Problem- based learning (PBL)

Medical Education Department
Faculty of Medicine,
Alexandria University.

Speakers

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Dr. Mennatallah Hassan Rizk Ismael	**Lecturer of Medical Education, Faculty of Medicine, Alexandria University.**
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Agenda

Time		Activity
8.30 – 9 am	Registration , pretest	
9 – 9.15 am	Overview about Manchester program in Faculty of dentistry, Alexandria University	Presentation
9.15 – 9.30	PBL Workshop agenda	
9.30 – 10.00 am	Demo PBL case	Video Group activity
10.00 – 10.45 am	Group reflections on PBL	Group activity
10.45 – 11 am	Coffee Break	
11 – 11.20 am	PBL educational strategy - The emergence of problem-based learning - What is PBL? - Rationale for PBL? - PBL and educational theory: Learning how to learn	PPT Presentation
11.20 – 11.40 am	- PBL process/steps - PBL Ground rules - PBL problem construction	Presentation
11.40 am– 12 pm	- Roles of tutor and students in PBL tutorials	Presentation
12 pm – 12.20 pm	- Assessment of tutor, students and group performance in PBL tutorials: Checklists and rubrics	Presentation
12.20 – 12.40 pm	Conclusion: Recap of the main points PBL Challenges, barriers	Group Discussion
12.40 – 1 pm	Post test and Evaluation	

Contents outline

- The emergence of problem-based learning in medical education (Traditional vs. innovative curricula)
- What is PBL? Rationale for PBL?
- PBL and educational theory: Learning how to learn
- PBL process/steps
- PBL Ground rules
- PBL problem construction
- Roles of tutor and students in PBL tutorials
- Assessment of tutor, students and group performance in PBL tutorials: Checklists and rubrics
- PBL Challenges, barriers and outcome issues

Student-Centered Learning
Small Group Learning

Problem Based Learning

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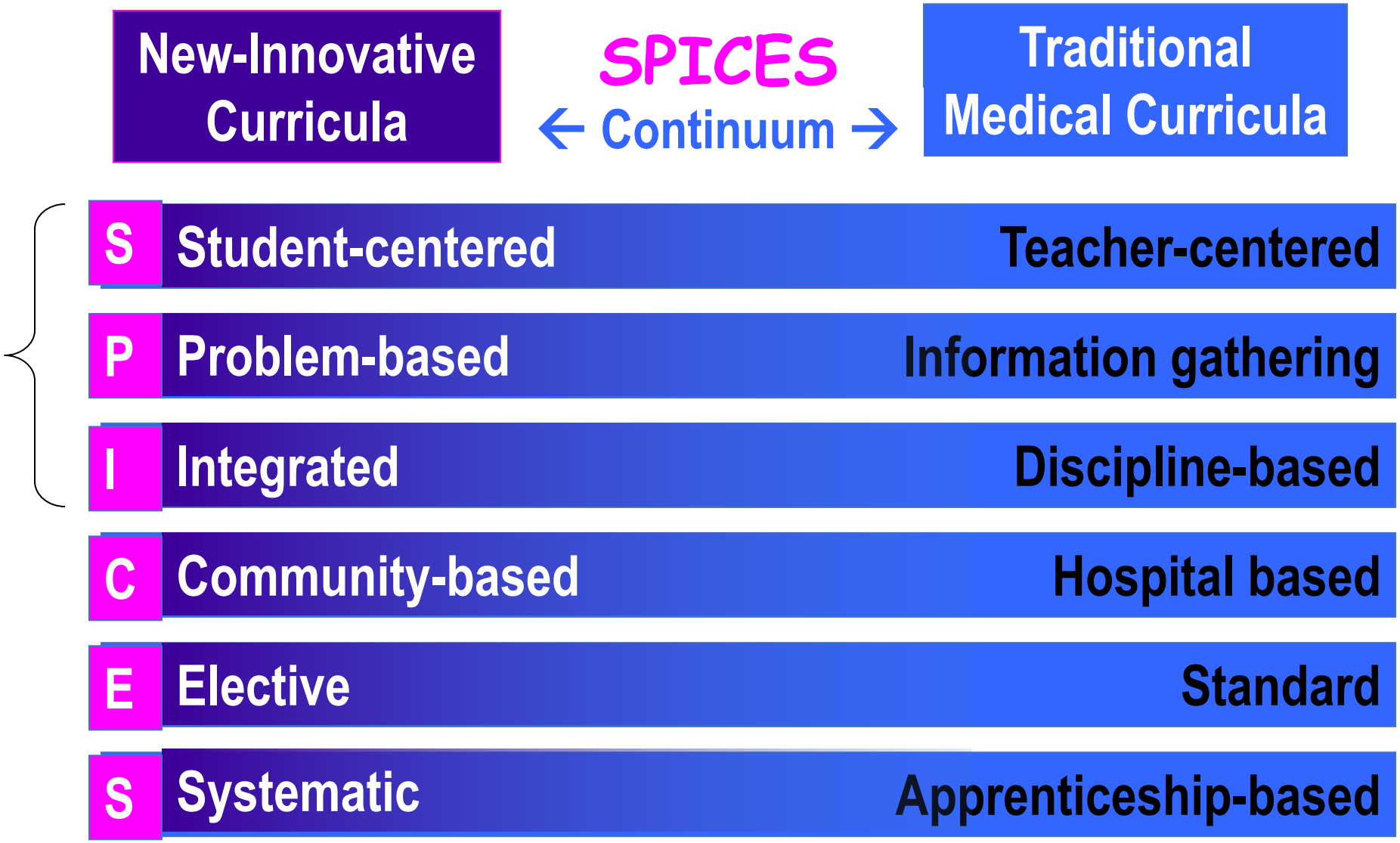
New-Innovative Curricula
SPICES
← Continuum →
Traditional Medical Curricula
S
Student-centered
Teacher-centered
P
Problem-based
Information gathering
I
Integrated
Discipline-based
C
Community-based
Hospital based
E
Elective
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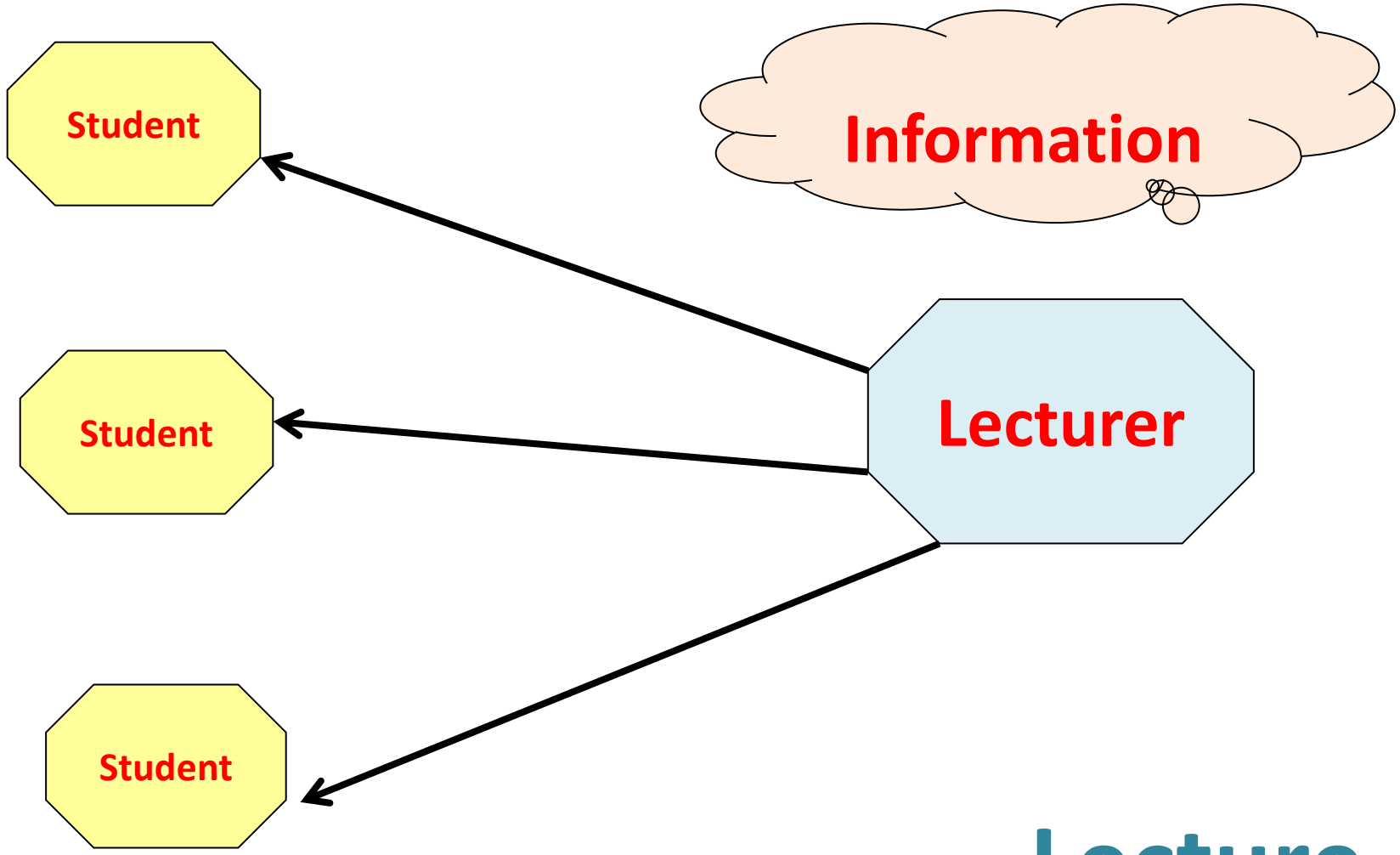
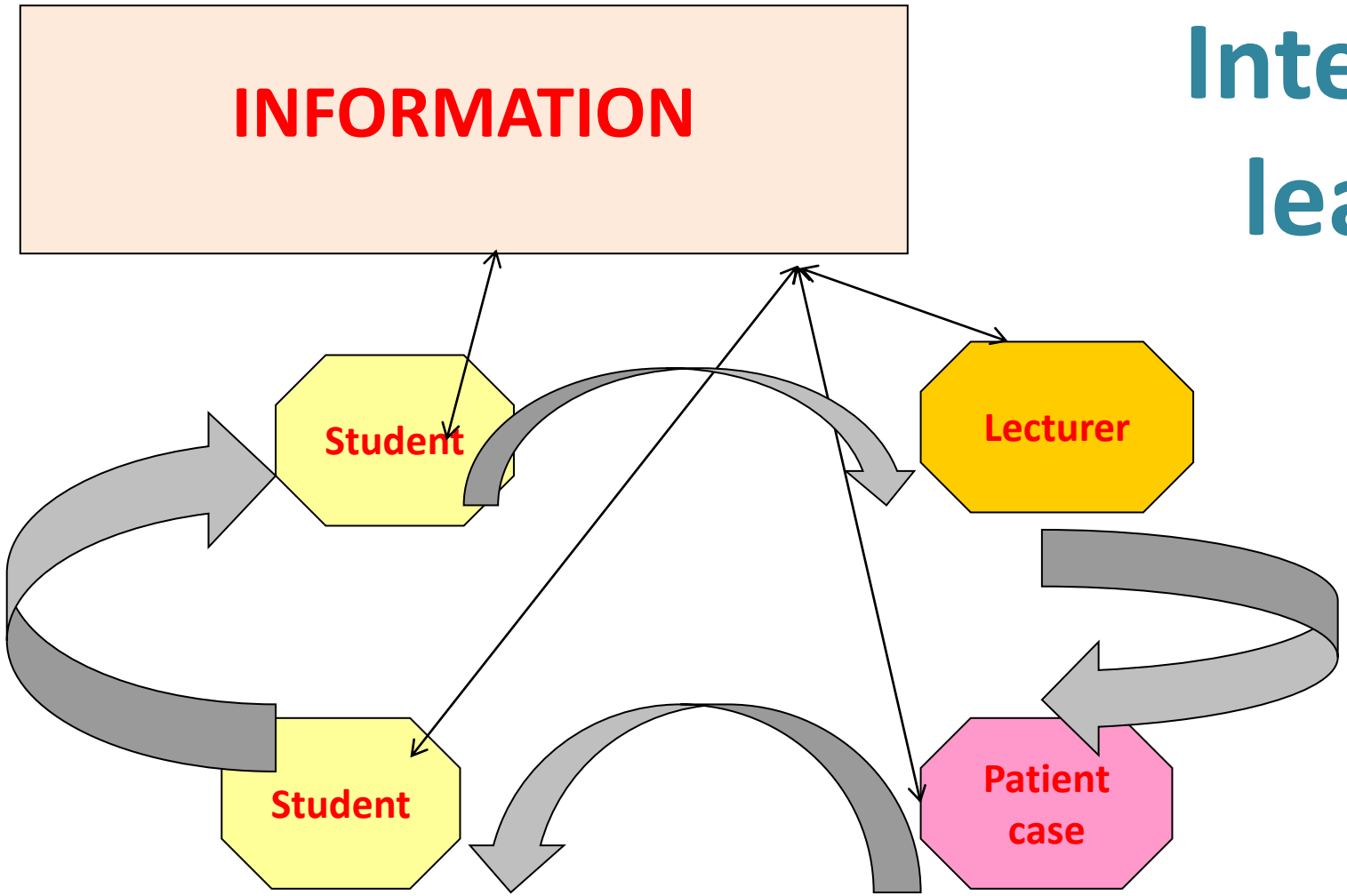
Apprenticeship-based



