ORIGINAL ARTICLE

WHAT ARE THE PRACTICALITIES OF MAPPING MINOR CURRICULUM?

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Background: Many under graduate medical colleges are in the process of mapping their curriculum. This process was investigated in three typical medical schools of Pakistan by semi-structured interviews of the senior faculty members. Conclusions were made and discussed. **Methods:** Semi-structured interviews were conducted with the senior faculty curriculum managers concerned with mapping Human Nutrition in three medical schools in Khyber Pakhtunkhwa (KPK) province of Pakistan. Issues relating to the principles and processes used in mapping minor curriculum themes were explored, and the costs and benefits were identified. **Results:** It was reported that fixed curricular criteria were published by the Pakistan Medical and Dental Council (PMDC) and therefore curriculum mapping was not necessary, with an intention to map minor curriculum themes eventually. Learning outcomes of curriculum themes were not recognized or described. There is no consensus by curriculum managers, evaluating authorities, implementing authorities or senior faculty members about the principles and process of curriculum mapping. Public pressure may cause resistance to any change in the curricula. Action was limited by lack of resources. **Conclusion:** Lack of awareness of the significance of curriculum mapping, as a tool for quality assurance, evaluation and management is prevalent and is the main factor in limiting this technique. Further research is required to establish what has been done in other medical colleges of Pakistan regarding mapping of curriculum themes and what the difficulties are. This analysis will lead to a strategy for improvement, and collaboration of all medical colleges in Pakistan.

Keywords: Minor curriculum, curriculum mapping, Pakistan, curriculum

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INTRODUCTION

The word curriculum is derived from Latin word for "racecourse". There are more than 100 definitions for curriculum in professional literature.[1] The curriculum can be defined as:

"*A sophisticated blend of educational strategies, course content, learning outcomes, educational experiences, assessment, the educational environment and the individual students' learning style, personal timetable and programme of work*".[2]

The concept of curriculum mapping was developed in 1980s, and is a reality based record of what outcomes are intended, what is actually taught, when it is taught and what is assessed.[3] Hausman was considered as pioneer of the concept of curriculum mapping.[4] The curriculum mapping concept was then extended in 1990 by Jacobs who also included a curriculum mapping timeline, the schedule of the taught content within the curriculum, a data review, exams content and electronic collection of curriculum data.[3] It was used as a tool for curriculum reforms in Scotland.[5]

The benefits of curriculum mapping allows the design, quality assurance and course management, in defining what content should be taught and learned and how it should be organized.[6] This enables faculty members and students to identify their learning objectives, match the course content to the curriculum and timetable to clarify where to teach, what to teach, when to teach, and when and where content should be assessed in valid exams.[7] It also helps to identify essential gaps and overlaps in the curriculum.[8,9] Curriculum mapping is now routinely used in most western medical schools.[5,9–11]

At graduation, a doctor should have essential knowledge, skills, behaviours and beliefs to carry out his medical practice and continue to improve his capabilities.[12] This is the vital starting point for the preparation of curriculum which is fit for educating doctors.[13] Curriculum mapping is a professional skill that has its own principles and praxis to ensure that the student achieves this aspiration. These may be summarised as: the clarification and specification of outcomes that define the kind of doctor a student will become at graduation, clarifying and organizing the learning objectives, the types of learning experiences required, establishing the assessments that are valid, reliable and have an educational impact.[1] The learning outcome approach is essential to ensure that medical graduates have been prepared appropriately for all the aspects of medical practice.[5]

In the medical curriculum, the outcomes are dispersed through the course, and arranged in modules and themes. They are present in subjects who are taught as specific units, for example the clinical disciplines of Pathology, Medicine and Surgery. Whilst others are implicit and integrated over the length of the course examples being ethics and professional skills. Human nutrition is a particular example that is incorporated into Biochemistry, Physiology, Pathology, Community Medicine and Medicine. In an integrated or distributed curriculum the minor, albeit very important subjects, are not always explicit and therefore easily overlooked.

The curricular manager should apply the principles of mapping the outcomes to ensure an appropriate presence and balance of major and of minor topics in the curriculum.

Curriculum mapping should be undertaken in Pakistan for purposes of audit, management and evaluation, quality assurance and accountability to the Medical Council. However, this does not seem to be a common practice. The purpose of this investigation is to identify some of the factors that constrain the process. This preliminary investigation was undertaken to identify the issues that are worthy of further investigation and this can pave the way to bring Pakistani medical schools in line with the World Federation for Medical Education (WFME) and Global standards.[14]

MATERIAL AND METHODS

This study was conducted in 2011 in three medical schools in the province of KPK, Pakistan. Two senior faculty members from each medical school were identified who were involved in curriculum development for more than 5 years. Semi-structured, in-depth non-standardized interviews were conducted from the identified faculty members concerned with mapping Human Nutrition curriculum. An 18 items questionnaire was developed by the author.

