What is Problem-based Learning?

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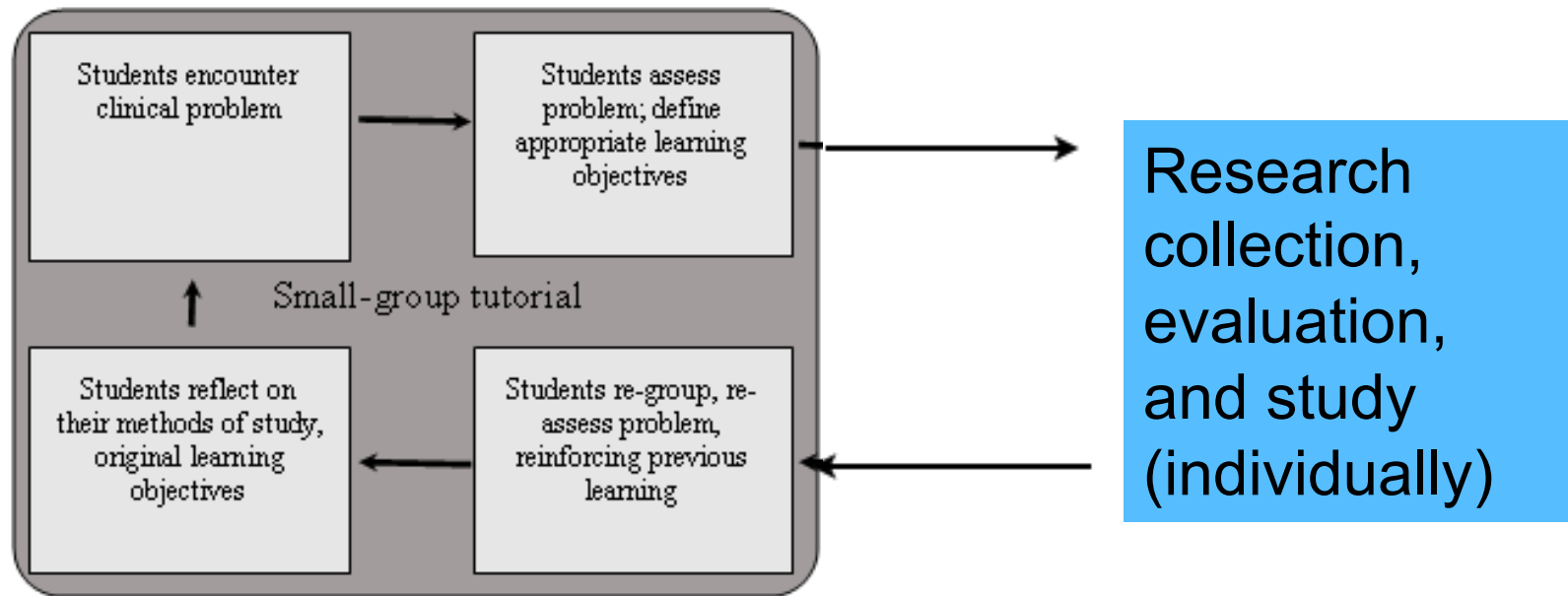
Outline

- Background and context
- Introduction to Problem-based Learning (PBL)
- Considerations for a successful PBL experience
  - Instructor
  - Curricular
  - Case
  - Tutor
  - Assessment

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Personal background

- Student in post-baccalaureate Doctor of Pharmacy program at University of Toronto:
  - Full therapeutics curriculum was delivered using PBL
- PBL tutor for the Faculty of Medicine, McMaster University
  - Vast majority of curriculum delivered using PBL
- Course developer and coordinator for PHARM 422 (Advanced Therapeutics)
  - Fourth-year course at School of Pharmacy taught with closed-loop PBL

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Important caveat...