Lecture

Interactive learning



Small Group Learning

WHY ?

Students
play an active role

- Teamwork
- Listening
- Recording
- Cooperating
- Negotiating
- Explaining
- Critical evaluation of literature
- Use of resources
- Presentation skills
- Independent responsibility for learning
- Sharing information
- Respect others

Small Group Learning

HOW ?

Small Group Learning

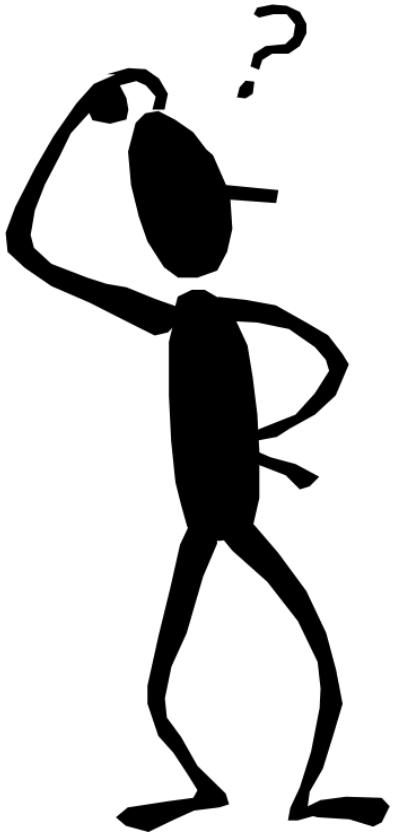
- ✓ Small Group Discussion
- ✓ Group Assignments
- ✓ Team based learning (TBL)
- ✓ **Problem based learning (PBL)**
- ✓ Case based learning (CBL)
- ✓ Practical / Clinical Sessions

Active participation

Face-to-face contact

Purposeful activity

PBL
What Is It?

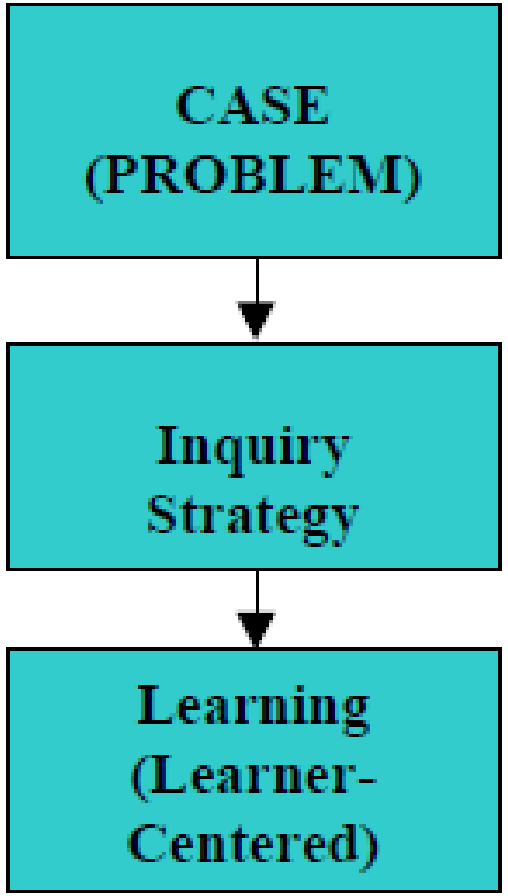


PBL

An instructional **student-centered approach** which uses carefully constructed problems as a context for students to:

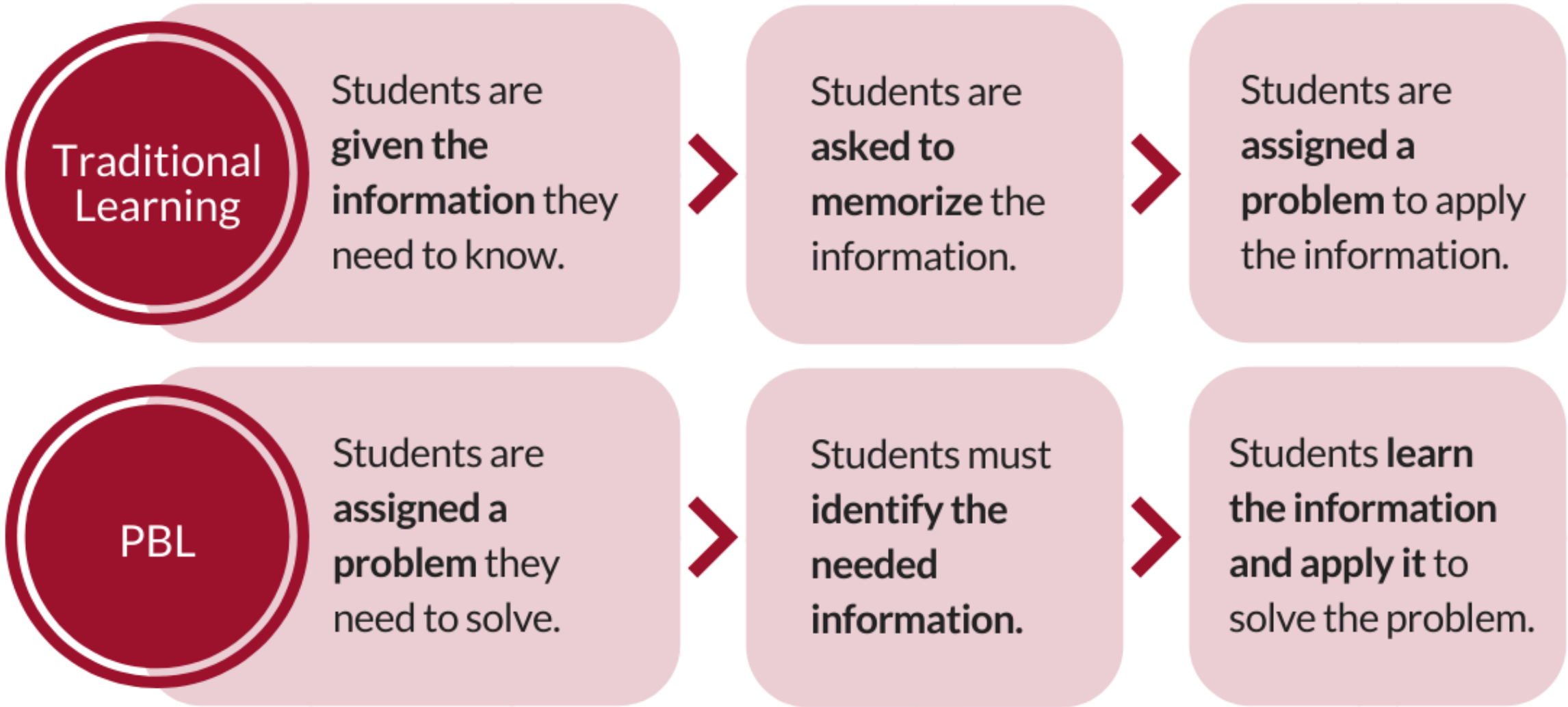
- ❑ The problem is the stimulus for the need to know.
- ❑ define their learning needs
- ❑ apply their knowledge & skills to solve a structured problem

