Integration of Science and Practice

Reasons for integration

1. Definition: Pharmacy is a health profession that links science with clinical practice to ensure patient’s optimum use of medicines and meet the health needs of the population.¹

2. Pharmacy curriculum: An undergraduate pharmacy program is fragmented with isolated courses, thus making it challenging for students to see a big picture and develop ‘integrative learning or thinking’.


¹

Outline

1. Introduction
2. Problem-based learning (PBL)
3. Workshop activity

3. Drug and health products: There are specific and high tech preparations.
4. Patients and the public: They are more demanding and require reliable disease and drug information.
5. Services: Healthcare and pharmacy services are getting complex with dynamic problems, but pharmacy students are not able to apply their knowledge and skills to solve the problems in practice.
6. Specialization: Pharmacy profession has moved towards pharmaceutical care with specialized pharmacists.

https://www.linkedin.com/pulse/20140321160204-8966999-integrating-laterals
**Pharmacy Programmes**

**Practice (Pharmacy Practice)**
- Clinical pharmacy/ pharmaceutical care
- Evidence-based practice
- Pharmacotherapy and PK/PD
- Pharmacoeconomic and health outcomes
- Adverse drug events and pharmacoepidemiology
- Social and administrative pharmacy (SAP)

**Science (Pharmaceutical Sciences)**
- Pharmaceutics
- Pharmaceutical chemistry
- Pharmacology
- Pharmacognosy and CAM
- Biomedical sciences

**Types of integration**

There are four types of integration:

1. Integrated curriculum
   - Individual disciplines are strategically combined to form a comprehensive whole.
   - Changing from a discipline-based curriculum with front-loading courses to an integrated curriculum.

2. Integrated courses
   - Only few courses

3. Integrated topics

4. Integrated assessments – Pharmacy Licence

- UK spiral curriculum – horizontal and vertical integration\(^2\)
- Curricular themes – body systems, diseases/symptoms, life cycle or mixed

Benefits and drawbacks of integration

Advantages

1. Students can acquire integrated knowledge and skills and apply them more effectively in practice.

2. Academics from various disciplines can work as a team – team teaching.

3. Students are mostly confused about the assessments.

4. Students’ knowledge and skills may be limited in some disciplines and this makes it difficult to pursue MSc or PhD study.

5. If fully integrated, each discipline will lose its uniqueness or specialization.

Disadvantages

1. Academic staff – fear for loss of courses and disciplines (workload)

2. Executives – pay less attention to the integration

3. Pharmacy Council of Thailand (http://pharmacycouncil.org/)
   - PharmD curriculum structure
     * Core competencies: 7 domains implying course contents...“Superduck Curriculum”
     1) Professional ethics and code of conduct
     2) Team-working and system management
     3) Information, communication and education
     4) Pharmaceutical products, herbal medicines, chemicals and quality control
     5) Drug procurement and preparation for individual patients
     6) Basic pharmaceutical care and use of herbal medicines
     7) Public health and healthcare system

   1) Ethical and moral development
   2) Knowledge
   3) Cognitive skills
   4) Interpersonal skills and responsibility
   5) Analytical and communication skills
   6) professional practice skills (professional competency)

4. Credits (>220) and time allocation (22 credits/sem)

5. Educational philosophy

Pharmacists are overeducated but underutilized!!!
Educational Philosophy (ปรัชญาการศึกษา)

- Educational philosophy is generally defined as the school of thought or concepts about education (i.e. teaching, learning and training) at all levels ranging from objectives, formats, methods and outcomes of education.

- Educational paradigm (กระบวนทัศน์การศึกษา), adapted from Guba's paradigm dialog, refers to a philosophical framework or set of beliefs that guides action on education, esp. horizontalism, constructivism.

- Program philosophy or ethos includes the mission, goals or objectives of a specific program that should be clearly specified in the programme and course specifications.


