



Analyzing the curriculum of the faculty of medicine, University of Gezira using Harden's 10 questions framework

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Abstract

Introduction: Despite the importance of curriculum analysis for internal refinement of a programme, the approach for such a step is under-described in the literature. This article describes the analysis of the medical curriculum at the Faculty of Medicine, University of Gezira (FMUG). This analysis is crucial in the era of innovative medical education since introducing new curricula and curricular changes has become a common occurrence in medical education worldwide.

Methods: The curriculum analysis was qualitatively approached using descriptive analysis and adopting Harden's 10 Questions of curriculum development framework approach. Answering Harden's questions reflects the fundamental curricular components and how the different aspects of a curriculum framework fit together. The key features highlighted in the curriculum-related material and literature have been presented.

Results: The analysis of the curriculum of FMUG reveals a curriculum with interactive components. Clear structured objectives and goals reflect the faculty's vision. The approach for needs assessment is based on a scientific ground, and the curriculum integrated contents have been set to meet national and international requirements. Adopting SPICES strategies helps FMUG and students achieve the objectives of the curriculum. Multiple motivated instructional methods are adopted, fostering coping with the programme objectives and outcomes. A wide range of assessment methods has been adopted to assess the learning outcomes of the curriculum correctly, reliably, and in alignment with the intended outcomes. The prevailing conducive educational environment of FMUG is favourable for its operation and profoundly influences the outcome of the programme. And there is a well-defined policy for curriculum management, monitoring and evaluation.

Conclusion: Harden's 10 questions are satisfactorily addressed by the multi-disciplinary and well-developed FMUG curriculum. The current curriculum supports the well-written faculty missions and educational objectives. It presents a structured, conceptual framework that supports the validity of the assumption behind the curriculum. The curriculum enhances intellectual and academic pursuits and supports social accountability.

Keywords: Curriculum; Education; Medical; Problem-based learning; Program evaluation

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Introduction

Medical education is a dynamic process, and the curricula of medical schools need multiple review and amendments to cope with the continuous changes in the medical field and the educational context. Curriculum analysis is an important task in detecting the validity of assumptions behind the curriculum and to assess its perspectives, goals and objectives (1). Curriculum analysis refers to segmenting the curriculum in order to understand the coherent plan (1, 2). On the other hand, curriculum development involves building and packing the curriculum in order to present a coherent plan (3). Curriculum analysis is a useful tool that can be utilized to evaluate how the different parts of the curriculum fit together in terms of focus and coherence, checking the underlying beliefs and assumptions validity. Also, it is an important step taken by most of the medical schools in seeking justification for curriculum choices and assumptions (2).

The Faculty of Medicine, University of Gezira (FMUG) is the first community-oriented, problem-based medical college in Sudan and Eastern Mediterranean Region (4). Initially, the Faculty of Medicine curriculum document was titled 'The School of Medical Sciences'. That was basically a traditional curriculum with some minor modifications; however, it did include some very good institutional objectives used in drafting the objectives of the present programme (5).

Methods

The curriculum analysis was approached using Harden's 10 Questions of curriculum development framework approach, Table 1 (6). It is a qualitative, descriptive analysis. This practical tool for approaching curriculum development was proposed in 1986 by Harden in Dundee University in Scotland. Harden's Ten Questions has been used in many universities worldwide due to its optimal validity and reliability (7, 8). These ten key questions provide a comprehensive framework for curriculum development and are relevant in all situations. Also it is an effective

method for planning a course or curriculum, and evaluating the course in a systematic way. A well-developed curriculum must address Harden's 10 questions during its developmental phase (6, 7).

We evaluated FMUG undergraduate curriculum in terms of *needs assessment, objectives, content, content organisation, educational strategies, teaching methods, assessment methods, educational environment implementation and curriculum management*. We looked at the implementation of these 10 questions for the current program in FMUG and how it responded to these questions. This process involves content analysis of curriculum materials. Triangulation and multiple sources of data were applied to ensure internal validity.

We explored FMUG's curriculum framework through analysis of the official curriculum documents, both published and unpublished, including external evaluation reports, programme/curriculum self-review outputs, and official FMUG website, and accreditation reports of Sudan Medical council and the written literature.

Results

Answering Harden's questions

1. What are the needs in relation to the product of the training programme?

FMUG curriculum is designed particularly to cater for the health needs of the central Gezira state. Gezira state is a rural community because 80% of its population are composed of rural population scattered over more than 3000 villages (9). Infectious and parasitic diseases are the main causes of morbidity and mortality. Non-communicable diseases are also emerging due to the change in socioeconomic and lifestyle conditions (10). World Health Organization human resources for health estimates maintains that doctor-patient ratio is 22 physicians per 10,000 population in Sudan (11).