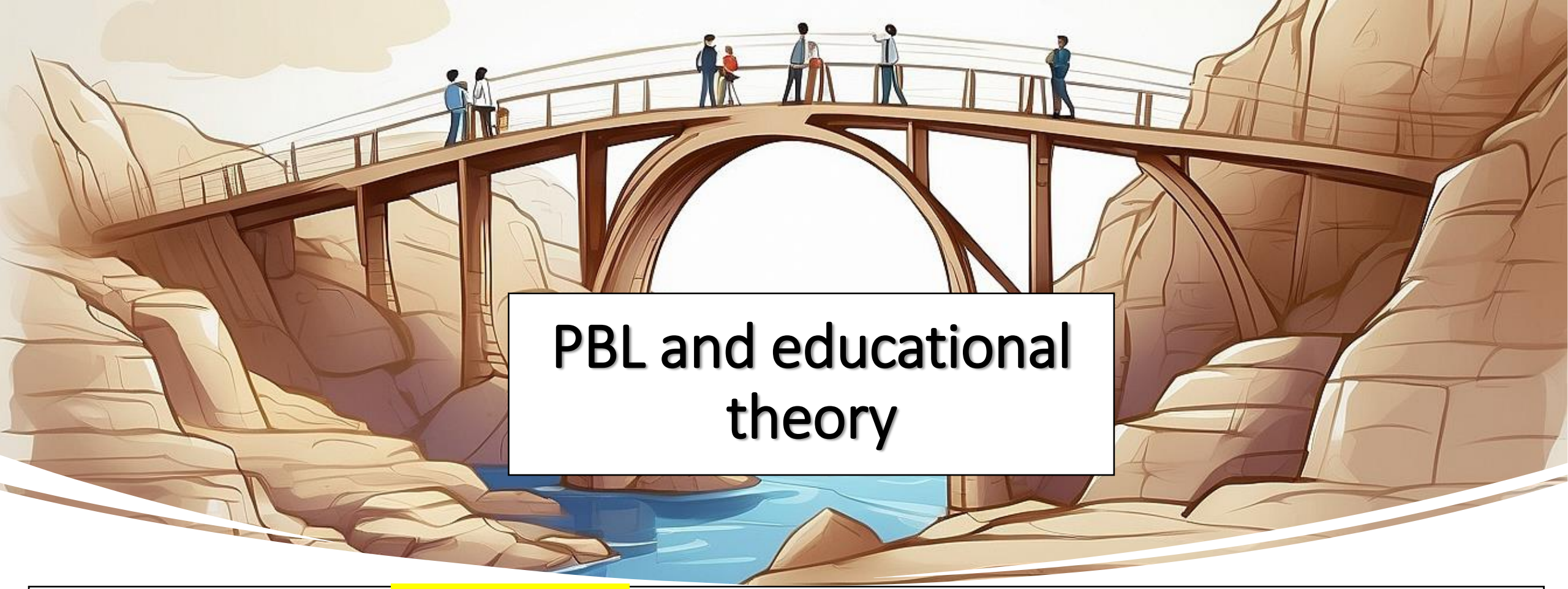
What is Problem-Based Learning (PBL)?



Traditional approaches have been criticized because they:

- **Create an artificial divide between the basic and clinical sciences.**
- **Have students struggle to apply the Knowledge.**
- **No apparent relevance of basic sciences**


Traditional Learning
Students are **given the information** they need to know.
Students are **asked to memorize** the information.
Students are **assigned a problem** to apply the information.
PBL
Students are **assigned a problem** they need to solve.
Students must **identify the needed information.**
Students **learn the information and apply it** to solve the problem.



PBL and educational theory

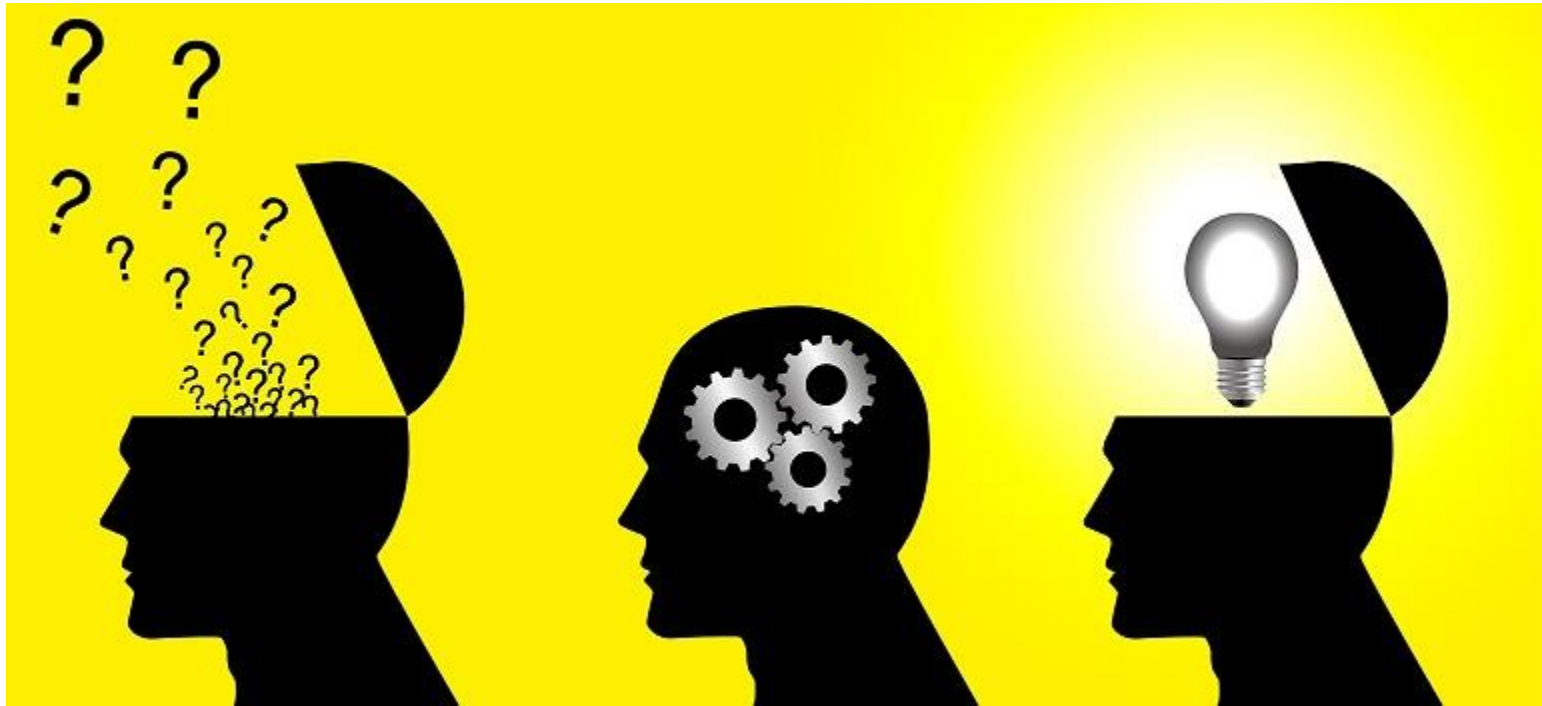
- Students have **pre-existing** knowledge, skills, beliefs and experiences that affect what and how they learn.
- PBL helps learners build a **bridge** between what they **already know** and what they **need to know**.

The rationale for PBL

- **learning is:**
  - Student-centered
  - Motivating for the student
  - Relevant to a career in medicine
  - Adaptable to the needs of the student

The rationale for PBL

- Students develop clinical reasoning and problem-solving skills



The rationale for PBL

- Promote interpersonal skills and the ability to work as a team member.

The rationale for PBL

- Learning how to learn.