The questions were designed to investigate the following themes:

- Are their medical colleges that are constructing the maps for minor curriculum?
- What are the challenges encountered while building minor curriculum maps?
- What are the learning outcomes and objectives of the minor curriculum for the medical undergraduate in view of minor subject like human nutrition?
- Where in the curriculum the integrated or minor curriculum is taught?
- What instructional method is used to teach minor curriculum?
- Where in the curriculum the integrated or minor curriculum is assessed and how it is assessed?
- What type of assessment method is used to ascertain whether the curricular content has been learnt successfully?
- How the quality assurance criteria of the assessment are set?
- Are there any activities associated with curriculum evaluation of minor subjects such as description, comparison, and prophecy that contribute in making judgement on the merit and worth of the minor curriculum?

The findings for each theme was summarised as follows:

- Are their medical colleges that are constructing the maps for minor curriculum?

  The fixed criteria are laid down by Pakistan Medical and Dental Council. In Pakistan, there is no concept of mapping the minor curriculum. However, there are plans to map the minor curriculum themes, and workshops for raising awareness. Some medical schools are at initial stages of prioritizing the contents and integrating it between clinical and basic subjects.
- What are the challenges encountered while building minor curriculum maps?

  These were reported as issues concerning the university authorities, intentions of senior staff, and parental pressure.

  The university authorities, evaluation authorities, the senior faculty members, and administrators who are concerned with implementing the curriculum resist any change in curricula. This resistance causes tension with the younger members of the university academia who want to bring the syllabi up to date. As a third-world country, Pakistan lacks funds, time and resources to map curricula. Furthermore we are also deficient in qualified trained staff in the subjects, and there is no common understanding about standards for developing the minor curricula themes. The students and parents are uncomfortable about replacing traditional methods with modern approaches.
- What are the learning outcomes and objectives of the minor curriculum for the medical undergraduate in view of minor subjects like human nutrition?

  The learning outcomes are not yet described in detail. However, the basic biomedical sciences, clinical and behavioural sciences are being integrated through new approaches that includes community based learning, problem based learning and peer assisted learning. However, minor subjects such as human nutrition, medical

ethics, disaster management, post-disaster psychological effects, psycho-social disorders and human-rights/ women's-rights are still in the planning stage.

- Where in the curriculum the integrated or minor curriculum is taught?
  The minor curriculum is delivered in the basic, clinical, behavioural and community curriculum aspects. However, they might not be defined in discrete terms at present.
- Is the minor curriculum (like human nutrition) of your medical institute intended to teach the basics of that topic or not?
  There is emphasis on teaching and evaluation of all the basic aspects of minor subjects but it is not in a structured way.
- How are the goals of that minor topic related to the general goals of medical curriculum?
  Emphasis is placed on delivering the minor curriculum. However, the priority is to identify and fill in the gaps in the existing medical curriculum to make it more comprehensive and more practicable. Minor topics cannot be separated from any basic clinical, behavioural and community subject of medical curriculum. They are implicit, but they are not defined in discrete terms at present. For example "nutrition" in the medical curriculum is a basic concept because an understanding of diet is linked to the probability and the risk factors of developing and treating disease.
- What specific objectives will be needed to attain in order to fulfil these goals?
  We intend to produce such a doctor who is a community leader, a healer who earns the faith of the people and is a good team manager. Therefore, students should be competent and capable of significant cognitive, psychomotor and affective aspects of medical practice.
- How are the objectives constructed so that they are comprehensive, attainable and assessable within the selected time frame?
  The objectives should be relevant to the topics taught in a particular year and integrated into the timetabled subjects. Resources and delivery of teaching should be tailored to meet the specific needs within the limited resources available.
- What instructional method is used to teach minor curriculum in your medical institute?
  The majority of the teaching is delivered by traditional lectures. Students are also involved in small group discussions, field trips, ward duties and assignments. We are also introducing PBL (Problem Based Learning), community based learning, and team based learning or peer assisted learning but we have not yet developed the methods for evaluation of these.
- In your medical institute what are the educational experiences that are provided to the medical students to achieve those purposes?
  The students are exposed to educational activities, didactic lectures, and provision of pedagogic material, group discussions, ward duties and field trips where they are introduced to community proper and are sufficiently prepared for their eventual professional environment.
- In your view what contents of minor curriculum like in case of human nutrition are required to enable students to achieve the required outcomes?
  The curriculum should include biochemistry of nutrients, food sources, their daily requirements in different conditions, nutritional status assessment, nutritional deficiencies and their management at individual and community level. In the case of human nutrition the students must be able to distinguish between nutritionally deficient patient and otherwise. S/he must be able to select tests and interpret the results to make a diagnosis of nutritional disorders. The students should be practically involved and must have sufficient command of communication skills to educate the community on the preventive aspects and management of the diseases especially the nutritional disorders.
- How are those experiences and knowledge organized effectively? I mean to say that particular sequence of the content is considered or not? How the topics are conceptually and logically related? How knowledge is acquired and built upon?
  There is a set of sequence in the curriculum from first year to final year which is not yet integrated. Currently, we are working on integration of syllabi and have partially finished some levels in some subjects. For some aspects of knowledge we are using the spiral model but it is not entirely comprehensive and is at the embryonic stages.
- How can we determine that whether the purposes from the minor curriculum are being attained or not?
  We evaluate the progress of our students during group discussions, assignments, question answer sessions and comprehensive examination. Currently we have introduced our students to OSPE (Objective Structured Physical Examination) and OSCE (Objective Structured Clinical Examination) in which we have also included some C2 and even C3 level questions to the bank.
- Where in the curriculum the integrated or minor curriculum is assessed and how it is assessed?

