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Curriculum Reform and the Future Direction of the Medical Laboratory Technology Program

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A periodic review of the curriculum is a key element for the success of any educational program. The Medical Laboratory Technology (MLT) program at King Faisal University has undergone repeated reviews of its curriculum. Recently, we evaluated the curriculum through an academic staff members committee which thoroughly reviewed, it proposed certain changes and finally implemented those changes into the program structure. We also investigated the student's views about the changes in the curriculum through a structured questionnaire. This paper describes the different changes that have occurred in the MLT curriculum and the senior students' and recent graduates' view of the program. It also discusses the introduction of Problem Based Learning (PBL) as one of the future directions of curriculum change, the challenges and barriers of introducing PBL and how PBL could be best adopted in the curriculum.

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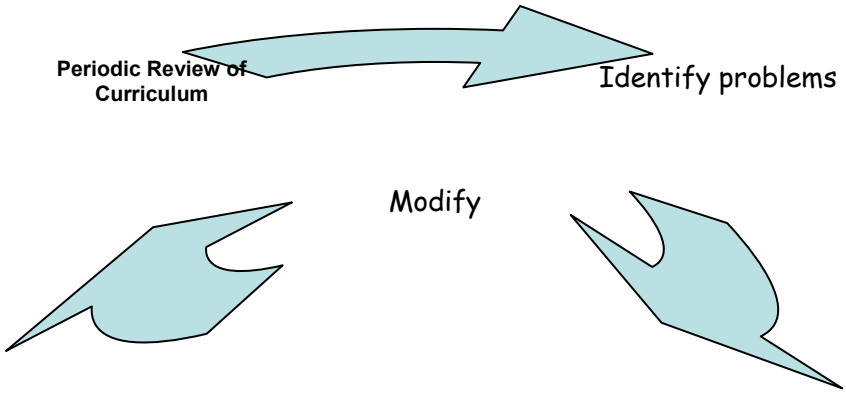
Defining a curriculum is difficult, many definitions have been offered, but none has been universally accepted. In very simple words it's a plan that will determine an educational experience[1]. In 1949, Tyler suggested that the curriculum should consist of four fundamental elements: objectives, content, methods and evaluation[2]. Based on this, various models of the curriculum have been developed stressing one of the four elements of Tyler's description; the most common among all is the stress on the contents. Kelly, in 1982, described curriculum as "all aspects and dimensions of the educational experiences which pupils have during any period of formal education."[3] This definition includes formal, informal and hidden curriculum and broadens the concept of curriculum beyond the content alone. Whichever definition and its related concept is accepted, each program's faculty have the ultimate responsibility to define curricular goals and objectives , create an appropriate learning atmosphere, establish the courses, train the students in such a way that they are most competent in theory and techniques, successfully meeting the market demand[4,5] .

The MLT program at King Faisal University was established in 1989 and since then its curriculum has undergone through various changes[6]. The curriculum model of the MLT program is a 2½ + 1½ curriculum structure which is a modification of 2+2 baccalaureate curriculum that

is adopted by many medical technology/clinical laboratory science colleges[7,8]. With increasing demands for allied health professionals and rapid advancement in newer technologies, [9] it is important to restructure the existing curricula of the institutions and design newer ones to meet the professional challenges and technological developments[10-12].

Three steps for curriculum reform are important. **First**, there should be a periodic review of the curriculum. This review could be taken by formulation of a curriculum committee comprising of senior staff members. The committee can also take a feedback from recent graduates and final year students to get student's view about the curriculum. **The second step** is to identify the problems in the existing curriculum. Many authors have reported problems in the curricula of the health education systems in the Saudi medical educational system[13-18]. Gindan et al summarized the problems of today's curricula as overcrowding of the curriculum, over presentation of some subjects, presence of relatively non-relevant subjects, dissociation between basic and clinical sciences, repetition of lectures and examinations, need for new subjects of clinical relevance, as well as non-optimal use of resources[19]. The identification of these problems reflects the awareness of the faculty for a need to reform. **The third step** is suggestions for improvements followed by their implementation through legislative and administrative work. Once the changes are incorporated into new curriculum, a periodic review of the curriculum is done again repeating the same steps.