PBL process/steps and ground rules

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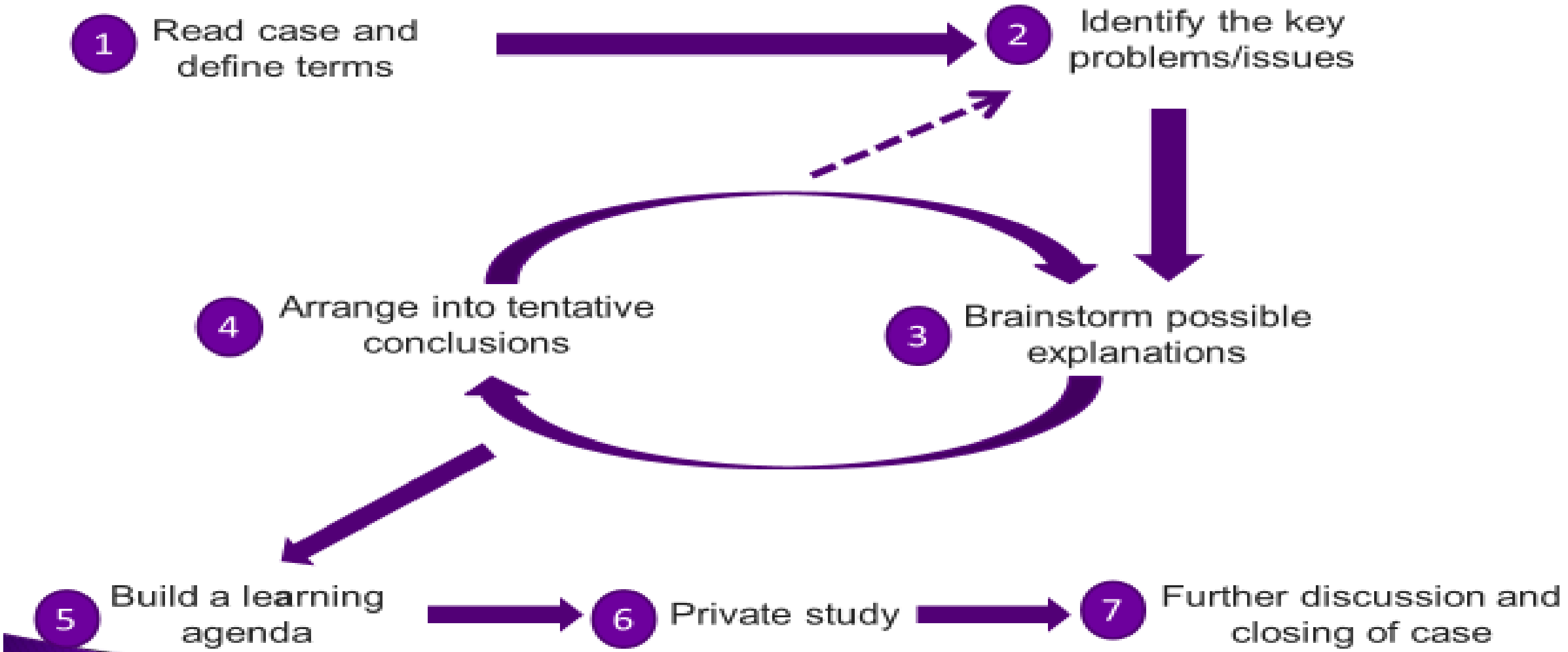
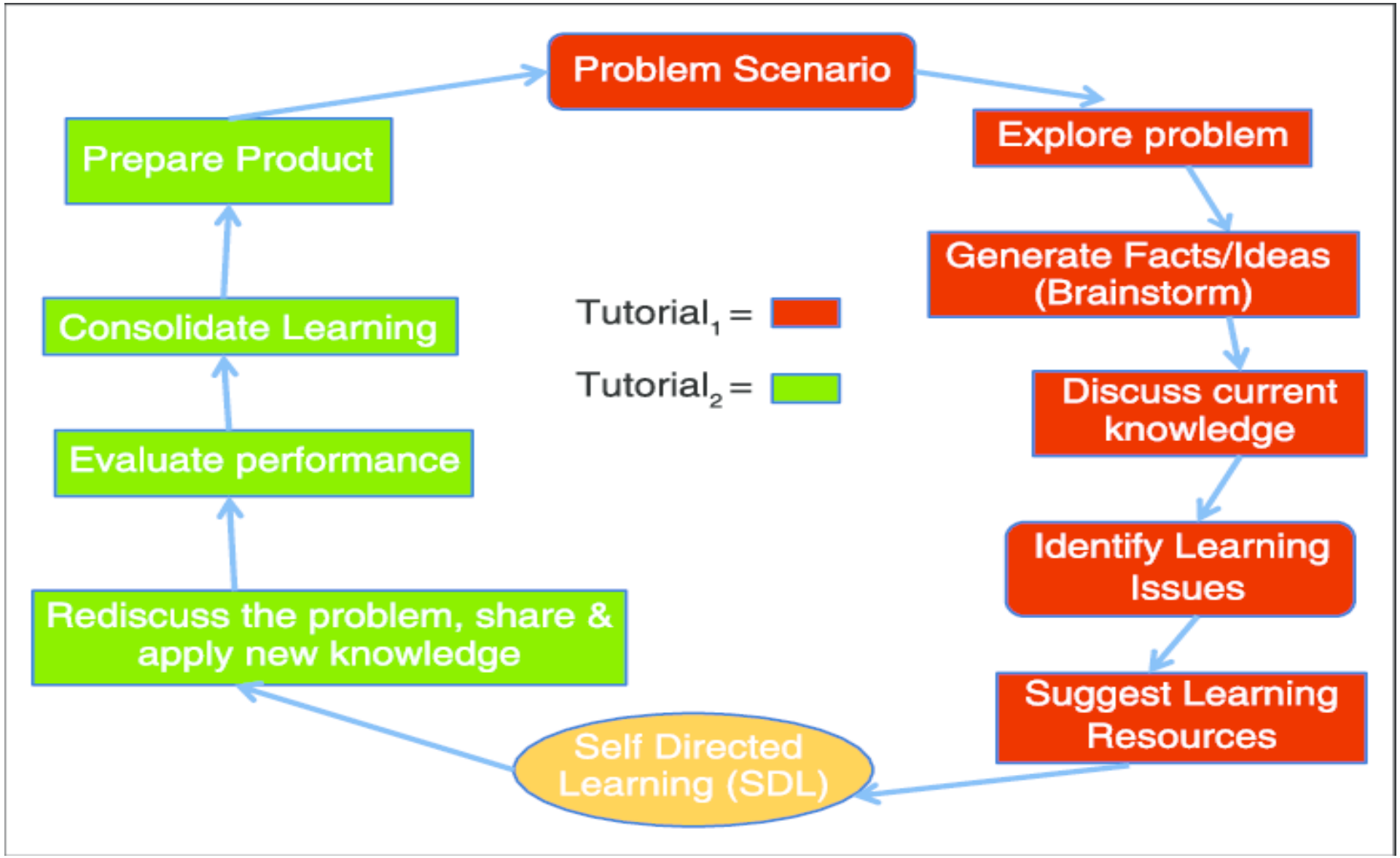
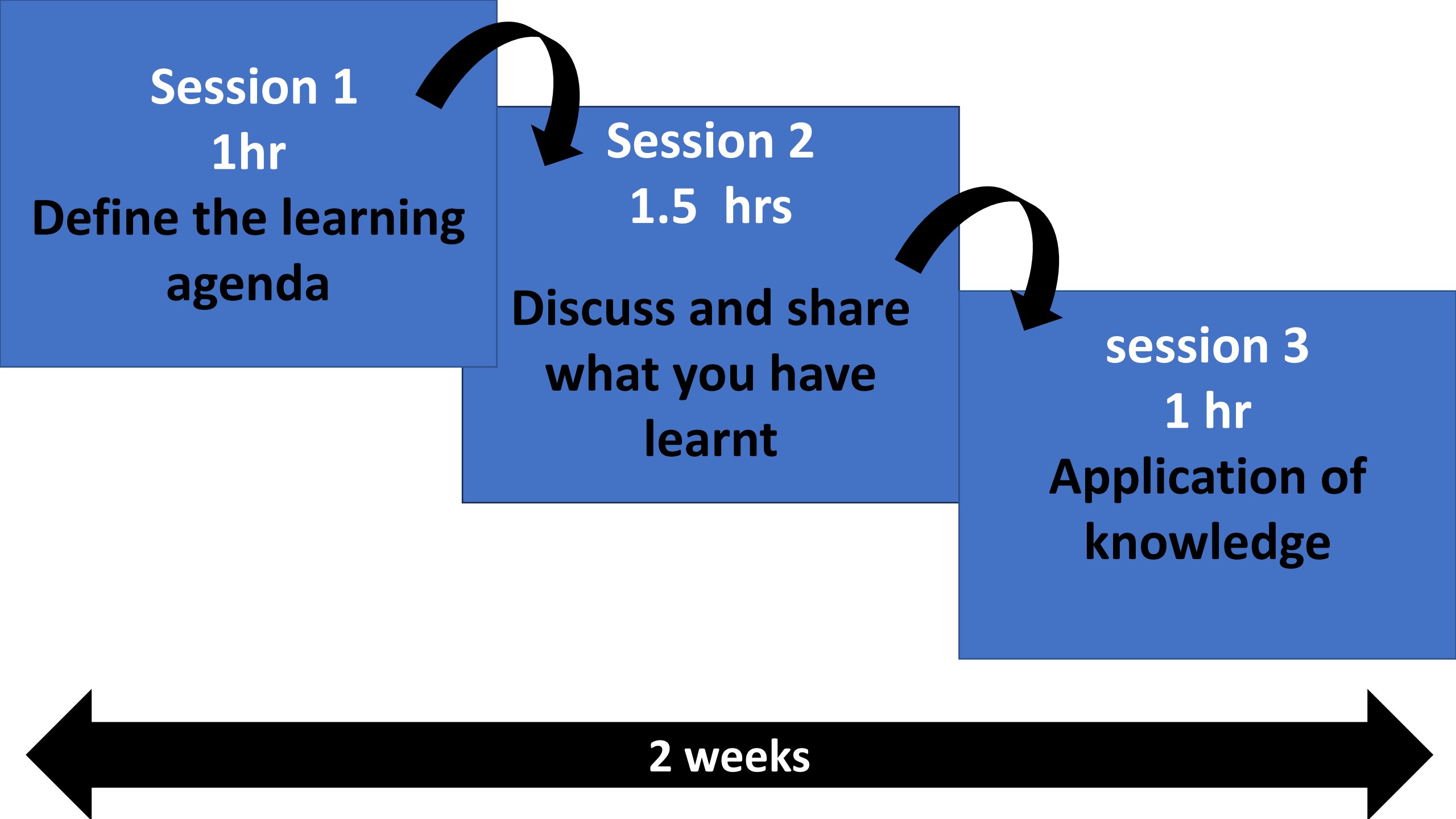
PBL process