FMUG adopted a multifaceted approach for exploring problem identification & needs assessment. The Delphi technique (12), together with Wiseman approach (13), was used. The senior consultants in the Gezira Ministry of health

Table 1: Ten questions to be asked when planning a course or a curriculum (6).

1.	What are the <i>needs</i> in relation to the product of the training programme?
2.	What are the aims and <i>objectives</i> ?
3.	What <i>content</i> should be included?
4.	How should the content be <i>organized</i> ?
5.	What educational <i>strategies</i> should be adopted?
6.	What teaching <i>methods</i> should be used?
7.	How should <i>assessment</i> be carried out?
8.	How should details of the curriculum be <i>communicated</i> ?
9.	What educational <i>environment</i> or climate should be fostered?
10.	How should the process be <i>managed</i> ?

used health indicators in Gezira state to obtain a consensus on the needed specific learning/training (14). Also, the answer to this question considers what has been specified in general terms by a government and by professional bodies. The specific learning/training needs are:

- Rural population constitutes the vast majority of the total population in Gezira so students and faculty need to feel a binding sense of purpose and an extraordinary level of community engagement and ability to work in limited resources rural environment (4, 14).
- Physicians practicing in Gezira would be specially trained in tropical and infectious disease (14, 15).
- Physicians in Gezira should be able to function in the community and should receive training that is both community-based and community orientated (14, 16).
- Physicians practicing in Gezira need special training to be community leaders, administrators, and problem solvers, who wisely allocate and utilize the available resources (14, 15).

2. What are the aims and objectives?

FMUG main mission and aims are (17):

- To participate in the development of an innovative health profession education and practice, scientific research and community health services at an individual and social level.
- To graduate doctors who are able to maintain, and improve the health system and are able to work as a group and resolve health problems through the development of the necessary knowledge, skills and attitudes.
- To provide solutions to health related needs, in particular, those addressing main community problems and high-risk populations, through sharing experience regarding education, scientific research and health policies with local, regional and international bodies.

The curriculum objectives/contents were set by the faculty staff and stakeholders based on community health needs and review of several internal medical curricula (18). The general and specific objectives of FMUG are summarized in Table 2 (19). The curriculum of FMUG is objective-oriented and integrates the general, intermediate and specific objectives of the faculty.

FMUG adopted a competence-based approach in all curriculum phases and the broad competencies required of students at graduation are:

- **Knowledge:** Basic knowledge in Anatomy, Physiology, Biochemistry, Pathology, Clinical Sciences (history, examination, investigations and management), Community Medicine and Behavioural Sciences.
- **Skills:** Basic laboratory skills, clinical skills, community diagnoses skills and research skills.
- **Attitudes:** Respect of patients' culture and values, demonstrating sympathy and concern about patients' problems, and conforming to the code of medical ethics.

These competencies were set to meet WHO standards and Sudan medical council requirements (4, 14, 18).

The optimum competencies (knowledge, skills, and attitudes) are closely related to the existing and emergent needs of the society because they are originally based on the society needs which were assessed at the start of the curriculum development (16, 18, 20). Moreover, those competencies are learned in the existing health units in which the students will practice after graduation (15, 21).

The principal stakeholders are the academic staff in FMUG, the University of Gezira, Ministry of Health and the Sudan Medical Council. The mission and objectives were formulated by the dean, all the academic staff, and representatives

Table 2: FMUG specific objectives

Field	Objective
General objective	Graduation of a highly qualified medical practitioner, who provides health services to the community and conduct relevant research.
Specific objectives	
Education	<ul style="list-style-type: none"> • Diagnose and treat endemic and epidemic diseases and all the health problems at the level of the individual, family and the community. • Solve health problems through community orientation and problem-based approach and play a role in prevention and treatment. • Consider the code of ethics, when dealing with patients, colleagues and the community as a whole. • Supervise, train and work with the members of the health team and delegate responsibilities to team members through his/her knowledge of the administration methods and ability to communicate with others. • Conduct research, propose and implement health programme and be able to report on these activities. • Continue learning after graduation.
Research	Propose and implement health programme and be able to report on these activities.
Service	To provide health and related services to the community.

of the other stakeholders.

3. What content is included?

The framework of the curriculum is built on four contents (21). *Clinical content* emphasize that the student should obtain the necessary basic knowledge, skills and training and apply this knowledge appropriately. Students are expected to develop logical thinking and become prepared to deal with uncertain situations.

Health content includes social, cultural and community issues, health promotion and disease prevention, research design and statistics relevant to healthcare services.

