Introduction to the Problem-based Learning Process

A Guide for Dental Students at The University of Hong Kong
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*This guide is intended for internal use only, at the Faculty of Dentistry, The University of Hong Kong*
1. Introduction

This guide is intended to help first-year students adjust to the Problem-based learning (PBL) approach used at the HKU Faculty of Dentistry. PBL will be a very important aspect of your educational process over the next 5 years (6 years, starting with the 2012 BDSIb cohort) at the Faculty and will prepare you for career-long learning.

At the HKU Faculty of Dentistry, when we use the term PBL, we mean:

- **Small groups** of students work in teams
- There are usually **two tutorials** for each problem, which are conducted by a facilitator (who is a staff member of the University)
- **Ill-structured and open-ended problems** are presented and discussed during tutorials
- **Practical sessions** that are linked to the current problem are provided between tutorials
- **Self-directed learning**, with appropriate use of learning resources, is undertaken by the students themselves

The basic features of how learning takes place through PBL are as follows:

1. Small groups of students work in teams
2. There are usually two tutorials for each problem, which are conducted by a facilitator (who is a staff member of the University)
3. Ill-structured and open-ended problems are presented and discussed during tutorials
4. Practical sessions that are linked to the current problem are provided between tutorials
5. Self-directed learning, with appropriate use of learning resources, is undertaken by the students themselves

This guide introduces you to some aspects about the group and tutorial processes for the first and second tutorials. Also covered are the facilitator’s role and students’ responsibilities in the tutorials. Most importantly, this guide explains the recommended manner of dealing with the ill-structured, open-ended problems used in PBL, and provides advice on the appropriate use of learning resources and what is involved in self-directed learning.
Overview of the PBL process

**Tutorial 1**
- Starting with a problem
- Reasoning through the problem
- Enquiry and analysis
- Clarifying the problem
- Committing to a probable outcome
- Deciding your group’s learning issues
- Identifying learning resources

**Self-directed Learning**
- Self-study
- Group collaboration
- Preparing for the second tutorial

**Tutorial 2**
- Reviewing the resources that you used
- Reassessing the problem
- Making final decisions about the problem outcome
- (Further self-directed learning)
- Assessment and Evaluation Session

**Reality Check**

We believe that the PBL approach described in this guide can be flexibly applied in a variety of professional contexts. Throughout this guide, look out for these “Reality Check” boxes, which show how the PBL process parallels what happens during professional teamwork in the real world.
2. The Group

Starting with a new group

Do not worry if you are completely new to PBL; most of your new colleagues will be in the same situation.

In addition, different students will have different backgrounds, experiences, and subject knowledge, and this diversity is part of both the challenge and success of our small-group PBL approach. When you first meet your new group and facilitator, some routine steps will be taken to help everyone get to know each other.

Introductions

Each student in the new group should introduce himself or herself. Each person should tell the group the following information:

♦ Where he/she is from
♦ Where he/she went to school or university before entering dentistry
♦ Any interesting work or studies
♦ Extracurricular interests

These introductions will allow you to become familiar enough with each other to begin working together as a team. You will find that some members have unusual backgrounds, while some may have interests that are similar to yours. Your group will also be able to get an idea about the areas of expertise among the group members, which can be useful when you work through problems together later.

Be sure the facilitators introduce themselves as well.

Reality Check

In your professional career, you will frequently find yourself having to work with other people. Introductions allow you to know where everyone fits in and also help create a productive work environment.
Establishing the learning climate

Express your ideas and thoughts freely!

The learning atmosphere, or climate, in PBL may be dramatically different from anything you have encountered so far in your educational experiences.

First of all, you need to overcome the common belief that you should not volunteer an opinion unless you know for sure that you are right. On the contrary, your hunches, guesses, and ideas are exactly what are needed! It is not the aim of PBL tutorials to find out who knows the “correct” answer.

In PBL, it is actually wrong to keep your ideas and thoughts to yourself, even if you are not sure you are right. It is essential that you express your thoughts about the problem that the group is working on, through ongoing discussions and comments among all group members. It makes no difference how “way out” or “outside the box” your ideas might seem to others. Expressing your ideas and knowledge gives you a chance to:

- Articulate your thoughts in the group
- Get other members’ reactions or thoughts
- Clarify or improve your own thinking

You can always qualify your ideas with a statement such as “I’m not sure of this, but I think…”. 
If you do not share your ideas because you fear that they might be wrong, you might deprive the group of the help needed because your hunch—no matter how unlikely or foolish it may seem—might actually be helpful. Speaking up allows the group to benefit from your thinking and for you to benefit from other people’s thinking. Later on, as you work with the problem (especially after self-directed learning), you will be able to reinforce, modify, or correct your ideas. Silent members of the group do not help themselves or the group.