- When I use the term PBL, I am referring to closed-loop PBL (the McMaster form)

Students encounter clinical problem → Students assess problem; define appropriate learning objectives

Small-group tutorial

Students reflect on their methods of study, original learning objectives ← Students re-group, re-assess problem, reinforcing previous learning

Research collection, evaluation, and study (individually)

Adapted from "Approaching PBL practically"
http://fhs.mcmaster.ca/facdev/documents/
ApproachingPBLPracticallySept.08.pdf

The School of Pharmacy

- Two plus four-year program, conferring entry-level Doctor of Pharmacy degree
  - Majority of students have completed a full University degree prior to enrollment

- Ideal graduate:
  - A caring, confident problem-solver with excellent communication skills

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Integrated patient focused-care (IPFC)

- Series of nine courses (years 2 to 4)

- Integrates pharmacology, pharmacokinetics, medicinal chemistry, clinical biochemistry, pathophysiology and therapeutics

- Taught in modular format

  – IPFC 1 – foundations, IPFC 2 – infectious diseases, IPFC 3 – endocrinology, IPFC 4 – cardiology....etc.

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Asthma week (In IPFC-1)

PHARM 422 (IPFC-9)

- Delivered using PBL

- Final therapeutics course prior to clinical rotations and graduation

- Main objectives for this course include integration of prior knowledge and skill development (versus content acquisition)
  - Cases are complex, reflective of real-life
  - Emphasis placed on retrieval, critical appraisal and application of the best available evidence

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The origins of PBL

- Harvard

- McMaster

Problem-based learning

- A problem is the stimulus to guide the student's learning

Students will:

1. Identify their learning needs (what do they know, what don't they know)

2. Utilize resources to address deficiencies in knowledge (e.g. primary literature, guidelines)

3. Critically appraise and apply information

4. Develop skills that enable them to be highly effective team members

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Problem-based learning: Why

- Student engagement

- May improve knowledge retention and improve self-directed learning skills

- Graduates tend to have superior cognitive and social skills

  - E.g. coping with uncertainty

- It bears a striking resemblance to real life

  - Patient issues are often ill-defined, information is frequently updated, health care is practiced in team environments

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PHARMACY Koh GC *et al.* CMAJ 2008;178:34–41

Problem-based learning: How

- Key elements:

  - Small-groups (8 or fewer students)

  - Problem (the case)

  - Protected time in the curriculum for self-study (4-6 hours per week)

  - Tutor

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Problem-based learning

Steps in the PBL process:

1. Identify the problem

2. Explore pre-existing knowledge

3. Generate hypotheses and possible mechanisms

4. Identify learning issues

5. <u>Self-study</u> **(outside of tutorial)**

6. Re-evaluation and application of knowledge to the problem

7. Assessment and reflection on learning

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Closed-loop PBL

- a.k.a. the McMaster form
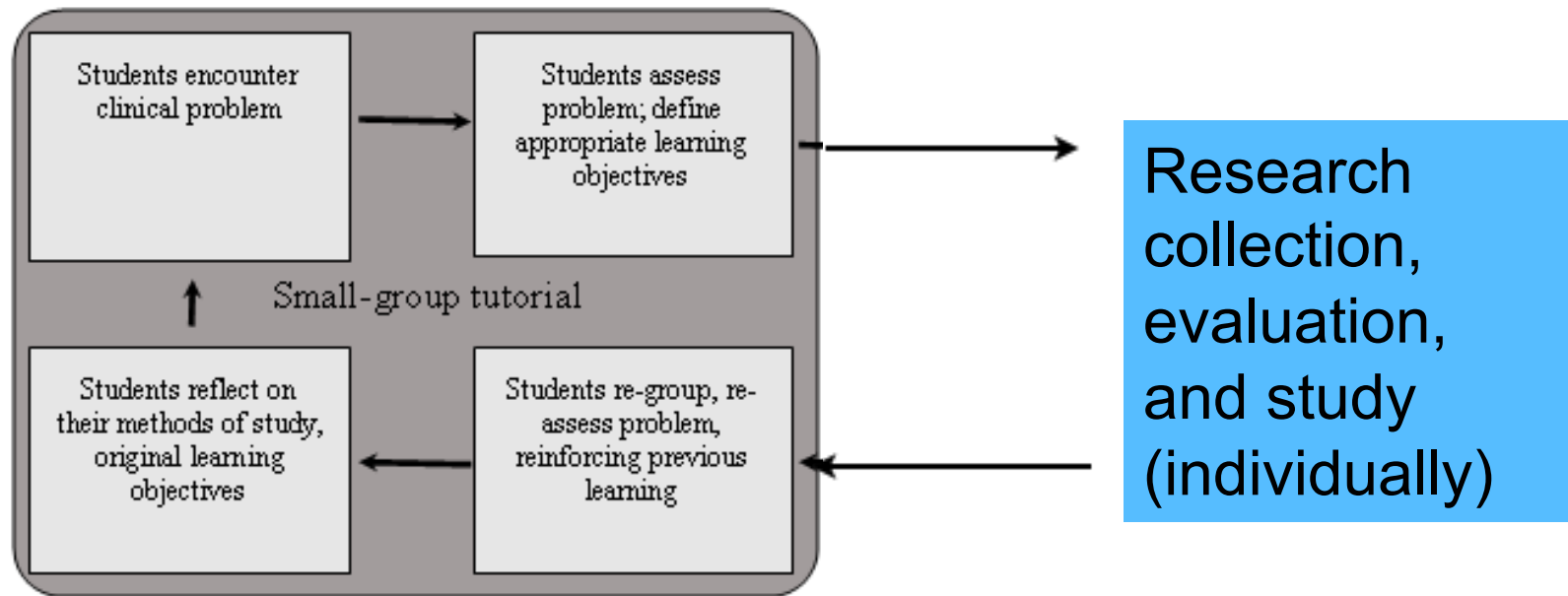
Sample tutorial schedule

