

PROBLEMISTICS IN HEALTH PROFESSIONAL EDUCATION

INCULCATING HOLISTIC CLINICAL REASONING AND PROBLEM SOLVING ABILITIES

KR Sethuraman *

INTRODUCTION

Although the practice of medicine is not a pure science, it is based on science and is always striving to become more scientific. Teaching of clinical practice is based on pragmatic considerations, educational theory, experience, and even on 'trial and error'. There is no justification to apologize for these attributes, because despite these shortcomings, our medical programs do yield practitioners who excel in clinical problem solving and who effectively navigate the complexities of diagnosis and treatment. There are no double-blind controlled studies of clinical reasoning or of any of the programs designed to teach clinical reasoning. We may not know precisely how our students become expert problem solvers, but over time most of them do so. Our job as educators is to continue to evolve our teaching methods in the hope that our students become more efficient and more accurate problem solvers (JP Kassirer, 2010)

Problem Based Learning (PBL) and Problem Solving Exercise (PSE)

The Essence of Problem Centred learning

Schmidt (1983) summarized PBL in terms of three essential principles:

1. Activation of prior learning via the problem;
2. Encoding specificity such that the resemblance of the problem to intended real-life application facilitates transfer of learning and
3. Elaboration of knowledge via group-discussion and reflection to consolidate learning experiences.

A characteristic of PBL, which follows from these attributes, is that it is unconfined by discipline boundaries, encouraging an integrative approach to learning which is based on requirements of the problem as perceived by the learners themselves and their identification of learning needs. Prior knowledge-base needed to solve the problem is not necessary for PBL. PBL is a major component of innovative PBL or Hybrid -'SPICES'- curricula.

In contrast, problem solving exercises (PSE) merely involve application of a prior learnt material. They are designed to consolidate prior learning and to scale up the level of student learning from knowledge to application and problem solving. PSE is a part of traditional curricula.

Fidelity Issues in PBL

However, the reality of PBL-scene in this region is not all that rosy. Jayawickramarajah (1996) did content analysis of six problem documentation sets of three medical schools. It revealed a number of factors influencing the construction of problem fidelity:

- i. Presentation format may vary from patient simulations and video recordings of cases (high fidelity) to "written simulations" in which the case is described on paper (exhibiting low fidelity).
- ii. Manifestation may be ill structured with a range of possibilities (high fidelity) or may be a comprehensive list of the pool of manifestation possibilities (low fidelity & textbook-like).
- iii. Associated problems -"noise"- may be included which complicate the scenario -"signal"- with possibly unrelated factors such as symptoms produced by medication or behavioural problems (high fidelity); alternatively, the problem may be filtered to present an isolated set of conditions (low fidelity).
- iv. Context may resemble that of actual situations such as those that afford the opportunity to talk to family members of the patient (high fidelity), or may be more contrived (low fidelity).
- v. Objectives may be defined in terms of the health of the patient (high fidelity and integration across disciplines) or may be discipline-bound (low fidelity and artificial).

He found that low-fidelity problems such as those stylistically borrowed from textbook models of problems to be "counterproductive in terms of the objectives of PBL. In this context textbook derived health problems are not considered very appropriate"

One of the important ways to improve the construct of problems for learning is for educators to understand the newer developments in the science of problem-dealing known as Problemistics.

* Prof. .Sethuraman MD, Vice-Chancellor,
Sri Balaji Vidyapeeth, Puducherry

Problemistics

Problemistics is the science of dealing with problems. It is an activity aimed at the recognition, identification and resolution of a problem and the development of Well-Being.

Problemistics is concerned with -

- Problem Framing – i.e., context and terms of reference (agenda)
- Problem Finding – i.e., identify the problem/s in all its dimensions
- Problem Solving – i.e., choose appropriate ways to resolution
- Problem Acting – i.e., act on the problem in a systematic way

It takes place in the following Spheres of life experience (life-world):

- Biomedical-sphere - nature and environment (e.g., infections)
- Socio-sphere - individuals and groups (e.g., phobic neurosis)
- Techno-sphere - tools and artifacts (e.g., implant malfunction)

It is apparent that most of the problem-based-learning involves only the second and third components of problem solving, usually limited to biomedical sphere only. In order to equip students with problem-dealing capabilities in a holistic manner, we need to expand the scope of PBL and PSE to include all the four components and the three spheres of life-world.

Problem dealer (The Healthcare Professional) needs development of the following characteristics:

- Dimensions emotive, cognitive, volitive
- Qualities thrill, skill, will
 - Thrill emotive dimension i.e. rapport building, empathy
 - Skill cognitive dimension i.e. critical thinking, creativity
 - Will volitive dimension i.e. patience, perseverance
- Purposes wisdom, wealth, health

WISDOM

Wisdom is appropriate understanding and judgement of reality, based on deep Knowledge that reaches the core and essence of reality of the problem on hand.

WEALTH OF OPTIONS

Wealth is freedom, richness and meaningfulness of choices and is not to be confused with abundance of material goods (affluence). Wealth emerges in the process of Design (Problem Solving) as a result of the shaping of Solutions to a continuous series of Problems with which the human being is confronted.

HEALTH

Health is biosocial (environment) and psychophysical (person) soundness and is not to be mistaken for simple lack of social ills or absence of physical/mental illness. Health emerges in the process of Planning (Problem Acting) as a result of the actuation of solutions to the problem.