♦ Note: “SILENCE MEANS ACCEPTANCE”—this means that if you stay quiet, it is assumed that you have accepted and agreed with what has been said.

Comment on the ideas and opinions of others

If you have a different opinion or point of view from that expressed by someone in the group, or if you notice a contradiction or flaw in what is being discussed, you must speak up. In this way, all the members of the group can benefit from the knowledge and thoughts of each other.

It would be a great waste of time if after every idea expressed by someone in the group, the facilitator would have to ask each of you if you agree with what has just been said. It should be a rule that if someone says something and no one in the group speaks up, then they all must have agreed with what was said.

♦ Note: This rule does not hold for the facilitator. Facilitators may disagree with you and not say anything.
3. The Facilitator and You

The role of the facilitator

Facilitators are present to stimulate and oversee group discussions. They are not to be a source of information about any aspect of the problem, even if they may be experts in that problem area. Facilitators do not “teach” in the conventional sense of the word; nor will they convey to anyone that they agree or disagree with what is being said.

However, facilitators actively oversee the process of PBL through questions that are carefully aimed at provoking thinking and discussion such as:

♦ “What’s going on in this situation?”
♦ “What ideas do you have?”
♦ “What do we need to find out about the situation to support those ideas?”

The facilitator should constantly challenge you about your thinking in order to check how well you know or understand what you are talking about, what the terms you use mean, and that you are also thinking about the basic science mechanisms and concepts.

To do this, the facilitator may need to ask “Why?” again and again, almost until everyone finds it annoying! The facilitator does most of the questioning in this way initially, but as the module progresses, this is the responsibility of the students. By questioning each other and always asking “Why?”, students will be thinking constantly and analysing the problem at hand.

♦ Note: A major objective of the facilitator is eventually to become unnecessary as the whole group takes increasing responsibility for keeping track of the PBL process and for challenging each other with questions such as “Why?” and “What is your evidence for that idea?”. Then, facilitators will comment only when they feel it is necessary.
Your own role and responsibility

You and your group must take on increasing responsibility for the PBL process and your own learning.

You are all expected to accept more and more responsibility for your own thinking and learning, for the PBL process itself, and for the group’s activities and tasks. You should make the facilitator’s role almost unnecessary!

The role of faculty staff

There are many staff in the HKU Faculties of Medicine and Dentistry who can be approached and who will be able to give you information when you want it.

There are also staff whose role is to give freely of their expertise and to provide information when you ask for it. Called “resource staff members”, they will be assigned to specific problems during your course, and you will be able to forward questions to them via a website—the Web-learning Centre—which has been set up for your year group.

Reality Check

*Establishing a good, cooperative environment that encourages full participation is essential in any working group in your professional career. It facilitates teamwork and sets the stage for group members to learn from each other.*
4. Tutorial 1—The Problem and Tutorial Processes

Starting with a problem

Agree on the learning areas for each problem

In the first of the two tutorials for each problem, your group is presented with a specific problem in some form of statement, situation, or scenario. For each problem, you will need to focus on learning areas that are of most importance to you and your group.

Agreeing on the group’s learning areas is a key part of the first tutorial, especially because one problem could lead to many months of study if you were to understand in depth all possible aspects of the problem, such as:

♦ Basic biomedical science issues, from molecules up to cells, tissues, organs, and systems, for example:
  ○ Biochemistry
  ○ Physiology
  ○ Anatomy
  ○ Pharmacology
  ○ Immunology
  ○ Microbiology
  ○ Pathology
 ♦ The mechanisms producing clinical symptoms and signs
 ♦ Clinical skills needed for diagnosis and treatment
 ♦ Epidemiological, professional ethical, economic, psychological, and sociological aspects of the problem
Still, the group’s discussion should attempt to address the problem from a variety of relevant angles—for example, in terms of the basic biomedical sciences, clinical dental and medical sciences, social and behavioural sciences, and community issues. The emphasis will differ from problem to problem, and some problems will recur throughout your curriculum, thus allowing your group to concentrate on related issues that had not been dealt with earlier.