15:30 to 17:15 - discuss learning objectives

17:15 to 17:30 - break

17:30 to 17:45 - "back to the case"

17:45 to 18:10 - develop learning objectives for new case

18:10 to 18:20 - assessment/reflection

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Modifications to PBL
(for illustration purposes, not endorsement!)
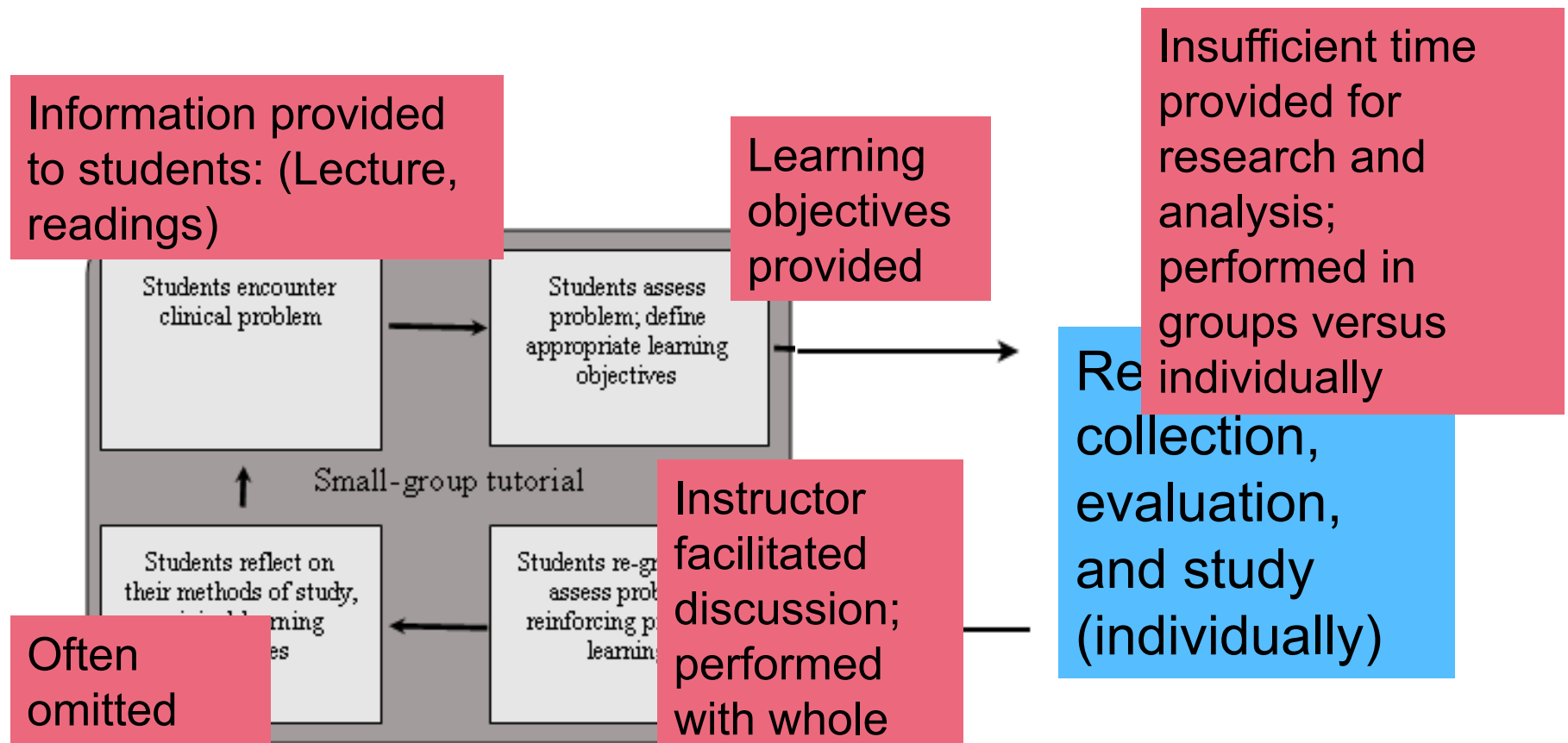