1
Read case and define terms
2
Identify the key problems/issues
3
Brainstorm possible explanations
4
Arrange into tentative conclusions
5
Build a learning agenda
6
Private study
7
Further discussion and closing of case


Problem Scenario
Explore problem
Generate Facts/Ideas (Brainstorm)
Discuss current knowledge
Identify Learning Issues
Suggest Learning Resources
Self Directed Learning (SDL)
Rediscuss the problem, share & apply new knowledge
Evaluate performance
Consolidate Learning
Prepare Product
Tutorial1 =
Tutorial2 =


Session 1
1hr
Define the learning agenda
Session 2
1.5 hrs
Discuss and share what you have learnt
session 3
1 hr
Application of knowledge
2 weeks

PBL tutorial process

- *Step 1* –Session 1
- **Read the Problem aloud and clarify unfamiliar terms**

- scribe lists unexplained terms after discussion.

Case 1: Tom visits his dentist

Tom was glad that his regular dental check-up was before he started University. He knew that future appointments might be difficult. The dentist greeted him and asked if there had been any problems since they last met and if his health was good. Tom certainly looked a fit and healthy 18 year old.

Extra-oral examination showed no abnormality or swellings. Intra-oral examination showed a healthy oral mucosa, the alveolar mucosa appeared bright red and the gingival mucosa pale pink. There was some mild gingivitis associated with interdental plaque deposits. A Basic Periodontal Examination was performed. All teeth expected were present.

Tom noticed his dentist used a hand gel before putting on his gloves, and wondered if this was better than washing them with soap. He thought about asking the dental nurse about this on his way out, but she seemed too busy clearing everything up to be interested in his questions.

PBL tutorial process

- *Step 2* – Session 1
- Define the problem(s) to be discussed from all views.
- Look for significant components (cues) and discuss

- scribe records a list of agreed problems.

PBL tutorial process

- *Step 3* – Session 1
- suggesting possible explanations on the basis of prior knowledge; and identify areas of incomplete knowledge
- scribe records all discussion.

PBL tutorial process

- *Step 4* – Session 1
- Formulate learning agenda;
- tutor ensures learning agenda is aligned with learning objectives.

Definitions

-
-
-
-
-

Learning Agenda

PBL tutorial process

- *Step 5 –* Private study

- all students gather information to the achieve learning agenda.

PBL tutorial process

- *Step 6, 7* – **Session 2: Share information and apply knowledge, cite resources used**
- tutor checks learning and may assess the group.

PBL tutorial process

- **Session 3:**

Application of knowledge

- Topics for the activities reflect specific aspects of the LOs from the case and may reflect practical sessions.

Trigger materials for PBL scenarios

- Paper-based clinical scenarios
- clinical laboratory data
- Photographs
- Video clips
- Journal articles
- A real or simulated patient


SUCCESS

Rules

Problem

Facilitator

Students

Feedback


GROUND
RULES

PBL ground rules

There are two types of ground rules:

I. Programmatic ground rules

II. Group interaction

Programmatic ground rules

Punctuality and regular attendance

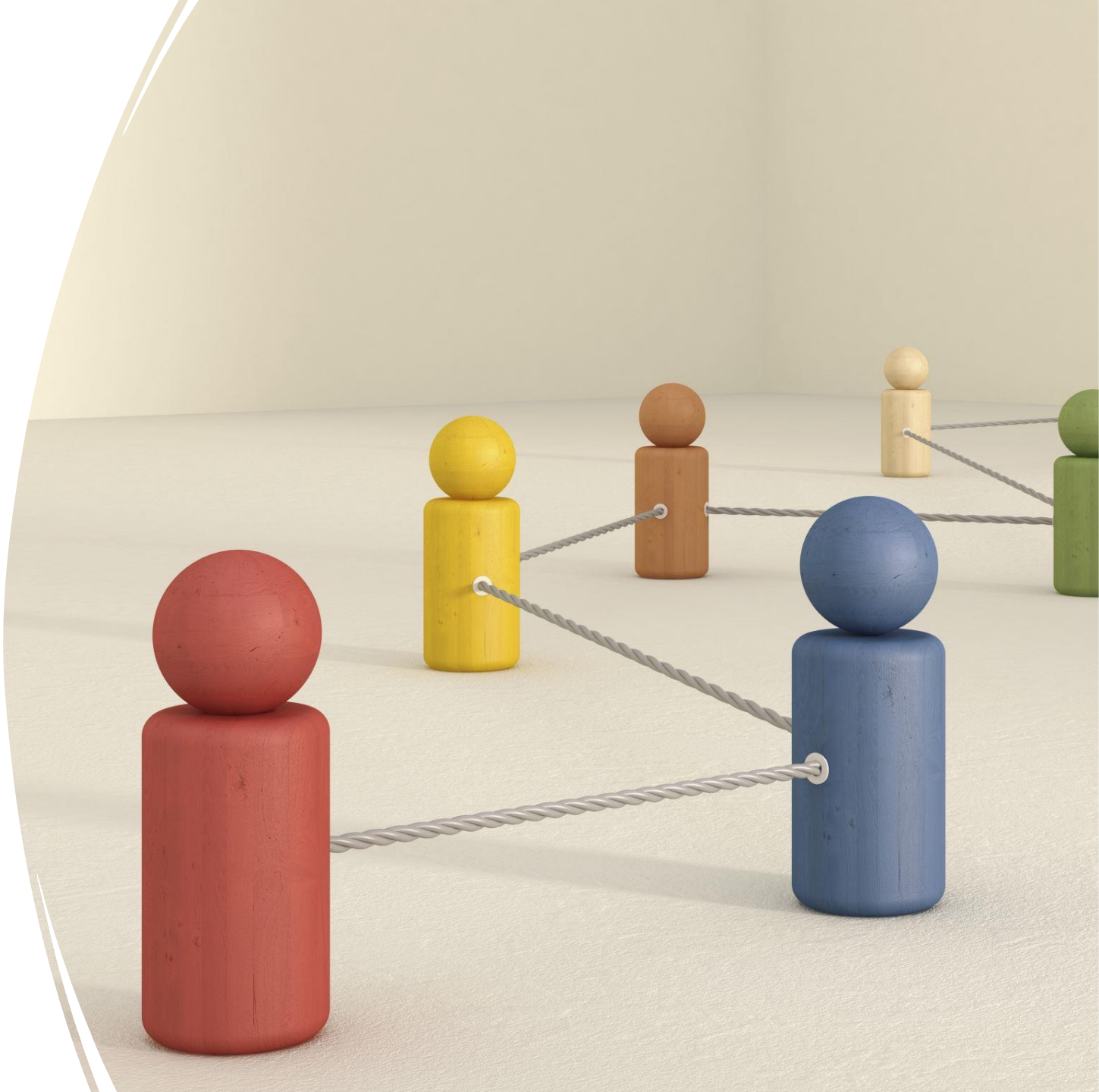
Roles of tutor and students

Following all the steps in the tutorial process

Having all students research major learning issues

Conducting regular reflection and assessment

Group interaction



Types and balance of participation

Handling conflict and sensitive issues

Being well-mannered and respectful

Providing constructive feedback

PROBLEM BASED LEARNING

Realistic, authentic

Integration of knowledge

Challenging but fit student's level

Addressing the pre-set learning objectives

Logical in their flow

Types of the problems

Explanation problem

Clinical Reasoning Problem

Moral Dilemmas problem

Roles of tutor and students in PBL tutorials

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Roles of students in PBL tutorial

- Chair (Leader)
- Scribe
- Time-keeper
- Group members

The Chair

- Student
- Start and end discussion on time
- Invite other students to participant in the discussion
- Summarize the discussion
- Check accuracy what is written with the group

The Scribe

- Ensure key issues are recorded properly
- Write on two boards (one for unfamiliar terms, cues) the other board will be for learning agenda
- Check with chair and group members the accuracy of what is written
- Summarize, paraphrase learning agenda
- Circulate learning agenda

PBL Group members

- Participate in the discussion and ask questions
- Support chair and scribe
- Engage in the self study
- Share learning sources
- Reflect on their learning and behaviors

What's your ROLE?

Facilitator

Resource

Evaluator

So, what I need to be aware of when I facilitate PBL session !!!!