♦ Note: Your facilitator will be on hand to assist your group when it decides on the most important learning areas to be covered in a problem, and there are also student guides for each module of the BDS programme.

Agreeing on learning areas early on helps considerably in focusing the group during its problem work and in directing the setting of learning issues later on. In other words, if you select to concentrate on a particular set of topics related to the problem, your hypotheses about the causes of the problem and your learning issues for subsequent self-directed research and learning would reflect that emphasis.

In addition, the agreed learning areas for a problem serve as an internal monitor of your progress, helping the group to decide where it should be going in its discussions. If, during a tutorial, the group becomes side-tracked with other issues pertaining to the problem, someone in the group (often the facilitator initially) may point out that the group’s discussion and concerns are travelling down a different path or starting to veer away from where the group originally intended to go.

Reality Check

Deciding on the most important areas of a problem and being able to stick to those areas are valuable skills during discussions and problem-solving work in your professional career.
Presenting the problem

The problem can be encountered in a variety of simulation formats or enquiry materials (e.g., a written problem, a written problem with one or more photographs, a document, a video tape).

The problem clerk and the board

In each initial tutorial, one member of the group takes on the task of the “clerk” to provide a written record of the group’s work with the problem, namely:

- The **Facts** that the group discovers about the problem
- **Ideas** about the problem
- The **Learning Issues** that need to be addressed during self-directed learning

The assigned clerk should divide the digital whiteboard (or “Panaboard”, from now on called the “board”) into three columns, as illustrated below. How these columns are filled will become apparent as the PBL process is described.

<table>
<thead>
<tr>
<th>Facts</th>
<th>Ideas</th>
<th>Learning Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

The task of the clerk is difficult. The clerk has to accurately record what the group is “thinking” in the appropriate columns and at the same time be an active, participating member of the group. The clerk also has the additional responsibility of taking care of the group’s notes, digital board printouts, and so on, that are relevant to the problem at hand.

The task of acting as clerk rotates among group members with subsequent problems. The other members of the group should help the clerk decide on what does and does not need to be recorded on the board.
Reasoning through the problem

Identifying facts

Once the problem is presented, the clerk should list in the **Facts** column on the board all the facts of the problem that the group feels are important to record. These facts will be identified from the problem statement as well as any enquiry materials supplied.

Generating ideas

After identifying and listing the facts, the group should think of and mention possible ideas that arise from the problem. In the **Ideas** column on the board, the clerk records all the group’s ideas—conjectures, possibilities, and guesses—that could have a direct bearing on the problem. The generation of ideas is a creative, mind-stretching activity and is essential in determining the kinds of information you need to obtain after the first tutorial to address the problem. Everyone’s ideas should be listed in the **Ideas** column, no matter how unlikely or remote the contributions may seem. They do not need to be listed in any particular order initially, as the list can be tidied up later as ideas are gradually developed and narrowed down.

When an idea is suggested, the person who suggested it should describe what he or she knows about the proposed idea and why it seems to be relevant to the problem. If the suggested idea is not clearly understood, or if there is disagreement about it, the clerk should be asked to list what needs to be learnt under the **Learning Issues** column on the board. That column does not need to be neat or tidy, because it can be cleaned up later when more is known or understood.

♦ **Note:** Throughout the idea generation stage, all group members should make sure they keep in mind the earlier joint agreement on learning areas.

Reality Check

Generating ideas and brainstorming, judging and narrowing down ideas, and identifying knowledge gaps are part of daily life and life-long learning in the dental profession.
Enquiry and analysis

Once the group members have finished thinking of possible ideas related to the problem, they should ask questions that they feel will help support or rule out the ideas listed. If it is not obvious to the group why a person has posed a specific question, that person should be asked to describe the rationale for the query in relationship to the ideas on the board.

This form of enquiry—to verify or rule out ideas—uses deductive logical reasoning skills, which you will need to perfect in addition to the free, creative inductive reasoning skills used when generating ideas.

At this point, some new facts to do with the problem may be introduced by the facilitator. The newly introduced facts need to be analysed against the ideas being considered and what is so far known about the problem. New information and ideas that seem relevant should again be recorded by the clerk on the board, in the Facts and Ideas columns, respectively.
The activities associated with deciding on what questions to ask, reviewing the possible significance of the possible answers to questions, and the related group discussions (for example, stimulated by the facilitator’s questions) will frequently raise additional unanswered questions about what is going on with the problem. Furthermore, the group’s discussions may reveal multiple areas of disagreement or limited understanding.