Information provided to students: (Lecture, readings)

Learning objectives provided

Insufficient time provided for research and analysis; performed in groups versus individually

Often omitted

Instructor facilitated discussion; performed with whole class versus small group

Research collection, evaluation, and study (individually)

Diagram text:

Students encounter clinical problem → Students assess problem; define appropriate learning objectives

Small-group tutorial

Students reflect on their methods of study, ... learning ...

Students re-gr... assess prob... reinforcing p... learning...

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Adapted ... ...ing PBL practically"
http://fh...master...ca/...acdev/documents/
ApproachingPBLPracticallySept.08.pdf

PBL considerations: Curricular

- Sequencing

  - Ideally (perhaps), PBL should be introduced later in the curriculum

    - Allows for reinforcing, and building upon foundational knowledge

    - Students (may) be more comfortable with the concept of "grey'

      - closer to being solo-practitioners

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PBL considerations: Curricular

- Sequencing

    – Ensure that important foundational topics have been covered, and/or appropriate supports provided

        - Examples from Pharmacy and Medicine:

            – Patient-care process (patient assessment, therapeutic thought process)

            – Critical appraisal of evidence

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PBL considerations: Curricular

SPRING 2017 Schedule

Rx2017 - 4B

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:30					
9:00				MEETINGS	
9:30	PHARM 425 LEC 9:00-10:50 PHR 1008 Symposium (Elaine Lillie)	PHARM 425 LEC 9:00-10:50 PHR 1008 Symposium (Elaine Lillie)	PHARM 425 LEC 9:00-10:50 PHR 1008 Symposium (Elaine Lillie)		
10:00					
10:30				PHARM 362 LEC (Part 2/2) 10:30-11:50 PHR 1008 Advanced Patient Self Care (Nardine Nakhla)	
11:00		PHARM 491 SEM 11:00-12:20 PHR 1008 Seminars in Pharm 3 (Colleen Maxwell)			
11:30			PHARM 466 LEC (Part 1/2) 11:30-2:20 PHR 1012 Advanced Geriatric Care (Luis Viana)		
12:00					
12:30		PHARM 362 LEC (Part 1/2) 12:30-3:20 PHR 1008 Advanced Patient Self Care (Nardine Nakhla)			
1:00				PHARM 466 LEC (Part 2/2) 1:00-2:20 PHR 1012 Advanced Geriatric Care (Luis Viana)	
1:30					
2:00					
2:30					
3:00					
3:30	PHARM 422 TUT 3:30-6:20 PHR 1008 IPFC 9 (Jeff Nagge)	PHARM 422 LEC 3:30-5:20 PHR 1008 IPFC 9 (Jeff Nagge)		PHARM 422 TUT (*8 rooms) 3:30-7:20 IPFC 9 (Jeff Nagge)	
4:00					
4:30					
5:00					
5:30					
6:00					

PBL considerations: Curricular

- Physical space

  – Each group of 6-8 students plus a tutor requires a room

  – 15 rooms required for PHARM 422 (!)