Self-directed lifelong learning content: FMUG adopts the problem-based learning (PBL) strategy which enables the students to deal with emergent problems in the future and become self-directed, lifelong learning doctors.

Leadership content: Adopting a community-based and PBL curriculum promote students to obtain leadership and generic competencies such as management and organization skills, teamwork, communication skills and problem-solving capabilities.

4. How is the content organized?

FMUG offers a five-year MBBS program in three educational phases with a curriculum covering 48 courses. Each Phase has different blocks/courses with their learning objectives and the content included in each Phase is based on the learning objectives of the block/system. The first phase (semester 1-2) emphasizes basic sciences with the introduction of relevant clinical sciences. The second phase (semester 3-7) encompasses system courses with increasing share of clinical sciences. The last phase (semester 8-10) comprises clinical disciplines as the major part of the courses, but relevant basic sciences are also incorporated (22). Clinical sciences are integrated into all courses in increasing amounts. All courses in the curriculum include clinical sciences, and objectives amounting to different weights ranging from 30% early in the curriculum to 70% late in the curriculum. In the system courses, the relevant clinical sciences are fully integrated with the basic sciences (20). The clerkship courses are mainly clinical. In these courses the students learn knowledge, attitude and clinical skills in addition to managerial skills. At different levels, the students are involved, i.e. they observe, participate and perform (23).

The content is integrated both horizontally and vertically throughout the programme (20) (Table 3). The spiral approach links the theory to practice, increasing the time for clinical activities

and allowing students to spend more time with patients. As a result, the students can apply their theoretical knowledge to clinical practice (18, 20).

Table 3: Position of SPICES scale in FMUG educational strategies

Student Centered	Teacher Centered
Problems Solving	Information Gathering
Integrated	Specialty
Community-Based	Hospital-Based
Standard Courses	
Systemic	Apprenticeship

5. What educational strategies are adopted?

Rahim stated six main strategies applied to help FMUG and students achieve the objectives of the curriculum (24).

- Community orientation
- Community-based education
- Integration of basic, clinical, community and behavioural sciences
- PBL
- Teamwork and early exposure of students to clinical training
- Continuous evaluation and partnership with related sectors.

FMUG adopted a modified, mixed approach with emphasis on the SPICES (25) [student centred, problem-solving, integrated, community-based, standard and systemic] strategy in its curriculum implementation. The major difference is that there are no elective courses and all are standard courses. Table 3 shows FMUG educational strategies in relation to the SPICES model.

6. What teaching methods are used?

The instructional methods used

Several instructional methods are used to achieve the educational objectives. These include:

- PBL
- Tutorials
- Small group discussion
- Self-directed learning
- Practical (laboratory, basic skill laboratory, bedside teaching in hospitals)
- Seminars
- Lectures
- Field visits (villages)
- Family visit
- Training in health centres
- Computer aided learning
- Training in rural hospitals.

Student grouping

FMUG adopted a combination of whole class teaching, small group teaching and individualized learning (20).

Teaching tools

A full range of educational tools includes slides, audio-visual tapes, overhead projector, exhibitions and most recently PowerPoint presentation.

These instructional methods ensure student-centred learning and help prepare the students for lifelong self-directed learning (20).

7. How is the assessment carried out?

Student assessment

In each phase, a range of assessment methods has been adopted to assess the learning outcomes of the curriculum correctly and reliably. The nature of a learning objective determines the instrument of its evaluation and hence more than one instrument is always needed to evaluate a learning activity and most of the evaluation methods used are a normo-referenced assessment (26).

The methods of evaluation used are: MCQs, essay, Clinical, OSCE, Practical exam, Log book, Write-up, Attendance, Performance, Student's product report, Family problem, Reports from rural hospital Doctors, Supervisory checklist, Peer evaluation and Community feedback.

Formative tests are used in all courses and never included in the summative assessment but are valuable in monitoring the students achievement and programme progress (26). Each of the 47 courses is evaluated by an end of course examination and each examination is composed of a number of evaluation tools ranging from 3 to 5 to maximize the validity and reliability of the examination. The balance between the written and the practical examination depends on the nature objectives of the course (e.g. weight of clinical exam in clerkship is 40% and in system courses 20%) (26). The use of external examiners (from other schools of medicine) in Phase III final examination ensures an accepted level of student competency in relation to students in other schools.

Programme evaluation

The Faculty of Medicine was the first school in Sudan to conduct self-evaluation, in consistence with the standard world federation of medical school (27). The programme is continuously monitored by students' feedback, staff feedback, and progress of students (examinations results), examiners' reports and external examiners' reports (20). Moreover, there is a well-defined policy which includes a mechanism for continuous monitoring and periodic evaluation (21).