We assess the minor curriculum at different levels of medical curriculum simultaneously, where they are taught. The minor curriculum is assessed through SEQs (Short Essay Questions), MCQs (Multiple Choice Questions) and oral *viva voce* examination.

- What types of assessment methods are used to ascertain whether the curricular content has been learnt successfully?
  At present we have switched over from long essay question to SEQs, MCQs, besides traditional examinations (oral viva examination). We have included C2 level OSPE and OSCE to our examination system. We do consider evaluation of attitudes and examining skills apart from just mere knowledge and interpretation.
- How the quality assurance criteria of the assessment are set?
  At present we do not have any such quality assurance criteria but in future we intend to carry out research into it, to know about it and its application. However, the questions are discussed first in the faculty meetings and then in the board meetings. The MCQs and SEQs are analysed for the level of reliability, validity and generalization. Proper keys are designed for MCQs and SEQs evaluation. Questions are continuously added and deducted from the bank based on the results of the test.
- In your view do the goals and objectives of minor curriculum of your medical institute address the needs of the learners?
  Although we teach the minor curriculum in detail at different levels but due to lack of evaluation and integration we address only 10% needs of the learners.
- In your view does the minor curriculum of human nutrition of your medical institute provides adequate opportunities for student learning?
  The minor curriculum of our institute provides adequate opportunities for student learning within the limited resources but we still feel a room for improvement if ample of learning opportunities are provided to facilitate them.
- Are there any activities associated with curriculum evaluation of minor subjects such as description, comparison, and prophecy that contribute in making judgement on the merit and worth of the minor curriculum in your medical institute?

At present we do not have the minor curriculum and the tools to evaluate the curriculum. The activities are being held at the level of university and Pakistan Medical and Dental Association but they are at very initial stages. The board of studies of our universities regularly evaluates the curricula and updates the curricula according to the needs of time and circumstances. We are hopeful that when minor curricula will be introduced the board of studies will evaluate every new addition to the curricula.

The findings reveal a number of issues to consider with respect to curriculum mapping. These include; attitudes of staff and parents, institutional systems and culture, aspiration and resources, and educational approaches.

Scepticism amongst senior faculty members is a limiting factor. Resistance to change cannot occur when the majority of the faculty do not understand, or support, the need for change. Senior faculty members are attached to their areas of expertise and any change is resisted due to the fear of losing control.[15] They are presently following the criteria laid down by PMDC (Pakistan Medical and Dental council) which was established in 1947, (with minor modifications in 1965 and 1972).

Curriculum mapping as a technique, has not been incorporated into the university procedures, evaluation processes, college management structures, and does not feature in evidence-based development. Key staff lacks awareness and training, which is an additional hindrance. The current suppressed economic circumstances impose a restriction on funding for faculty development. In addition, there is a shortage of professional departments with appropriate expertise in human nutrition and other minor themes, which limits authoritative guidance.

The aspiration is to produce a 'seven-star' doctor, able to assess individual and group problems and prescribe remedies for them. However, there is a lack of clarity about the goals and objectives that prospective graduates should achieve.