Two major educational philosophies

<table>
<thead>
<tr>
<th>American Philosophy</th>
<th>British Philosophy</th>
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<tbody>
<tr>
<td>- Pharmacy as a health science</td>
<td>- Pharmacy as a science</td>
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<tr>
<td>- Practice-focused curriculum (practice &gt; research)</td>
<td>- Research-focused curriculum (research &gt; practice)</td>
</tr>
<tr>
<td>- Knowledge and skills are acquired in various courses during a short period of time (or 1 semester = 15 wks).</td>
<td>- Knowledge and skills are obtained from integrated modules in a long period of time (or 1 year = 3 terms or 30 wks).</td>
</tr>
<tr>
<td>- Course credits are transferable between different programs.</td>
<td>- Module credits are NOT transferable.</td>
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<tr>
<td>- Both formative and summative assessments are used.</td>
<td>- Same as the US, but the summative are mainly criterion-based with percentages, i.e., Fail (&lt;40 or 50%), Pass (50-59%), Good (60-69%) and distinction (&gt;70%)</td>
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<td>- The summative can be either criterion- or group-based with grade-point averages (GPAs)</td>
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Problem-based Learning

- Problem-based learning (PBL), adapted from Barrows and Tamblyn, refers to a student-centered learning approach in which students learn about a subject through the experience of solving open-ended problems found in trigger material or "trigger", e.g. problem cases or scenarios, photos, video clips, etc. and it emphasizes on a learning process through group working.

- The PBL process does not focus on problem solving with a defined solution, but on knowledge acquisition, enhanced group collaboration and communication.

It was first introduced to education in 1950 and medical education at McMaster University in 1970.

Terminology regarding PBL:
- Pure PBL
- Hybrid PBL – PBL with lectures and other teaching strategies
- Modified PBL

### Relationship of PBL and other learning methods

PBL is associated with other learning methods

- Project- or task-based learning (TBL)
- Integrated learning
- Case-based learning (CBL)
- Problem-based learning (PBL)
- Patient-centered learning (PCL)
- Pathway models

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### Comparison of PBL and CBL

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PBL</th>
<th>CBL</th>
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<tbody>
<tr>
<td>1. Learning type</td>
<td>Active learning</td>
<td>Active learning (less)</td>
</tr>
<tr>
<td>2. Scenario or case drives the learning</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Focus</td>
<td>Learning process &gt; outcomes</td>
<td>Learning outcomes &gt; process</td>
</tr>
<tr>
<td>4. Prior knowledge or experience about the subject matter</td>
<td>No need</td>
<td>Need a certain degree</td>
</tr>
<tr>
<td>5. Learning objectives, outcomes or tasks</td>
<td>Set by the PBL group, but first determined by resource persons (or tutors)</td>
<td>Set by resource persons (or tutors)</td>
</tr>
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### Benefits and drawbacks of PBL

**Advantages:** Some advantages include:

1. Student-centered approach – “learn to learn”. PBL enhances active learning, retention and lifelong learning skills.
2. Helps students develop generic skills and attitudes required in future practice.
3. Integrates science and practice.
4. Motivates students and facilitators, as it is fun and they are all engaged in the learning process.
5. Fosters deep learning and team-working in a real life situation.
6. Helps acquire 21st century learning skills (4 C’s) – critical thinking and problem solving, communication, collaboration, and creativity and innovation.

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Disadvantages
1. Students may dislike PBL for various reasons.
2. Students may be overloaded by information for self-study or discussion.
3. Students may be worried about assessments or raise the issue of fairness.
4. Lecturers who enjoy passing on their knowledge via lectures may find a PBL session difficult or frustrating.
5. PBL cannot cover all contents.
6. PBL does not provide a role model.
7. PBL needs more staff to take part in the session.
8. PBL requires a large number of students to access the library databases or computer resources simultaneously.

PBL course: Design and implementation
1. Define learning outcomes for a course.
2. Identify individual outcomes achieved by PBL.
3. Determine the number of PBL sessions in the course.
4. Write learning objectives for each PBL, PBL cases/scenarios and facilitator guides (tutor notes).
5. Pilot with the faculty members.
6. Refine the cases/scenarios and facilitator guides.
7. Pilot them with student groups.
8. Write the PBL course syllabus or handbook for students.
10. Train facilitators and prepare students for PBL.
11. Implement the course.
12. Evaluate the course.