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PBL considerations: Case

Good PBL cases should be:

- realistic, preferably based on a real case
- engaging and able to stimulate integration of knowledge across disciplines
- challenging, but adjusted to students' prior knowledge
- set in a context representing students' future careers
- stimulating to students' discussion at a higher cognitive level
- open-ended or using a gradual disclosure design
- addressing the pre-set learning objectives
- student-centred in their design

Azer SA *et al*. Medical Teacher 2012; 34: 361–367

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PBL considerations: Case

Upon completion of this case, students will be able to help a patient optimize their medication regimen for the prevention of cardiovascular events taking into account their values and preferences.

Tutor info (not to be given to the students)

Instructor objectives:

1. Describe the strengths and limitations of various methods used to measure blood pressure, and outline a role for BpTRU testing in primary care
2. Outline the design and main findings from the HYVET and the SPRINT studies
3. Compare and contrast the main strengths and limitations of the HYVET and SPRINT studies, and be able to apply the findings to patients with hypertension
4. Referring to primary literature, discuss the potential harms associated with intensive blood pressure lowering, focussing on older individuals.
5. Explain the role for other non-pharmacological and pharmacological cardiovascular risk-

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PBL considerations: Case

Important concepts/probing questions

How estimate this patients risk of a cardiovascular event? How would you communicate this risk estimate to the patients?

1) Some students may try to use a cardiovascular risk calculator to estimate Shamir's risk of a cardiovascular event. This is inappropriate for a few reasons. First of all, he has peripheral artery disease. As such, the Framingham risk equations do not apply, because the people studied in the Framingham cohorts were free from cardiovascular disease at baseline. Second, he is 81-years old. The risk calculators start to lose accuracy when individuals are older than 75. Additionally, at the age of 81, the largest contributor to his risk of a CV event is his age (which clearly can't be modified by intervention!). It is probably best to simply acknowledge that his risk of a major CV event in the next 5 to 10 years is likely greater than 20%.

Why are there differences between Shamir's BP measured at the last visit

PBL considerations: Case

- To provide references, or to not provide references....
  - Balance between risk of missing important information and harm of not practicing search skills
    - PBL example case
  - Likely depends upon placement in the curriculum (early vs. late), and goals of the course (content delivery versus skill development)

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PBL considerations: Tutor

Responsibilities of the PBL tutor:

- **<u>Making the environment comfortable</u>**

- Facilitate planning (structure of tutorials)

- **Provide guidance on learning objectives**

    – **Ensure they are complete, clearly written, and not overly tangential**

- Provide guidance when students get "off-track"

- **Ask probing questions and challenge assumptions**

    – **Ensure they are critical of any evidence they cite**

- **Evaluate learning outcomes**

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PBL considerations: Tutor

- Should they be content-experts, or not?

- Adequate training is **essential**

  – Need to know: PBL theory, attributes of good tutors, how to facilitate reflections, how to ask probing questions, how to provide meaningful feedback for individuals students and the whole group

    - Develop a retention strategy!

- Remuneration

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PBL considerations: Assessment

Assessment	Brief Description	Value/100
Mid-term test	Short-answer, case-based questions	20
Final exam	Short-answer, case-based questions	30
Mid-term tutorial assessment	Participation in tutorial will be graded by the tutor, and will include assessment of each students' professional behaviour, contribution to group process, and contribute to group content	15
Final tutorial assessment	Participation in tutorial will be graded by the tutor, and will include assessment of each students' professional behaviour, contribution to group process, and contribution to group content	35

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PHARM 422 (IPFC-9): Tutorial performance rubric

Student name:_____ Tutorial group number:_____ Midterm evaluation   Final evaluation

