System Approach

Dr R. P. Nerurkar
Professor & Head
Department of Pharmacology
T.N. Medical College & BYL Nair Ch Hospital Mumbai
Learning Objectives
At the end of this session participant should be able to

• discuss general system theory

• describe various elements of a general system theory

• describe briefly various components of a system approach to medical education and program planning

• list the advantages of system approach
System

• A system is a set of elements that functions as a whole to achieve a common purpose
  – Human body
  – Car
  – Solar system
  – A pendulum
  – Medical Education system
  – Medical Institution

• A system has functional identifiable parts that communicate efficiently and affect each other

• System concept can be applied to all fields of science, research, technology, industry, education, management and organizations
System Approach

- System approach is an approach that entails analysis of problems and come up with blend of solutions

- Tackling problems in an advanced disciplined manner keeping priorities in mind.

- System approach in teaching is a rational, problem solving method of analyzing educational process and making it more effective
4 main foundations of system approach

• Input

• Process
  – Subsystem
  – Interdependence of subsystems
  – Positive energy
  – Open systems interact with the environment

• Output

• Feedback
A typical system
Human Body as a system

• Input
  – Food, Water, Oxygen

• Process
  – CNS
  – CVS, RS
  – GI, Excretory etc

• Output
  – Carbon dioxide
  – Excreta – Feces, Urine
Medical Education System

• Medical Council of India
  – Mission, Goals

• Medical Colleges

• Departments
Medical Institute as a system

• Input
  Target Students
  Pre, Para and clinical knowledge

Process
  Teaching Learning Activities
  Medical Teachers Departments
  Subsystems

Output
  Young medico (Doctor) who will provide basic medical care to the society

Feedback from the Society
  – Quality of Doctors
Concept of General System Theory

• Proposed by Ludwig Von Bertalanffy in 1940s

• A system is a dynamic network of interrelated parts

• Each and every part is important in constituting the whole
  – If one part does not function → Problem in the system

• System as a whole is much more than sum of its part

• System as a whole functions differently than the parts of the system
General system theory

• All systems studied by physicist are “closed” – they do not interact with outside world e.g. Solar system, an atom, a pendulum

• A living organism will die without environment and therefore is a “open” system because it interacts with the environment
  – Input
  – Output
  – Boundary
  – Transformation of input to output is called throughput
An open system in interaction with environment
General system theory

- Individual parts of a system are called **subsystem**

- Group of interacting systems combine to form **supersystems**
  - Human → Family → City

- When we know what is going on in each every subsystem (depicted as white box)
  - Classical medicine is based on this reductionist view

- When we cant see what is happening to what goes in i.e. subsystems are not clearly defined (depicted as black box)
a system as a "white box", containing a collection of interacting subsystems, and as a "black box", without observable components.
The 'systems' model of the educational process
System Approach in Education - Steps

• **INPUT**
  – Formulation of Objective
  – Pre-assessment of pupils entry behavior
  – Desirable attitude and aptitude
  – Content to be taught and instructional material to be used is planned
  – Cost factor
System Approach in Education - Steps

• **PROCESS**
  • Deciding suitable teaching strategies
    – Appropriate Teaching Learning media, methods
    – Selecting appropriate evaluation procedures
    – Formulating a time table

• System Operation/ Implementation
  – Role and function of elements
  – Teaching, pupils, material resource

• Evaluation of learning outcome objectives
System Approach in Education - Steps

• OUTPUT

• Attainment of desired objectives $\rightarrow$ Achieved
  – System is allowed to continue

• Attainment of desired objectives $\rightarrow$ NOT Achieved
  – System needs to be modified
  – Restructure
  – Reorganize
  – Replan
Steps of System Approach in teaching

• Understanding and analyzing the present situation
• Framing the goals for the desired outcome
• Identifying the various tools for evaluating the obtained goals
• Creating alternative situations
• Finding out solutions considering cost benefit analysis
• Making framework of the system
• Making design of the supervision of the system
• Making framework to introduce the new solution
The various stages in the systems approach

1. Consider target population characteristics and topic area
2. Estimate relevant existing skills and knowledge of learners
3. Formulate objectives/learning outcomes
4. Operate course or curriculum
5. Select appropriate instructional methods
6. Assess and evaluate
Advantages of System Approach in Education

- Framework for planning, decision making control and problem solving
- Participants can identify the intent of the program
- Learners know what they are expected to learn is documented
- Instructors know what they will be teaching
- Knowledge, skills and behaviour expected to change are identified
- Provides a model for identifying problems so that steps can be taken for correction and improvement of quality of education
Characteristics of a Good System

• Effectiveness
• Efficiency
• Dependability
• Flexibility
• Acceptability
Problems in Medical Education System

• In the present system - Interns do not learn clinical skills during internship?

• Problems of education in a private medical institution?
Further Reading


• Basic Concepts of System Approach: http://pespmc1.vub.ac.be/sysappr.html


• System approach in science and engineering:
  http://www.creatingtechnology.org/sysapp.htm

• The System Approach: http://silvae.cfr.washington.edu/ecosystem-management/system.html