Keeping students on track

Challenge their thinking by asking and not explaining

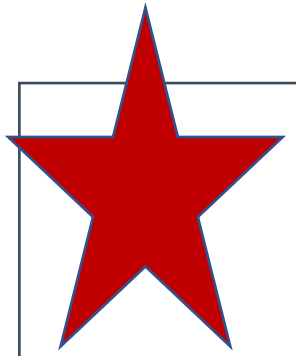
Help students integrate basic and clinical sciences within case

Facilitate developing high order thinking learning agenda

Asking why and how

Avoid teaching and dominating

Maintain group dynamics



Provide feedback and encouragement

Facilitate self assessment and reflection

Perfect Good Job

Support

Good start!!, you managed to explain the link between cholesterol and patient condition, so let us read the case more time and I want you to think if you need to provide additional explanation

Challenge

I think this will do for the case, try to do better next time

You did not bring any thing to discussion

Feedback with the good Judgment

Ask What did you well and why

Then you analyze what they thought well

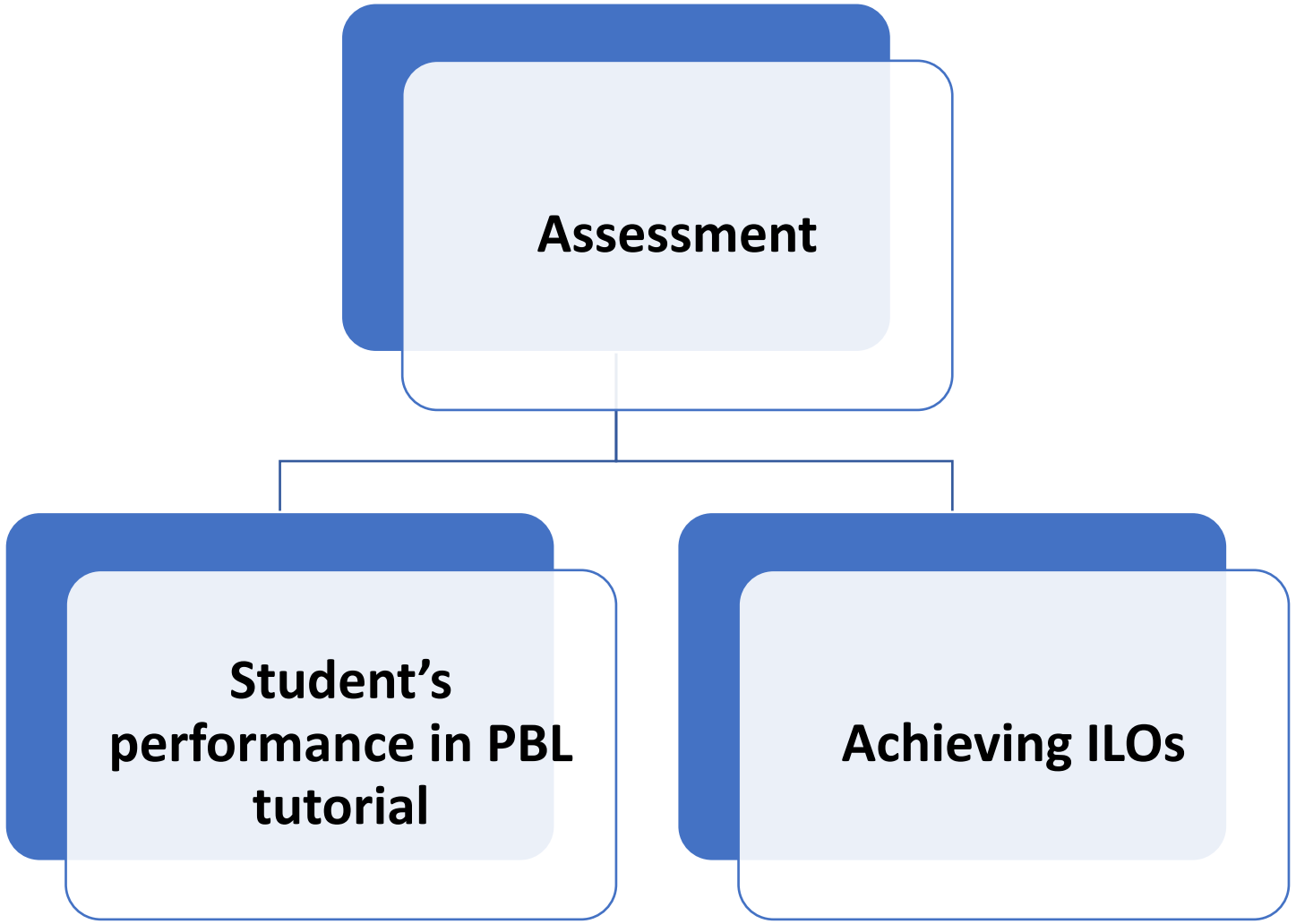
What they need to do better next time and why and how

Then analyze what needs improvement with some suggestion

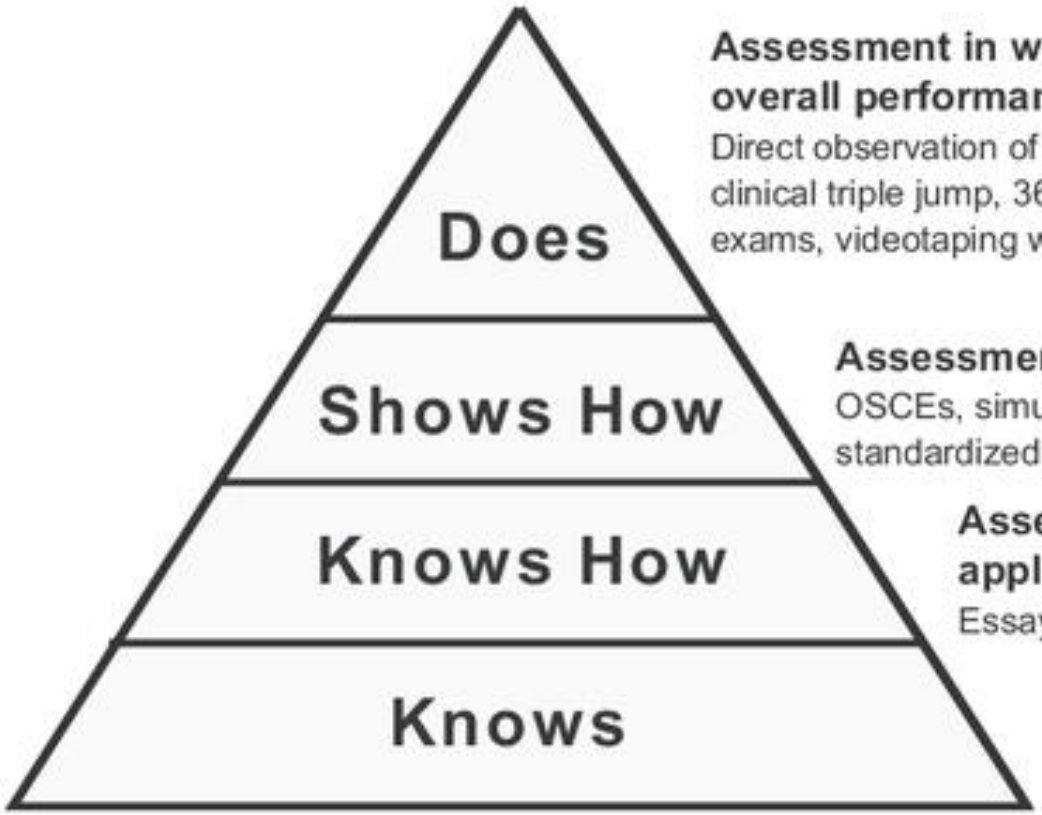
How to deal with difficult-shy-reluctant students in PBL

Next workshop

Assessment of students in PBL



Assessment of learning outcomes



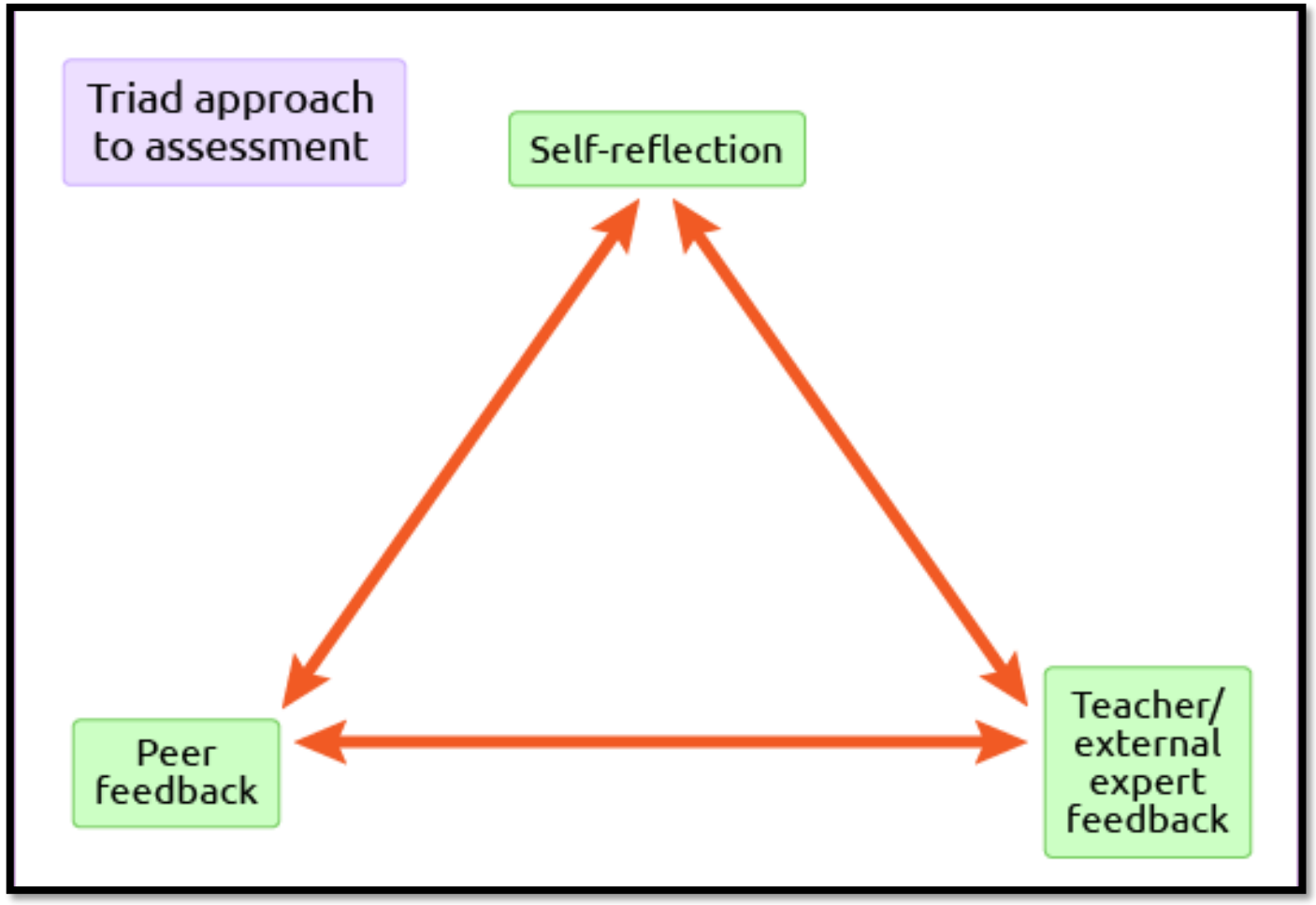
Assessment in work environment; focus on overall performance, not components
Direct observation of learner performance, portfolios, clinical triple jump, 360 assessment, clinical competency exams, videotaping with follow-up review