Periodic reviews of curricula and reforms are a must to keep pace with changing needs and essential for the success of any educational process. [5]

Problems of the existing curriculum: A curriculum committee reviewed the MLT program at King Faisal University. The aim was to respond to existing problems in the curriculum design and suggest changes that would meet present needs as well as future demands. The problems identified in the curriculum were basically related to the contents of the curriculum. Some course contents were repeated under different course names, some relatively non-important subjects were allotted more credit hours. Then there was less integration of basic courses with clinical

courses and relatively more didactic teaching rather than the practical training. These problems are summarized in **Table 1.**

Table 1 Problems identified in the existing curriculum

1	Presence of non relevant subjects
2	Course contents repeated under different courses
3	Over presentation of relatively non important subjects
4	More didactic teaching
7	Less integration of basic courses with clinical courses
6	Need to introduce new subjects like human genetics, virology and laboratory management

To rectify these problems the curriculum committee suggested several measures. Some of the non-relevant subjects such as 'Dynamics of Health' and 'Analytical Chemistry' were removed. To eliminate repetition, the course contents that were repeated under different course numbers were combined to single courses. Some basic science courses that were allotted too much time were reduced to their reasonable size. Demand for future was met by the introduction of new courses of Learning Skills, Molecular Biology, Virology and Laboratory Management. The reforms also resulted in less didactic teaching and an earlier start of clinical courses. Some of these changes are summarized in **Table 2**. The reforms suggested by curriculum committee were accepted and a new curriculum was implemented, thus successfully completing the curriculum reform process.

Table 2 Changes in the Curriculum and the reform principles, by comparing old and new curriculum.

Reform Principle	***Subject***	***Old curriculum***		***New Curriculum***	
		Year	CH	Year	CH
Elimination of non-relevant subjects	Dynamics of Health	2nd yr. 1st term	2		-
	Analytical Chemistry	2nd yr. 1st term	2		-
Elimination of repeated subjects	Introduction to Clinical chemistry	2nd yr. 1st term	2		-
	Introduction to Microbiology	2nd yr. 1st term	2		-
Over-presentation of some subjects	Biology	1st term	8	1st yr.	4
	Chemistry	1st yr.	8	1st yr. 2nd term	4
	Physics	2nd yr. 1st term.	6	1st yr. 2nd term	4
	Biochemistry	2nd yr. 1st term	5	2nd yr. 1st term	4
	Anatomy	2nd yr. 1st term	4	2nd yr. 1st term	3
	Physiology	2nd yr. 1st term	4	2nd yr. 1st term	3
Introduction of new subjects	Learning skills	-	-	1st yr. 1st term	2
	Molecular biology	-	-	2nd yr. 1st term	2
	Virology	-	-	2nd yr. 2nd term	2
	Lab. Management	-	-	4th yr 2nd term	2
Total CH			**43**		**30**

*** CH = Credit hours**
Yr = Year.

Student's opinion on the curriculum: An effective curriculum should reflect the needs, priorities and abilities of the students. Senior students, through their own educational experience, are in a much better position to give advice or judge certain aspects of curriculum such as balance and relevance of course contents, use of resources and drawbacks or advantages of their didactic and practical trainings[20-21.] We investigated the students view about the content of their studies, the undergraduate and internship training they receive and their overall perception of the curriculum. An 18 item questionnaire was designed for this purpose and distributed randomly to final year students and new batch of interns. One hundred questionnaires were distributed, 93 were returned completed. To the question of grading the program as a whole, 12 (12%) responded as excellent, 18 (19.4%) responded very good, 44 (47%) good, 12 (13%) satisfactory and 8 (8.6%) had no response. To the question "which curriculum, old or new is more suitable for training", 64 (69%) responded for the new curriculum, 23 (25%) for the old and 6 (6.5%) had no response. Also the changes made by the department regarding the internship training period met with students' expectations and resulted in improvement. In this change all laboratory sections were included in the internship period, instead of three laboratory disciplines in the previous program[22].

