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## Integrated Modular System in Medical Education: Options for Simplification

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### Abstract

This special research article is an attempt to explain the new teaching system being introduced in many countries including Pakistan, and how it differs from the traditional system. I personally have worked under both systems and was part of the Curriculum committee at Islamic International Medical College (IIMC), Islamabad under Riphah University, where Integrated Modular System is being implemented. The complete Pharmacology Curriculum submitted by myself at the curriculum committee in 2012 was approved by the committee and is now being followed in IIMC.

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### LEARNING OBJECTIVES INCLUDE:

1. Understand the need for a new system
2. Explain the Integrated Teaching System
3. Describe types of integration
4. Describe features of integrated curriculum
5. Describe the steps of Integration
6. Acknowledge the advantages of the integrated system
7. Understand the assessment system in integrated system
8. Know flaws of the integrated system

### CHANGE! WHY?

What is the Need for Change?

Man has many a time been resistant to change and this time its no different. After a few attempts, it finally seems the new system is going to be implemented.

### NEED FOR CHANGE

Medical curricula are expanding continuously

Medical books 30-40 years ago were much thinner and now they have all become voluminous but

duration of course remains the same.

Students are being overloaded with knowledge

Thus students are being overloaded with knowledge, so much so, that the most common question from them now days is **“Sir, what are important questions?”**

Knowledge being imparted in a disjointed, uncoordinated manner

Departments are imparting their knowledge in isolation, independently where hardly any department even knowing what other departments are teaching.

Meaning of Integration

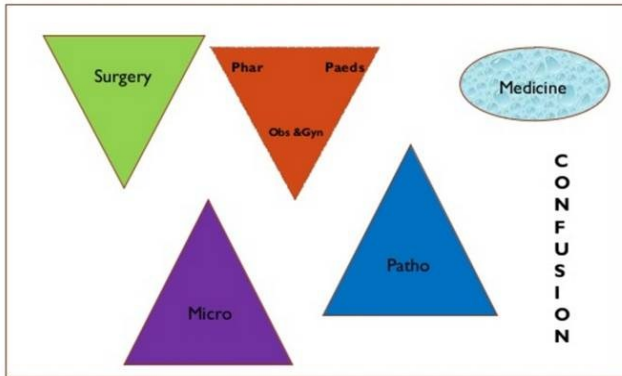
- Integrate means ‘To make into one whole’
- Integration denotes ‘Coordination of different activities to ensure harmonious functioning’

Let us compare the following two pictures of a “jigsaw puzzle”:

We can clearly see which puzzle has been solved and which one is confusing.



### Parts of a Puzzle



### Whole Puzzle

Makes a whole:



### PURPOSE OF INTEGRATION

- To increase effectiveness of the teaching-learning process
- By making information more easy to understand/more digestible

### BASIS OF TEACHING

- In the traditional system, teaching is subject based
- In the integrated system, teaching is system or module-based

### MODULES

A module is "A planned UNIT of educational experiences which is multidisciplinary"

#### Examples of Modules

1. Foundation Modules (Basics of each subject are taught; e.g. general pharmacology)
2. CVS Module
3. Respiratory Module
4. ENT, Eye Module
5. Cancer & Immunology Module

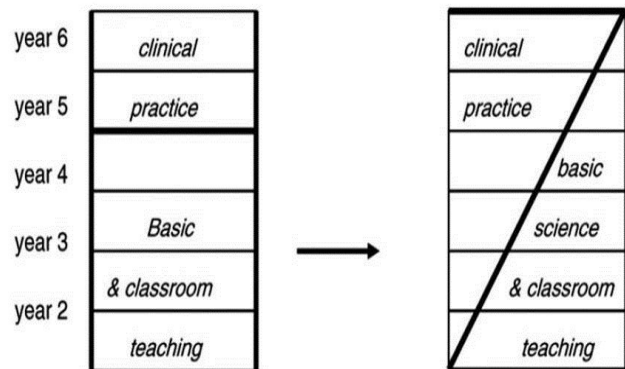
#### Requirements of a Module

- Module Coordinator
- List of Participating Departments
- Learning Objectives
- Teaching Methods
- Learning Resources
- Timetable
- Evaluation Plan
- Feedback

### SPIRALS OR PHASES

1. The integrated system runs in spirals, or also called phases, usually 2 or 3
2. All systems CVS, CNS, GIT etc. are taught in 2 spirals
3. In first spiral (1st 2-2.5 years), more emphasis is on basic science subjects (70 %) with less on clinical science subjects (30%)
4. Reversed in 2nd spiral (more emphasis on clinical science subjects (70%) and less on basic science subjects (30%))

This is seen in the following picture in which "H" shaped or ladder shaped curriculum is converted into "Z" shaped curriculum.