You have to become sensitive to when this occurs and recognise that it indicates your own and the group’s areas of limited knowledge or confusion. It is important to be able to identify these areas and to have the clerk list them on the board under Learning Issues. These learning issues represent areas for further research and study, and the group will gradually refine and prioritise them throughout the first tutorial.

**Clarifying the problem**

At some point after a number of questions have been asked and the group seems to be running out of ideas about what more should be asked, one member of the group should summarise the important facts that have been learnt about the problem so far, without looking at the board. This is the iterative process in PBL and is an essential skill you will need to have in clinical work during your undergraduate programme—for example, when conferring with colleagues, working with clinical teachers, and writing up your patients’ records.
During this stage, the rest of the group should listen to the summary, also without looking at the board. Once the summary is finished, the others should add what else they remember or what they feel needs to be added. This summary should include all the essential listed **Facts** (you have to learn to decide what they are) and exclude any non-essential facts about the problem. This summary also ensures that all group members have a similar picture of the problem. The **Ideas** listed on the board should then be reviewed after the summary to achieve the following:

- To see if any ideas can be eliminated or have been weakened (and if so, a line is drawn through them)
- To see if any ideas can be strengthened or confirmed as possibilities (and if so, a check/tick mark is placed after them)
- To add any ideas: often, this review of the problem will suggest new ideas that should have been considered earlier

Eventually, your group will have gone as far as it can with the problem, using your combined knowledge and skills to analyse the problem and what can be done about it. You will have expanded, revised, and focused your **Ideas** as well as possible, obtained and organised all the **Facts** you feel are relevant about the problem (in light of your ideas), and listed all the areas where further learning and study seem appropriate in the **Learning Issues** column.

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**Reality Check**

Both sorts of reasoning—deductive logical reasoning and free, creative inductive reasoning—as well as being able to periodically consolidate information and refine hypotheses are necessary skills when problem-solving in your professional career.
Advice to Quiet Members in a Group

Not everyone speaks his or her mind freely in group discussions. Some people are naturally not very talkative or reserved in manner and reluctant to join in discussions. This quality, admirable in many situations, is counterproductive in PBL.

It is exactly the different experiences, different areas of prior knowledge, and different ways of thinking within the group that need to be vocalised and applied in active discussions, and which make PBL a powerful learning method!

♦ If you are quiet during group discussions, the members of the group cannot profit from your prior knowledge, experiences, and ideas.

♦ If you do not express your own thinking and understanding, you miss the opportunity to have the accuracy or validity of your ideas tested in the group’s discussion.

♦ If you do not let the group know that the discussion is veering away from the agreed learning areas, you miss the opportunity to help your group save precious time and energy.

♦ Every student in Hong Kong comes to university with his or her own standards of expression in English. Do not worry if you think that your spoken English is not good enough. Nobody will make fun of you. By expressing yourself freely, your spoken English will improve through practice.

♦ Speaking up in the group is also a valuable way to learn how to communicate with others and to use correct professional language.

♦ A more serious problem posed by the quiet group member is that the facilitator and the other members of the group can never be sure how well that person understands what is going on in the group’s discussions or how much that person has learnt.

Therefore, if you are naturally quiet you must recognise this and force yourself to deliberately and regularly contribute to group discussions. If you find this difficult—and many do, especially in a group of very talkative students—you should discuss this during the group’s Assessment and Evaluation Session at the end of the problem (see page 33). Perhaps an agreement can be made with your colleagues that they will pause frequently in ongoing discussions and ask for your opinion.
Committing to a probable outcome

When your group has gone as far as it feels it can with the problem, and all members, including quiet ones, have been encouraged to contribute fully to the work of the group, you will need to make a commitment about what you think will eventually turn out to be the main Learning Issues connected to the problem. You should also make a commitment as to what should be done about the problem and how self-directed learning should be managed. These commitments should be recorded on a piece of paper and retained by the clerk.

Committing to main issues and probable outcomes has two valuable purposes. First, your commitments will further motivate you to look things up during your self-directed study (see page 25) to see if you are right. Second, your commitments allow you to reflect on the need for further learning that is related to the specific learning issues identified.