Components of PBL
PBL consists of the following:6
1. Resource person/subject specialist
2. Facilitator/tutor – staffing & workload
3. Students: 8 – 15 (av. 10) as Chair, Secretary/Scribe or members
4. Trigger material, i.e. problem case or scenario, video clip, etc.
5. Facilitator guide or tutor note
6. Learning resources – information sources
7. PBL room
8. Timetabling
9. Assessments – peer assessment, formative or summative assessment

People involved in PBL: Roles and responsibilities
Resource person/subject specialist
1. Prepare a trigger, esp. writing a problem case or scenario, based on predetermined learning objectives.
2. Write a facilitator guide or tutor note to clarify the relevant problems and details of possible issues discussed.
3. May act as a facilitator/tutor in a PBL session .... cons > pros

**Facilitator/Tutor:** Neutral & no decision-making authority

1. Encourage all group members to contribute.
2. Assist Chair with group dynamics and keeping to time, including resolving conflicts.
3. Check Scribe/Secretary keeps an accurate record.
5. Ensure the group achieves appropriate learning objectives.
6. Encourage students to utilize their prior experience to the benefit of the group and to clarify their ideas or examine new ideas.
7. Check understanding and test for agreement between group members.
9. Summarize the progress of the group.

**Students**

All students should have some generic skills and attitudes as follows:

- Team-working with good communication
- Chairing a group
- Listening – active
- Recording
- Co-operation
- Respect for colleagues' views
- Critical evaluation of literature
- Self-study and use of resources
- Presentation

**Students: Chair**

1. Lead the group through the PBL process.
2. Encourage all members to participate.
3. Maintain the group dynamics.
4. Keep to time allocated.
5. Ensure the group keeps to tasks in hand.
6. Ensure Secretary/Scribe can keep up and make an accurate record.
7. Summarize all tasks for self-study and discussion in the next PBL session.

**Students: Secretary/Scribe**

1. Record points made by the group.
2. Help the group order their thoughts.
3. Take part in discussion.
4. Record resources used by the group.
Students: Member
1. Follow the steps of the PBL process.
2. Take part in discussion.
3. Listen to and respect others’ contributions.
4. Ask open questions.
5. Help formulate learning objectives.
6. Research all the learning objectives.
7. Share information with others.
8. Take turn acting as the Chair or Secretary/Scribe.

PBL cases or scenarios
Characteristics of PBL cases or scenarios:
- Integrate knowledge of science and practice.
- Enable students to formulate learning objectives consistent with the faculty’s.
- Provide problems appropriate to the level of students’ understanding and the curriculum stage and sufficiently open so that discussion does not take place too early in the process.
- Have enough “intrinsic interest” for students or relevance to future practice.

PBL Process
- The process of PBL may have 4, 6 or 7 steps depending on faculty’s preferences.
- This workshop presents the adapted process of Maastricht Seven-Jump Method (https://www.maastrichtuniversity.nl/education/why-um/problem-based-learning)
  - PBL session 1: Steps 1 – 5
  - Self-study: Step 6
  - PBL session 2: Step 7

Step 1: Clarify terms and concepts
- (Introduce Facilitator and members, select Chair and Secretary, and read the trigger)
- Clarify unfamiliar terms in the scenario.
- Secretary/Scribe lists those that remain unexplained after discussion.
Step 2: Identify the problems
- Identify the problems needed to be discussed.
- Students may have different views on the issues, but all should be considered.
- Secretary/Scribe records a list of agreed problem(s).

Step 3: Brainstorming
- Suggest possible explanations based on prior knowledge.
- Students draw on each other’s knowledge and identify ideas of incomplete knowledge.
- Secretary/Scribe records all discussion.

Step 4: Identify possible explanations/solutions
- Arrange explanations into tentative solutions.
- Secretary/Scribe organizes the explanations and restructures if necessary.

Step 5: Set learning objectives
- The group reaches consensus on the learning objectives and set tasks.
- Facilitator/Tutor ensures learning objectives are focused, achievable, comprehensive and appropriate.

Step 6: Research solutions
- Students do self-study by gathering information related to each learning objective or task allocated.

Step 7: Synthesize results
- The group shares results of self-study by identifying their learning resources and results.
- Secretary/Scribe records the learning resources and results.
- Facilitator/Tutor checks students’ learning and assesses the group.

Workshop Activity
- Role playing – Facilitator and students (Chair, Secretary and members) for 1.5 hrs
- Follow the PBL process until Step 5 ≈ 1 hr
- Facilitator assesses the PBL process and students complete the peer assessment.
- Discuss PBL and integration of science and practice ≈ 30 mins