
4. "All good work"	10. "Sometimes it is interesting"
5. "Teamwork"	11. "Good Instructors"
6. "Illustration"	12. "Everything is good"
	13. "Helpful"
What are the weak points of the lab work? (Total responses=12)	
1. "Using the lab (sometimes) as lecture room with too much information"	6. "There is no lab manual"
2. "No week point" (03 responses)	7. "Afternoon time"
3. "No prelab handouts"	8. "Too much time"
4. "The instruments are old"	9. "Only one instructor satisfactorily answered the questions"
5. "Some lectures do not need a lab"	10. "Only one instructor helped the students overcome difficulties"
Remarks & Additional comments (Total responses=5)	
1. "I'd like to thank all the Physiology staff, they are one of the well organized departments"	b. Lab work
2. "Tutorial should not be lecture in the lab"	c. Short Quiz (No mark)
3. "It would be nice if the lab works like this:	d. Discussion"
a. Prelab handout with home work	4. "Please make the lab in the morning"
	5. "Ask thinking Questions"

DISCUSSION

In line with policy of the University of Dammam, our department continuously tries to enhance academic standard and academic quality in Physiology teaching. Our target is not just quality assurance but quality enhancement as well. We encourage both internal and external reviews. This study was based on student review of a component of their course.

Up to the middle of last century the role of students in evaluation of curriculum has been controversial.¹¹ However in recent years, the role of students in the QA of higher education has become exceedingly recognised, as being both necessary and desirable. Students are increasingly being involved in the improvement and enhancement of their own learning experiences.¹² This may be by providing feedback on the courses they have taken, contributing to the development of learning and teaching in their

subject area, participating in university decision making processes, or representing student views in any number of ways through student representatives.¹³ In the absence of an organised evaluation student feedback can be misleading and usually fails to be constructive.¹⁰

Our first observation was that due to our approach of 'voluntary response' a sizeable proportion of male students (i.e., 44 out of 95) did not respond. However in case of female students the non-responders were just 7 out of 95. The difference was so significant that we had to make focus groups to find out the reason of no response. After discussion with students we realised that it was due to general careless attitude of male students that is recognised by other studies as well. When the students were informed that results of their ratings would be used for decisions about improvement in curriculum, some of the male students suggested that now when we are through this course it is of no benefit

to our class. This approach was adapted by their close friends. This trend was however not seen in the female students. On literature search we found a study that gave exactly similar conclusion.¹⁴

The proportion of male students agreeing to the question *'The students were encouraged to ask questions'* was far less as compared to the female students. This reflected a disparity between male and female faculty. However most of the students (both male and female) agreed to question *'The instructors satisfactorily answered the questions'*. It was communicated to the faculty that answering the questions is very good but we all must encourage the students to ask more questions and make them 'learn by questioning'. A sound knowledge of Physiology is considered to be the basis of a rational medical practice.¹⁵ Understanding the mechanisms of the body functions requires a high level of interaction and integration, not just a descriptive approach.¹⁶

The proportion of disagreeing students (both male as well as female) to the question *'The students were properly guided about preparing the lab reports'* was very high. It was realised after discussion amongst the faculty that there is a difference between 'guidance to resources for preparation' of lab reports and 'helping in writing' lab reports. The faculty was requested to encourage students to find answers to questions in lab reports by guiding them to proper resources.

In our study a significant number of responders agreed that the lab work in our department enhanced learning of Physiological concepts, developed scientific approach and motivated students for creative and critical thinking. All these are the major objectives of our curriculum. However the large number of students disagreeing with the question *'The lab work motivated the students for creative and critical thinking'* was not at par with our departmental policy. It was decided to take appropriate measures to improve this short coming. Laboratory teaching and learning is hard work. Both student and teacher must be deeply and personally involved. A casual, superficial or disinterested approach by either teacher or learner can result in failure.¹⁷

Most of the students did not respond to open ended questions. Out of the responders a majority of students in the responses to open ended question *'What are the strong points of the lab work'* liked small groups in the lab, practical work and team/group work. There is a lot of evidence that student achievement, persistence in science courses, and attitudes toward science are enhanced by having students work in small groups on appropriate intellectual tasks.¹⁸

The weaknesses pointed out by the students were real eye openers. They bluntly showed their dissatisfaction with use of laboratory time for 'lecturing'. They were not satisfied with a lot of tutorials and less

labs. They were unhappy with some of the equipment. They reported that there was no lab manual and asked for pre lab material. A number of responders pointed out "long time" or "boring" labs.

The medical educators realise that the conventional modes of teaching medical students neither encourage the right qualities in students nor impart a life-long respect for learning.¹⁹ In the early 20th century Sir William Osler realised that the complexity of medicine had already progressed beyond the ability of the teachers to teach everything that students would need to know. Osler recommended abolishing the lecture method of instruction and allowing students more time to study. He also emphasised the important role of teachers in helping students to observe and reason.²⁰

There is no absolutely correct and no absolutely wrong way of fulfilling a particular pedagogical goal, however there may be less or more effective ways of achieving specified objectives. The structure of a curriculum depends on the target student population as well as on the faculty available to administer the curriculum.²¹

Although the complexities of medical care have increased dramatically over the last century, the methods of teaching medicine have changed little. Teachers need to learn about the latest techniques and theories of both adult learning and medical education. Medical education should be given the same emphasis as research and patient care. A combination of both the conventional and newer curricula may provide the most effective training for undergraduate medical students.

The results of this student rating were discussed in the departmental board meeting. We took all the points one by one and decided to take remedial steps immediately. It was noted that on many days lab time was converted to tutorials due to shortage of lab practicals. There was a need to develop new lab practicals. The major quality assurance and quality enhancing steps implemented were:

- Launch of *'departmental faculty development program'* to further enhance the skills of faculty in teaching, assessment, communication, interaction and motivation.
- Making lab work more interesting and lively to avoid *'long time'* or boredom feeling
- Developing more labs/practicals to minimize use of lab time for tutorials.
- Preparation of lab manual.
- Review of existing equipment, upgrading or procurement of new wherever required.
- Changing the *'modus operandi'* for tutorials. Making them case based, small group and 100% interactive. Incorporating vignette based EMQs in tutorials.

CONCLUSIONS

We conclude that review through students' feedback is a valuable instrument for quality assurance and quality enhancement of Physiology curriculum.

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