The programme is evaluated regularly through a comprehensive programme evaluation every 10

years (18).

8. How are details of the curriculum communicated?

FMUG curriculum details are communicated in a coordinated chain of operations to many stakeholders in more than one forum. The most thoroughly explored opinion is that of students and tutors, these being the most intensely involved stakeholders. Most commonly this is done through workshops and official materials such as syllabi and timetables (21).

The prospectus book includes the details of the course objectives, content and facts, entry prerequisites, the resource available and other necessary information for the potential candidates.

At the beginning of each course, students are oriented thoroughly about the format of the course, aims and objectives, teaching methods, assessment techniques, the resource available and other information from the respective course coordinator. The curriculum committee is responsible for communicating any changes in the curriculum, timetables and other information to the teachers, students and the academic support staff (20).

9. What educational environment is fostered?

Haron (2012) studied the educational environment in FMUG using Dundee Ready Educational Environment Measure (DREEM) (28). The study concluded that the prevailing conducive educational environment of FMUG is favourable for its operation and profoundly influences the outcome of the programme (29). The environment encourages scholasticism, propriety, social awareness and cooperation between students. Moreover, DREEM showed positive student perceptions of atmosphere and students' social life.

10. How is the process managed?

The whole educational process is managed by the university senate, FMUG dean, faculty board, curriculum committee and course committee. Students were represented in the faculty board (full members) in the first years of school establishment, but that was not the case a few years later. The representation of the students during that period was of immense benefit to the school (18).

The curriculum committee is responsible for establishing and deciding policy in relation to the curriculum. It is fully authorized for planning, implementation and control of the curriculum. This is approved by the faculty board. It discusses and decides on the progress

of all courses, implementation, evaluation, allocation of resources, and conflicts. Major curriculum changes are subject to the approval of faculty Board and University Senate. Each semester sub-committees are responsible for the details of the timetable and the implementation of the programme. The course committees and departments teaching the course are accountable to these committees (30).

Discussion

When curriculum analysis follows a systemic approach to provide high quality evidence of that, it integrates a content area with educational theory and methodology. The strength of this study is that analysis was performed on the basis of Harden 10 questions, which is very well-structured and conceptualized (7, 8). This study demonstrated the applicability of this approach to curriculum analysis in setting an innovative medical curriculum.

The multifaceted approach used for identifying the specific learning needs including Delphi techniques are demonstrated in the literature as a reliable empirical method for needs assessment (13, 31). Changes in healthcare policy, living conditions and healthcare needs necessitate regular revisions of the curriculum (32). However, the FMUG curriculum is based on priority health needs defined in 1970s, but the identified health problems remain unchanged.

The study described FMGU curriculum as a community-oriented and community-based, student-centred, problem-based, and integrated learning programme (SPICES model). An evidence base for effectiveness of this approach is emerging to accumulate rapidly (33).

The success of this curriculum is reflected by the fact that many regional medical schools seek to emulate FMGU. FMGU has assisted in the PBL curriculum design of several medical schools in Sudan as well as a few in the WHO East Mediterranean Region (4, 34).

FMGU curriculum had been subjected to external evaluations. An external assessor conducted evaluation of the school curriculum in response to the assignment from the Network: Towards Unity for Health (TUFH). Based on that report the school was recognized by the Network (4, 14).

World health organisation (WHO) was an essential partner for all the comprehensive evaluation programme of the school (18, 20, 21).

The Limitation of our study is that we only used qualitative method without a quantitative tool. Further studies are therefore necessary to confirm our findings.

Conclusion

The advantage of Harden 10 questions approach described in this article go beyond the classical focus of goals, educational strategies and so on. It may be that the organizational impact of curriculum analysis will be of more long-term utility rather than simple enhancement of curricular material.

Harden's 10 questions are satisfactory addressed by the multi-discipline and well-developed, well-structured, and integrated FMUG curriculum. The curriculum supports the mission and objectives of FMUG. The significant features of the curriculum are the implementation of mixed innovative educational methods that facilitate the integration of many disciplines focusing on multi-discipline learning/educational strategies. Also, the curriculum enhances intellectual and academic pursuits and supports social accountability. The validity of assumption behind the curriculum is well-addressed.

The curriculum features a community-oriented, problem-solving approach using an integrated, block system of education. It also blends with the existing health care delivery system and with the community around it and adopts team-work as a basic strategy.

The continuous monitoring and periodic programme evaluation lead to positive contribution to curriculum development and adaptation.

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