Assessment in controlled situations
OSCEs, simulations, lab practicals, standardized patients

Assess capacity for clinical-context application
Essays, triple jump, case-based MCQs

Test factual recognition
Context-free MCQs, reports written by students, oral exams

Student's performance during PBL



What are the criteria on which tutorial performance is based?

- Students are assessed in five areas:

- **✓Knowledge Base**
- **✓Reasoning / Decision-Making**
- **✓Communication**
- **✓Assessment**
- **✓Professional Behavior**

What are the criteria on which tutorial performance is based?

Knowledge Base

- Demonstrates adequate preparation for tutorials
- Asks appropriate clarifying questions
- Makes connections between ideas and facts that cross levels of organization
- Integrates knowledge and information from multiple sources
- Summarizes issues clearly and succinctly
- Integrates biology with the other perspectives (behavior and population)
- Presents both big picture and details when discussing learning issues
- Uses variety of information resources
- Demonstrates knowledge of ethical principles

Reasoning Process/Decision-Making

- Supports statements with reasoning and evidence
- Recognizes the boundaries of own knowledge by:
    - defining learning issues
    - asking questions
    - ending fruitless discussions
- Evaluates quality of various information sources
- Develops clearly defined, relevant, mechanism-oriented learning issues
- Relates hypotheses to clinical evidence
- Advances discussion and understanding with appropriate questioning
- Applies concepts from prior blocks and other components of the curriculum
- Demonstrates ability to translate and abstract patient data into correct medical terminology

What are the criteria on which tutorial performanc is based?

Communication

- Uses correct pronunciation and spelling
- Speaks clearly
- Listens critically to others as demonstrated by:
  - contributing to discussions
  - seeking clarification and verification from others
  - summarizing discussions
- Contributes to discussions in ways that promote group learning
- Checks for shared understanding
- Uses a variety of media and methods (diagrams on the board, flow charts, tables, etc.) to facilitate communication
- Seeks consensus
- Makes presentations that are logical, ordered, and responsive to needs of learners

Assessment

- Participates in self, peer, and group assessment
- Uses specific examples during self, peer, and group assessment
- Recognizes and articulates areas in need of improvement
- Receives constructive feedback in an open, nondefensive manner
- Critically assesses concepts in a logical, constructive manner

Professional Behavior

- Attends tutorials regularly and arrives punctually
- Behaves toward others in a courteous, kind, caring, and respectful manner
- Accepts responsibility
- Conducts him/herself in an honest manner
- Incorporates feedback and implements plans for improvement
- Modulates personal behavior to promote healthy group functioning
- Applies ethical principles

Knowledge assessment

Case 1 Session 3: Tooth Morphology Exercise

Your task:

Eddie, an 8 year old boy, visits your practice for a dental check-up. On examination he appears to have good oral hygiene, no restorations and appropriate dentition for his age. One member of the group should write the group's answers on this document below. You have **25 minutes** for the activity. You will then share your answers with the tutor.

1. Chart the teeth that you would expect to see in Eddie's mouth using (i) the Palmer notation and (ii) the FDI notation. For each notation place the tooth symbols in the appropriate quadrant similar to the one below. **[6 marks]**

   W X Y Z | Z Y X W
   W X Y Z | Z Y X W

(i) Palmer notation:

|
|

(ii) FDI notation:

|
|

2. For each of the following *permanent* teeth state the tooth type, whether maxillary or mandibular, and the tooth symbol in Palmer notation. **[18 marks]**

Knowledge assessment

Case 1 Session 3 Tutor Notes: Tooth Morphology Exercise

5 minutes	*Introduction and group allocation*
25 minutes	*Preparation of task*
10 minutes	*both groups to feedback results and subsequent discussion of task*
5 minutes	*Group marks and feedback of group performance*

This session is designed to test the students' understanding of tooth identification and eruption dates. In addition, it should develop their team working skills and encourage them to think in a logical, organised manner.

Divide the EBL group into 2 groups. Give each group the Q&A sheet. Allow them 25 minutes to complete the task and fill in the answer sheet. At the end of 25 minutes go through the answers of both groups awarding marks according the mark scheme below. Ask the students to explain what features of the teeth they used for identification.

Your task:

Eddie, an 8 year old boy, visits your practice for a dental check-up. On examination he appears to have good oral hygiene, no restorations and appropriate dentition for his age. One member of the group should write the group's answers on this document below. You have **25 minutes** for the activity. You will then share your answers with the tutor.

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   W X Y Z | Z Y X W
   W X Y Z | Z Y X W

2. For each of the following permanent teeth state the tooth type, whether maxillary or mandibular, and the tooth symbol in Palmer notation. **[18 marks]**

Student's reflection form

How do students know how they are doing in EBL?

Excellent	Satisfactory	Cause for Concern
During Session 1, capable of establishing the relevance/meaning of significant components ('cues') in the case and linking such cues together	During Session 1, usually capable of pointing out significant components ('cues') of the case, and explaining what they mean	During Session 1, does not pick out significant components ('cues') or does not explain their relevance
During Session 1, capable of establishing what is already known by the group, making speculative hypotheses and identifying what information is still missing	During Session 1, usually capable of establishing what is already known	Not capable of recalling prior knowledge to shed light on case and not capable of applying current knowledge to a new case
Always prepared for the entire learning agenda	Prepared for some parts of the agenda	Not prepared
Finds interesting anecdotes/articles besides classic textbooks	Sticks to textbooks	Sticks to Wikipedia
Reports information, without notes, in a conversation style	Reports information	Does not report information at all or over-relies on reading from notes
Explains concepts clearly and in a lively style, starting from the big picture and then going into details. Asks for help when needed	Explains concepts but may need prompting or correcting from the rest of the group	Does not attempt to explain concepts or explains concepts illogically, getting bogged down in details or by information that cannot be remembered
Attempts to clarify points that have been misunderstood by the group	Draws the group's attention to points that are not understood	No attempts to explain misunderstandings; gives up easily
Uses the whiteboards or overheads effectively and appropriately; use adds to the discussion and does not hinder the flow of the session	Sometimes uses the whiteboards / overheads	Does not use whiteboards or overheads; turns the EBL discussion into a mini-lecture
Always challenges others' statements when appropriate	Occasionally challenges others' statements when appropriate	Accept statements, never challenges what someone else says
Asks probing and thoughtful questions to stimulate discussion	Asks questions to stimulate discussion	Unquestioning
Genuine enthusiasm throughout the sessions	Can muster some enthusiasm	Disinterested, head on table
Shares information willingly	Shares when asked	Secretive, does not share sources
Tries to include all members, including quieter students	Usually includes everyone	Excludes individuals
Attitude is considerate, understanding	Attitude is considerate, understanding	Intolerant, impatient
Never dominates discussion	Generally does not dominate discussion	Dominates discussion
Does not interrupt others	Does not interrupt others	Interrupts others
Always listens well to the conversation	Mostly listens well to the conversation	Does not listen
Adds on relevant comments	Attempts to add on relevant comments	Adds on irrelevant comments breaking the flow and logic of conversation or simply repeats what others have already said
Capable of sharing relevant personal experience with group	Shares personal experience, although sometimes not always relevant to discussion	Does not share any experience
Volunteers for tasks willingly	Acts as scribe or chair	Fails to take on group tasks

Student reflection form

During Session _ Case _, please rate your own **contribution** and **professionalism** using the scales: Excellent / Satisfactory / Cause for concern (see '**How a**
I doing in EBL?'). Give the form to your EBL tutor who will give you written feedback on your performance.

		Contribution	**Professionalism**	**Staff signature**	**Date**
Cases ___					
During Cases ___, what went well for me personally? and for the group? What could be improved?					
Tutor comments (if you do not agree with the student's self-appraisal please state here). What did the student do well? What could be improved?					