(For further study of Problemistics, visit www.problemistics.org)

When one applies the concept of problemistics to clinical problem-solving, then the following list emerges:

- 1- Problem sensing
- 2- Problem hypothesizing
- 3- Problem searching & refining
 - rule in / rule out
 - prognostic and severity info
 - clues for most appropriate management option
 - new problems - biological, psycho-social, technical or economic
- 4- Problem identification (definite, single/multiple or indefinite)
- 5- Problem resolution (implement one or more of several Rx options)
- 6- Problem (resolution) verification

- problem(s) resolved fully
- not fully resolved and try another Rx option
- problem initially identified seems incorrect: redo from step-2
- in emergencies, initially a hypothesis for life-saving Rx; do a detailed work-up later

Components of cognitive skill:

- Attention to problem cues - mindfulness
 - Knowledge of relevant data
 - Skill in data gathering
 - Analysis and interpretation of data
 - Evaluate and prioritize the significance of the findings
 - Synthesize data in to diagnostic conclusions
 - Knowledge of available interventions
 - Selection and application of appropriate intervention
 - Evaluation of outcomes
 - Identification of the need for and application of changes in management as indicated
- (BJ Andrew, 1972)

The above list of problem-solving skills can be further split in to diagnostic clinical reasoning and therapeutic clinical reasoning (Jerome P. Kassirer, 2010). The list will help educators to adopt micro-component skills training strategies to systematically cultivate clinical reasoning abilities in the learners.

Components of Diagnostic Clinical Reasoning

- Hypothesis generation
- Context formulation
- Hypothesis refinement
- Test interpretation
- Bayesian reasoning
- Probabilistic, physiologic, and causal reasoning
- Differential diagnosis
- Assessing for adequacy, coherence, and parsimony
- Working (final) diagnosis
- Cognitive errors

Components of Therapeutic Clinical Reasoning

- Treatment under conditions of uncertainty
- Tradeoff between the risks and benefits of tests, and of treatments
- Choices based on the relation between the likelihood of disease and therapeutic risk
- Treatment thresholds
- Test-treatment thresholds
- Decisional close calls and “toss-ups” when faced with uncertainty
- Therapeutic trial as a diagnostic test
- Watchful waiting versus immediate action

Common difficulties in problem solving

“Pseudodiagnosticity” is the tendency to seek data relevant to a single disease, while ignoring information that point to alternative diagnoses. Human mind may have a tendency to test hypotheses sequentially rather than concurrently; therefore relate evidence only to the current hypothesis. I call it the “can-occur syndrome”, very prominently noted in novices: a new finding which is characteristic and even sine qua non of an alternate diagnosis is considered as a ‘can-also-occur-finding’ of the currently suspected diagnosis. The tendency of pseudodiagnosticity, of jumping to premature conclusion and to stick to a single hypothesis and is called “Freezing” in clinical psychodiagnosis. (L Kern & ME Doherty, 1982)

“Shot Gun approach” is another common tendency seen in novices: to try as many diagnostic and treatment options as possible so that one or more hits the ‘bull’s eye’ and help in resolution.

“Tunnel vision” problem solving is another common shortcoming in novices. They look at the problem from a narrow biomedical view and miss out on psycho-social and economic issues.

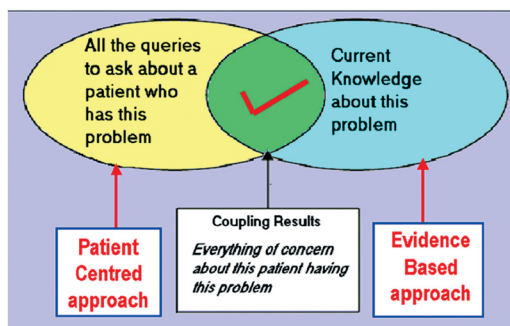
Problem-Knowledge coupler (PKC)

The use of Problem-Knowledge coupler (PKC) is a strategy to open the minds of learners to holistic dealing with problems.

Patient centred approach mandates a bio-psycho-social approach to consider all aspects of how the problem has affected the patient. Evidence based approach examines all the current scientific evidence for diagnosing and managing the problem. Combining both approaches permits synthesis of a solution to the patient problem that is specific to the particular case.

TABLE. SOME CHARACTERIZATIONS OF THE CONVENTIONAL AND PBL APPROACHES

Issue:	Conventional PSE	PBL
1. Class time to “cover subject”	100/100	80/100
2. Learning objectives	Selected by the faculty. Students see clearly 100% of the objectives planned.	Students generate about 60% of the objectives.
3. Subject focus	One subject at a time. Difficult to integrate but easier to be sure of what is expected.	Great for integration but difficult for students to resolve depth versus breadth.
4. Student focus - [learning style]	Tend to learn the facts and try to collect as many example, typical cases as possible.	Learn a systematic problem solving process and subject knowledge in the context of solving a problem.
5. Mode of Problem solving	Focus is on pattern matching – ‘fit’ the problem with a memorized data base of cases.	Current focus places little emphasis on pattern recognition.
6. Number of problems dealt with in a given time.	10	1
7. Assessment.	Traditional written & oral examinations. Students have clear idea of what to expect.	No formal exams - Self-assessment.



Summing Up

Given the complexity of healthcare and the piecemeal approach to managing patient problems, teaching-learning of how to deal with healthcare problems and solve them in a holistic manner is more important now than ever before. A thorough understanding of current concepts in clinical reasoning and problem dealing by the educators of 21st Century will equip them to effectively plan and implement relevant problem-oriented learning.

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