### DIRECTIONS OF INTEGRATION

- **Horizontal Integration:**  
The integration within basic science subjects or within clinical science subjects of the curriculum
- **Vertical Integration:**  
The integration between the basic and clinical science sections of the curriculum

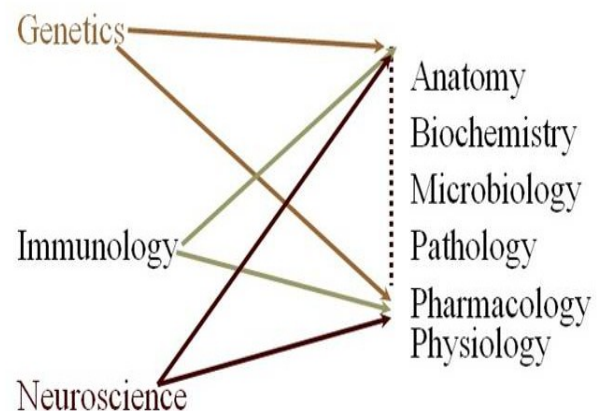
### EXAMPLES

What type of integration are these?

- A physiologist and pharmacologist sit together to discuss integration of topics of CVS
- A surgeon & anesthetist get together to discuss integration of topics related to cardiovascular surgery

Answer: Both of these are examples of horizontal integration

Following is another examples of horizontal integration:



**MORE EXAMPLES:**

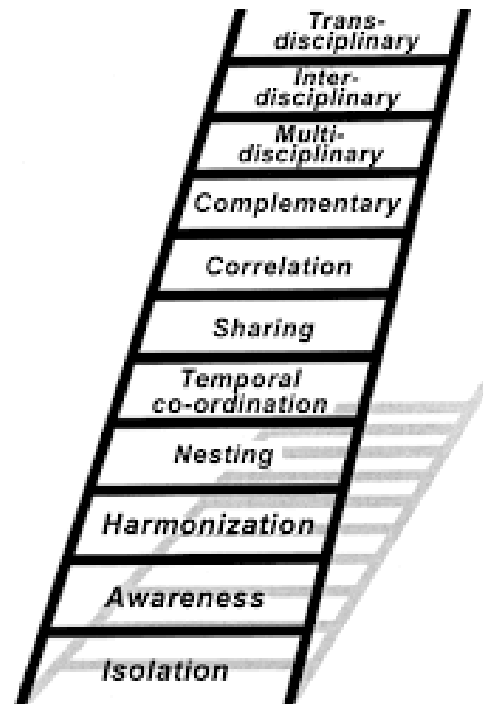
- **Horizontal:** Combined teaching-learning of renal structure and function by Anatomy and Physiology.
- **Vertical:** Combined teaching-learning of renal failure by Pathology and Medicine departments.
- **Both:** Combined teaching-learning of renal failure by the departments of Physiology, Pathology, Medicine and Surgery.

**THE INTEGRATED CURRICULUM**

1. Medical educationists stress that our aim is NOT to make students biochemists, pharmacologists, physiologists etc.
2. Our aim is only make them tomorrow's doctor or 7-star doctor;
3. Hence we should try to focus on aspects related to more pertinent problems, diseases/ conditions prevalent in our country.
4. A curriculum committee stresses that there should be a clear demarcation between what may be asked (or what level may be asked) from students of BDS, MBBS & MPhil. When I was making integrated curriculum in Islamic International Medical College, Islamabad under Riphah University, I was asked "please tell us what would be the difference in your MBBS curriculum and an MPhil curriculum?"
5. We were asked to make well-defined documented learning objectives as to what a student should know at the end of each topic. This would make it easier for the students to search answers to questions not found in recommended textbooks and know what is expected from a lecture that he/she has inadvertently missed. No question may come from outside those learning objectives.
6. As every teacher may have specific learning objectives of his own from each topic & may assess them in exams, so all these should be collectively or otherwise documented by the University.
7. Studies show that students learn best when curriculum objectives are well identified, related to each other and allied to real life experiences
8. Documenting these learning objectives encouraged students to search for answers instead of sticking to one textbook. It encouraged active learning. Similarly teachers were given freedom to teach and ask questions from any textbook as long as it was covering those learning objectives.
9. The system also gave the opportunity to students to challenge questions that came out of the documented learning objectives.
10. Makes horizontal & vertical integration much easier

**STEPS OF INTEGRATION**

11 Steps of Integration:



1. **Isolation:** Departments are working independently of one another in isolation, not knowing what others are teaching
2. **Awareness:** Teacher in one subject is made aware of what is covered in other subjects in the curriculum. Teachers made aware through documentation
3. **Harmonization** - teachers responsible for different disciplines consult each other and communicate about their course
4. **Nesting:** An integrated approach where teacher refers to knowledge and/or skills relating to other disciplines.
5. **Temporal coordination:** Parallel teaching, The timing of the teaching of topics is done in consultation with other disciplines. The timetable is adjusted so that topics within the subjects or disciplines which are related, are scheduled at the same time. Similar topics are taught on the same day or week while remaining part of a subject-based teaching programme.
6. **Sharing:** Two disciplines may agree to plan and jointly implement a teaching programme.
7. **Correlation:** More Subject-based plus integrated system (less).
8. **Complementary:** Less Subject-based plus integrated system (more)
9. **Multi-disciplinary:** A multidisciplinary approach brings together a number of subject areas in a single course with themes
10. **Interdisciplinary:** Higher level of integration In the interdisciplinary course there may be no reference to individual disciplines or subjects, and subjects are not identified as such in the timetable.
11. **Transdisciplinary:** Even higher level of integration.