An Evaluation Survey for EBL

Sections 1 and 2 of this evaluation refer to the part of your module where you were learning through Enquiry Based Learning[1]. For the purposes of this evaluation questionnaire, we will refer to it as 'the activity'.

Section 1
For each statement, tick one box to indicate your response as follows:

1 = strongly disagree
2 = disagree
3 = neither agree or disagree
4 = agree
5 = strongly agree

	Statement		1	2	3	4	5
1	I felt that I understood the learning process in this activity						
2	I learned about how to present my findings to an audience						
3	I found this activity difficult						
4	This activity helped me to develop my team working skills						
5	I learned how to plan my learning						
6	During the module, I was given opportunities to establish my own research questions						
7	The staff focused more on encouraging me to find information than on giving me the facts						
8	The activity was more about analysing and evaluating information than it was about memorising it						
9	I feel I am better able to find information from different sources						
10	I am more confident in my ability to evaluate the information I have found						
11	I feel I am better able to evaluate different sources of information						
12	I needed a lot of support from staff in this activity						
13	This activity helped me to discover what was expected of me as a learner						
14	The group was effective in developing shared goals						
15	I enjoyed working in this way						

[1] Evaluators might wish to replace "Enquiry Based Learning" with some other term that is understood by the students, e.g. Design exercise, Problem Based Learning, an investigative study etc.

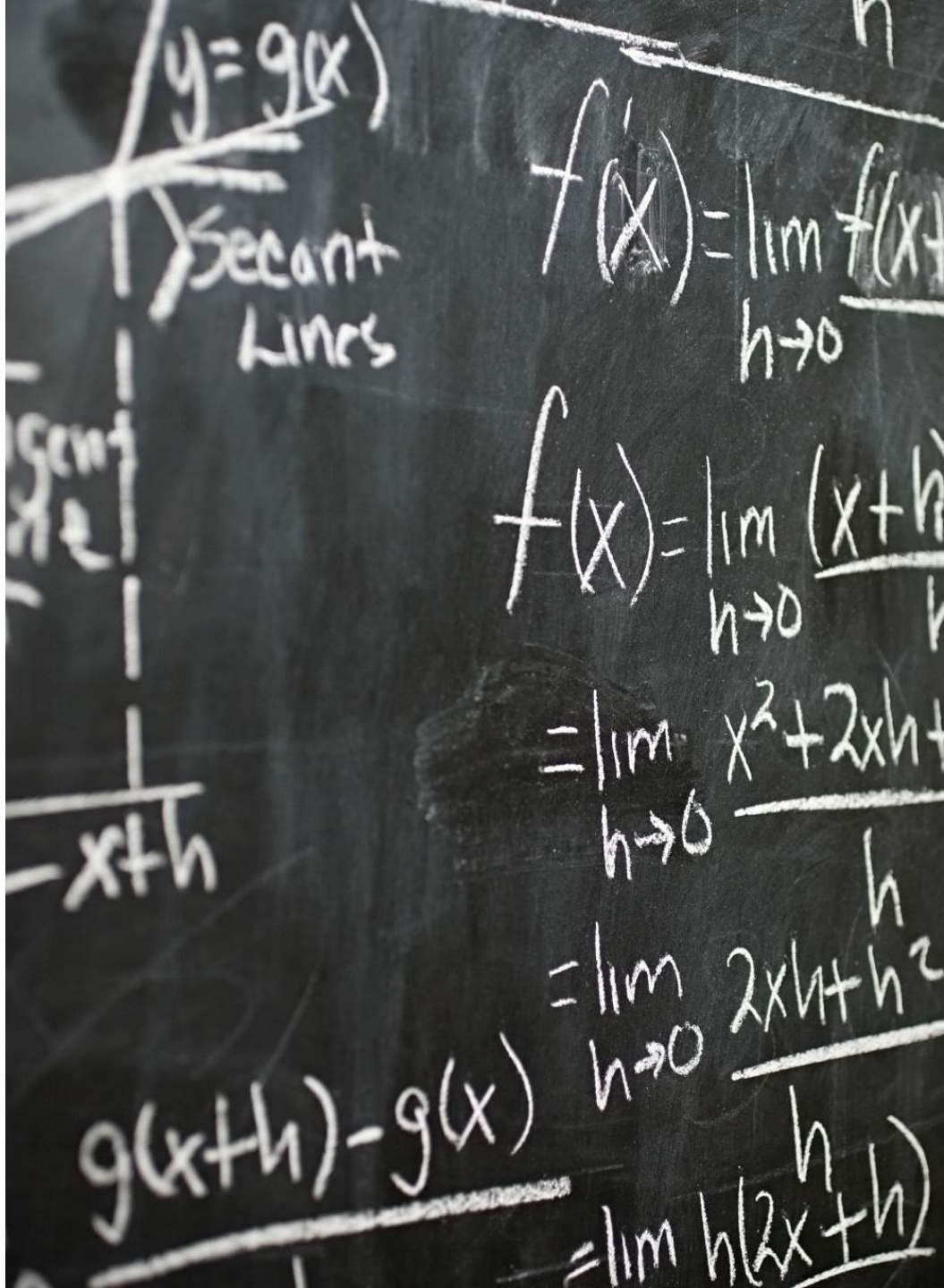
Section 2
Please add a comment to follow the introductory statement
During the activity

1	The thing I found most helpful was…..
2	The most useful thing/skill I learned was…..
3	The thing that most changed the way I learned was……
4	What made learning most effective for me was….
5	The thing I found most difficult was….
6	To help me to improve as a learner, what I need to work on is….
7	What I need to stop doing, which hinders my learning, is…
8	To help me improve as a learner, I would like my tutor to: Stop…. Start… Continue….

PBL Challenges, barriers and outcome issues

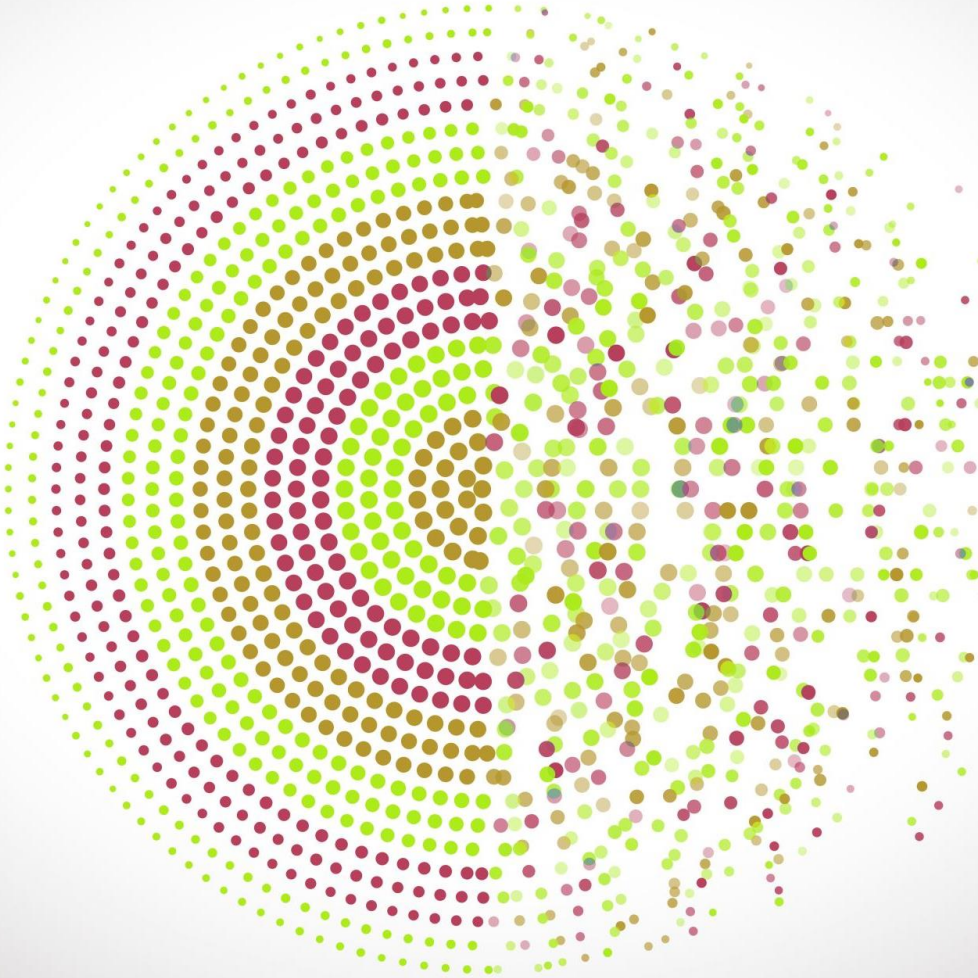
Challenges of PBL

- **PBL is costly, with significant start-up and maintenance costs**
- **PBL is demanding on staff time**
- **PBL is stressful for both students and staff**
- **Students acquire less knowledge of the basic sciences**
- **It may be difficult to implement PBL when class sizes are large, or when there is a lack of enthusiasm for the process**



Problem-based learning: Challenges, barriers and outcome issues

- **Difficulties in integration**
- **Difficulties in creating problems**
- **Polictical and professional challenges**
- **Time consuming**
- **Required changes in assessment**
- **Substantial change in management and organizational structure**
- **Student asked for more feedback**



Problem-based learning: Challenges, barriers and outcome issues

Disagreement within some groups

Resource intensive

A number of stressors were unique to adapting to PBL

Students were less clear about the goals/ objectives of curriculum.

Extra-time required from students compared to traditional lecture-based subjects.

References

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Thank
you