Although the Schools have embarked on the planning stage, and they intend to include human nutrition, medical ethics, disaster management, post disaster psychological effects, psychosocial disorders and other minor themes, there is no clear strategy about how this will be achieved. The difficulties are compounded as there are no standards that define the minor curriculum.

The predominant style of delivery is through didactic lectures, group discussions, field trips, ward duties and provision of pedagogic material. The intention is to introduce problem-based learning, community-based learning, and team-based and peer-assisted learning, which will enable the minor subject to be appropriately integrated into the schedule. The benefit of adopting a multiple approaches of teaching and learning is the underpinning of professional practice. In the medical profession self-directed learning, patient care, and research are considered to be the backbone of professional life. This will require a shift in the teaching role, from maintaining

passive learning to promoting active learning. The role of professional educator will include information provider, facilitator, assessor, planner, role model and resource developer.[7]

However, there was some resistance to change in the curricula. Following the implementation of COME curriculum (Community Oriented Medical Education) and the plan to introduce PBL (Problem Based Learning), the parents expressed concern and resisted any change in the traditional curricula.

The lack of certainty about the curriculum will be detrimental to assessment and students' achievement. Although the institutes have introduced a range of assessment instruments, for example, the long comprehensive examination, group discussions, assignments, OSPE and OSCE, any confusion about the nature of the learning outcomes reduces the validity of the examination, and limits the quality assurance criteria of the assessment.

The medical schools sampled may be regarded as representative of the general trend of curriculum development in Pakistan. The lack of clear learning outcomes, and a technique for mapping the curriculum components inhibits evaluation and informed developments in the curriculum. The absence of this technique prevents the minor disciplines from being included, in rational, balanced and appropriate curriculum. The challenge is not insurmountable.

The value of mapping outcomes has been demonstrated, for example, in Scotland, where five medical schools defined the Scottish Doctor[12] and described the outcomes necessary for graduates from Scottish medical to become competent and reflective medical practitioners. The World Federation of Medical Education in collaboration with the WHO is undertaking a process of accreditation of the world's medical schools. A national, collaborative effort by all medical colleges of Pakistan would share the resources required to formulate an up-to-date standardized medical curricula, and would synchronise with, and enhance the accreditation process.

RECOMMENDATION

Further research is required to investigate that what has been done on mapping the minor curriculum of all medical and dental colleges of Pakistan, and what are the practicalities to be considered when mapping the minor curriculum. A collaborative effort by all medical colleges of Pakistan should be made to optimise the resource requirement and help to formulate a national, standardized core curriculum for all medical colleges.

AUTHORS' CONTRIBUTION

SF, PE: Contributed to concept development and study design. SF: Conducted the structured interviews. SF, PE: Drafted the manuscript; SF, PE revised manuscript. None of the authors had a personal or financial conflict of interest to disclose.

Appendix-1: Questionnaire

No.	QUESTIONS
1.	Whether your medical college is constructing the maps for minor curriculum? If yes at what stage they are at?
2.	What are the challenges encountered while building minor curriculum maps?
3.	Which elements are typically included in the maps and which published outcome framework are included?
4.	What are the educational purposes that your medical institute wants to attain from the minor curriculum especially from the integrated topics like human nutrition?
5.	Is the minor curriculum of your medical institute intended to teach the basics of that topic for example in case of minor topic of human nutrition the basics are taught or not?
6.	How are the goals of that minor topic related to the general goals of medical curriculum?
7.	What specific objectives will be needed to attain in order to fulfil these goals?
8.	How are the objectives constructed so that they are comprehensive, attainable and assessable within selected time frame?
9.	What instructional method is used to teach minor curriculum in your medical institute?
10.	In your medical institute what are the educational experiences that are provided to the medical students to achieve those purposes?
11.	In your view what contents of minor curriculum like in case of human nutrition are required to enable students to achieve the required outcomes?
12.	How are those experiences and knowledge organized effectively? I mean to say that particular sequence of the content is considered or not? How the topics are conceptually and logically related? How knowledge is acquired and built upon?
13.	How can we determine that whether the purposes from the minor curriculum are being attained or not?
14.	What types of assessment methods are used to ascertain whether the curricular content has been learnt successfully?
15.	How the quality assurance criteria of the assessment are set, i.e., reliability, validity, standardization, sensitivity and specificity are looked?
16.	In your view do the goals and objectives of minor curriculum of your medical institute address the needs of the learners?
17.	In your view does the minor curriculum of human nutrition of your medical institute provides adequate opportunities for student learning?
18.	Are there any activities associated with curriculum evaluation of minor subjects such as description, comparison, and prophecy that contribute in making judgement on the merit and worth of the minor curriculum in your medical institute?

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