Categories	Unsatisfactory (1 point)	Fair (2 points)	Highly proficient (3 points)	Exceptional (4 points)	Multi-plier	Total
Professional behaviours	Not able to accept or give constructive feedback OR rarely punctual or prepared OR lack of respect shown toward others OR did not exhibit positive attitude.	Rarely provided feedback OR not prepared or punctual on a few occasions. Generally positive and engaged.	Generally provided quality feedback (sometimes superficial). Always positive and engaged. Generally punctual and prepared.	Consistently adept at giving and receiving meaningful constructive feedback. Consistently engaged. Always punctual, positive and prepared.	x1	
Quality of contributions	Contributions were consistently incorrect, inaccurate, irrelevant or superficial. Did not meaningfully contribute to discussion.	Unclear whether student understood a significant amount of the material. Did not contribute to enhancing the understanding of others (see next two columns). Contributions were sometimes irrelevant, incorrect, or inaccurate.	Generally demonstrated a clear understanding of the material. Helped facilitate the understanding of others by asking questions and clarifying points. Generally checked the accuracy and validity of information; generated and considered alternative perspectives.	Conveys a greater than expected understanding of the material. Contributions were consistently accurate, precise, insightful, and frequently enhanced the understanding of other group members. Asked relevant and insightful questions and clarified points; generated and considered other perspectives. Made links with prior relevant readings, experience and knowledge. Masterful use of resources to support contributions.	x2	
Quantity of contributions	Rarely contributed to the discussion or consistently dominated the discussion.	Usually participated in discussion. Participation was limited at times or occasionally dominated the discussion	Consistent and balanced participation throughout the tutorial	N/A (highest is proficient)	x1	
Contribution to group process and leadership	Uncooperative or unwilling to listen to and support others to achieve group objectives, passive with respect to planning tasks and resolving problems	Generally cooperative, but occasionally unwilling to listen to or support colleagues, provided occasional leadership but generally left others to take initiative and solve problems	Consistently listened to others ideas and worked cooperatively to achieve group goals. Provided some leadership and initiative to help the team achieve its objectives.	Consistently listened to others; willing to sacrifice personal interests to achieve group objectives. Encouraged participation of others. Provided consistent, effective leadership to help team achieve objectives and resolve problems. Emerged as the obvious group leader.	x2	

Instructor comments:	Total score (maximum score = 23)	

2
8

Rubric as it appears on LEARN

PHARM 422 tutorial rubric

(not graded yet)

Criteria	Exceptional	Highly proficient	Fair	Unsatisfactory	Score and Feedback
Professional behaviours	○ 4 points Consistently adept at giving and receiving meaningful constructive feedback. Consistently engaged. Always punctual, positive and prepared	○ 3 points Generally provided quality feedback (sometimes superficial). Always positive and engaged. Generally punctual and prepared.	○ 2 points Rarely provided feedback OR not prepared or punctual on a few occasions. Generally positive and engaged.	○ 1 point Not able to accept or give constructive feedback OR rarely punctual or prepared OR lack of respect shown toward others OR did not exhibit positive attitude	
Quantity of contributions	○ 0 points N/A (highest is proficient)	○ 3 points Consistent and balanced participation throughout the	○ 2 points Usually participated in discussion. Participation was	○ 1 point Rarely contributed to the discussion or consistently	

PBL: Excellent resources

- http://www.fhs.mcmaster.ca/facdev/teaching_tools.html

- http://fhs.mcmaster.ca/facdev/documents/ApproachingPBLPracticallySept.08.pdf

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PBL experience in Pharmacy

- IPFC – 9 student feedback (first offering):
  - Not very positive
    - "What is the right answer?"
    - "Why do some groups learn different things?"
    - "Give us the learning objectives!"

  - Solution:
    - Do nothing

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PBL experience in Pharmacy

- IPFC – 9 student feedback (subsequent offerings):
    - "I thought this was the best IPFC in terms of student learning"
    - "PBL is a good idea...it helped me build confidence when providing therapeutic recommendations and be more comfortable about confronting disagreements on therapeutic decisions"
    - "Love PBL - great way to learn"
    - "(I) felt I retained information better than from a didactic lecture"

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