**PROCESS OF INTEGRATION**

Trained faculty is required to formulate curriculum at the university level (while becoming part of the Curriculum committee). Everyone can give their input to their subject representatives as mentioned below:

1. Understand the integrated modular system.
2. Understand the need for the integrated system.
3. Understand how integrated modular system works.
4. Know which modules are planned to be taught in a particular year.
5. Formulate learning objectives of their respective subjects of every module.
6. Determine learning format of each learning objective (Lecture, SGD, PBL, OSPEs).
7. Get together & Integrate learning objectives horizontally and vertically (1-2 representative of each subject): e.g. Cardiovascular Module.
8. Subjects or topics that cannot be integrated are taught in separate or Parallel modules e.g.
  - ⇒ Islamic Studies
  - ⇒ Pakistan Studies
  - ⇒ Behavioral Sciences
  - ⇒ Research, Ethics
  - ⇒ Forensic Medicine
  - ⇒ Community Medicine
  - ⇒ ANS, Chemotherapy
9. Make a weekly time table of activities (lectures, practicals, SGDs, PBLs etc) of module.
10. Distribute copies of learning objectives of module before commencing it.
11. Teach course content according to the well defined learning objectives.
12. Understand the evaluation system.
13. Prepare MCQs, SEQs, OSPEs, OSCEs etc according to the defined learning objectives.

#### **PROBLEM-BASED LEARNING (PBL)**

This is a relatively new teaching methodology in which students are encouraged to acquire new knowledge of some important aspects of medical education through real life scenarios (problems), based on recognition to learn. In this system, students play a far more active role; working in groups, students identify what they already know, what they need to know, and how and where to access new information that may lead to resolution of the problem.

- ◇ Problems presented as real-life scenarios.
- ◇ Students take active participation in solving the problems.
- ◇ Scenarios involve aspects of multiple disciplines e.g. anatomy, physiology, pharmacology, medicine, surgery etc.
- ◇ Mostly involve integration.

#### **SELF-DIRECTED LEARNING.**

Students are encouraged, assigned with self-learning from the library, internet & other sources for related and new knowledge-become life long learners.

#### **EVALUATION SYSTEM**

1. Students are assessed after every module or after a combination of modules
2. Distribution of questions to a subject in an assessment is according to weightage of time given to each subject in the module (s)
3. Questions whether of C1 or C3 level, have to be formulated from the given learning objectives.
4. Formative and Summative Assessments
5. MCQs, SEQs, OSPEs, OSCEs
6. Recommended that students should pass in each subject of the module

#### **ADVANTAGES OF INTEGRATED SYSTEM**

Why or How is it a MORE EFFECTIVE system?

1. It helps to improve concepts through horizontal & vertical integration.
2. There is less repetition & overloading.
3. Develops critical thinking ability and brainstorming.
4. Vastly improves the cognitive & psychomotor skills of students.
5. Students become more interactive.
6. Enhances their ability to correlate clinically.
7. Learn to solve clinical problems, also with help of integrated PBLs.
8. Improves their diagnostic and management skills, so as to become better clinicians.
9. Learn art of self-learning.
10. The student is encouraged to adopt a holistic approach to patient.
11. Incorporates and stimulates the principals of adult learning.
12. Promotes communication and collaboration between staff.
13. Provides opportunities for high-quality research.
14. Inculcates life-long learning habits in students .

#### **FLAWS OF INTEGRATED SYSTEM**

1. Integration is a difficult task (how & when to integrate).
2. 100% Integration is NOT possible.
3. Lack of consensus among teachers while preparing curriculum.
4. Dissatisfaction among subject specialists about time & information allotted to them in the module(s).
5. Lack of adequate weightage given to subjects in evaluation.
6. Fragmented learning of subjects with fragmented assessment (subject is taught in parts in different years of the MBBS course, (e.g. General pharmacology in 1st year and CNS in 4th year).
7. Too many modules may result in complex timetables among the classes (each class of MBBS running their own modules).
8. Students may study subjects selectively (instead of studying topics selectively in the traditional system) if it is not necessary to pass each subject (e.g. if there are 10/100

mcqs from Pharmacology, a student may skip Pharmacology course all together and aim for 50-55% from remaining courses).

9. Needs increased number of highly qualified dedicated faculty & trained as well
10. Needs lot of other resources including infrastructure etc
11. Biggest Fear  
Fear among basic science specialists that their subject may be hijacked by clinicians

### CONCLUSION

1. There are references of institutions reverting back to the traditional system due to various reasons.
2. Integration should be done in the best way possible (and not experimented on students) before being implemented across colleges by the university.
3. More comparative research needs to be done and reported in journals about cognitive & psychomotor performance of students coming out from both systems in this country.

Only then may we have a better indication of which system is better.

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