(**Table 3** describes students' view about some other aspects of the curriculum).

Table 3- Students' opinions on the MLT program
Total Number of students 'N' = 93

Question	Agree		Disagree		No response	
	N	%	N	%	N	%
Do you grade the Program as a whole as very good?	74	79.6	11	11.8	8	8.6
Are you satisfied with the six main laboratory rotations during internship?	89	96	3	3.2	1	1.1
Are you satisfied with electives during internship?	31	33	59	63.4	3	3.2
Did you get sufficient opportunities to learn practical skills?	70	75	22	24	1	1.1
Did the program help you to become competent technologist?	70	75	21	22.6	2	1.1
Will the program motivate you for further specialization?	75	81	1	1.1	17	18.3
Is the new curriculum suitable for your training?	64	68.8	23	24.7	6	6.5

Though this was a small short study it provided a valuable feedback that the changes in the curriculum have been met with student's satisfaction. Further studies with a larger group and more structured questions will be conducted about various aspects of the curriculum in the near future.

Curriculum reform and Problem Based Learning:

Many medical and allied health education curricula have adopted PBL and its success has been well publicized[23-30]. However a full implementation of PBL is not without challenges and barriers. It undoubtedly requires a very detailed planning of the curriculum with careful

selection of course contents. The process itself is so time consuming that in one study the faculty spent 50 hours in meetings alone to develop a course based on PBL[31]. Increased class time, good facilitator training, development of student and facilitator assessment tools, provision of instructional materials like computerized classrooms and increased space (more classrooms) are some of the other important issues[32-33].

In one study Schwartz et al reported that an ambitious attempt to introduce a full problem based curriculum in an undergraduate medical school failed[34]. The main reason for the failure was that the faculty was not ready and convinced for such a drastic change. However, when some of the principles of the PBL were introduced in the courses, the program produced the desired results. Some clinical laboratory science programs have introduced PBL at senior levels in the form of one or two courses with good results. Beadling et al reported introducing two courses of clinical correlations I and II at the senior level in the curriculum of clinical laboratory science in the state University of New York with successful results[35]. It is highly plausible that the same approach could yield good results in our case. PBL can be introduced in the form of a few courses at the senior level. Some of the courses could be deleted or their contents reduced to allow room for such courses. This will reduce overcrowding of the curriculum and increase integration of subjects. Among the students it will promote self directed learning, critical thinking ability, team work spirit and communication skills. All this could be achieved only if the PBL courses are designed with meticulous care, proper assessment tools, provision of space and time and above all the preparedness and conviction of the faculty to make the program successful.

Curriculum changes in medical laboratory science programs have long been advocated, and the literature is comprehensive with studies showing the need for change in clinical laboratory science curricula[7,10,11,36,37]. The curriculum of MLT or clinical laboratory science is somewhat unique in the sense that the program is limited to four years, and laboratory science knowledge is rapidly advancing. This forces educators to add the subjects which are in high demand and delete the subjects which have become relatively unimportant.

CONCLUSION:

The MLT program at King Faisal University has continuously reformed its curriculum over the past 15 years. The key elements of the reform had been elimination of relatively non-relevant subjects, elimination of repetition, less emphasis on didactic teaching, less emphasis on basic science subjects compared to clinical laboratory science subjects and an early start of practical courses. We have also added some new important courses like laboratory management and Molecular Biology. Some courses at the senior level could be transformed into PBL. We feel that a quick dramatic change in the KFU, MLT curriculum is not required, however a refinement and a periodic reform process is needed and should continue.

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