Deciding your group’s learning issues

Determining learning issues

At this point, you have come as far as is feasible with your problem in the first tutorial, using your own and your group’s pooled knowledge and reasoning skills to understand these questions:

♦ What is the problem?
♦ What is responsible for the problem?
♦ What might be done about it?

Furthermore, in this process, you all have identified:

♦ Areas of confusion that need to be resolved through research and study
♦ Areas where learning is indicated, especially in light of the curriculum objectives for your year of study and the agreement on learning areas developed by your group at the beginning of the problem
Now, it is time to review, clean up, and focus the Learning Issues that the problem’s clerk has written on the board during the many discussions that took place as you reasoned through the problem. There will undoubtedly be some learning issues that were recorded early on that may no longer be relevant to the problem. There may also be some learning issues that you now realise are unrelated to the group’s learning areas. These can be eliminated if the group agrees.

You will find that some learning issues are too broad in scope and researching them, as written, would involve far more study time than you want to spend. In this case, you can split them up into more defined subcategories and eliminate the subcategories that seem less relevant. For example, a disease entity or category of diseases related to one of the Ideas on the board could represent extensive study, so it might be better to break it down into the following subtopics:

♦ Physiological aspects
♦ Anatomical aspects
♦ Clinical symptoms and signs
♦ Pathology
♦ Immunological aspects
♦ Treatment alternatives, etc

Then, you can choose the most relevant topics at that stage of the module.
Assigning learning issues

Once the Learning Issues have been expanded, trimmed, or focused, the group should identify and agree on which learning issues are of general interest or central importance. These must be studied by all members of the group.

However, such central issues often contain many sub-issues that could be more productively divided and assigned to individual group members. In addition, each member of the group should choose special learning issues that they want to pursue in depth.

Here are some guidelines for making this choice:

♦ Many of the issues were raised by certain members of the group because of their awareness of a personal learning need or interest in the subject. They would be the most motivated person to research the issues.
♦ Each member should choose those learning issues to study in depth that involve an area where he or she lacks sufficient background or knowledge.
♦ Members of the group should avoid learning issues in which they already have some background or are particularly well versed.
  ○ It is a terrible temptation to choose an issue with which you are comfortable just because it would be very easy to get and understand the needed facts quickly. It would be far more productive for each individual, and the group, if each person chooses an area representing an educational need and challenge.
  ○ When the group returns to the problem after self-directed learning, in the second tutorial, the members of the group already with expertise in an area may then discuss or comment on the learning of others in these areas. This promotes good discussion and helps validate learning.
♦ Several members of the group may pick the same learning issues and work together in their research and study.

♦ Note: As a general principle, all members should have learnt enough about all learning issues at least to a generalist level, so that they are capable of fully understanding what is reported back in the second tutorial by the group member to whom a specific learning issue had been assigned.
Why are learning issues split up and assigned?

For PBL to work, group members handle specific learning issues in depth and are expected to have researched the issue to such an extent that they become the group’s new resident expert on that issue.

In the beginning, however, there may be some misconceptions among the group because most of its members have just come from more traditional learning backgrounds where teachers have provided students with all that they should know, through lectures and reading assignments. Hence, group members who have researched an assigned issue in detail may think they should prepare and present their work as a mini-lecture to the others.

Conversely, PBL students might each want to take on all the learning issues to the same detail because they may feel uncomfortable with the idea that they have to learn from fellow group members who are learning as they are. In turn, they may dread the possibility of hearing mini-lectures from other students at the second tutorial. But if every member of the group were to research all the learning issues listed to the same depth, learning becomes too broad and superficial because of time constraints. Superficial learning defeats one of the most important aspects of PBL: the ability to pursue information and relate it to your own knowledge base, so that it is deeply and well understood.

♦ Note: When dividing up learning issues, conducting self-directed study, and sharing information at the second tutorial, definitely avoid all thoughts of preparing and delivering mini-lectures!

Gaining a sound knowledge of general topics, wanting to build up specialist knowledge in particular areas, and enjoying the challenge of keeping up-to-date are what life-long learning is all about.
How to cover learning issues

Even though you concentrate in depth on your one or more assigned learning issues, you should also review the learning issues that have been assigned to others, so as to be better prepared to understand the information they bring to the group in the second tutorial. This approach increases the depth of the group’s discussions, and allows every member to continue actively contributing to the PBL process.

Bear in mind that when group members share their information in the second tutorial (see page 28), it is always in the context of reviewing and discussing the original problem, rather than generally reporting on each member’s self-study.

In addition, you should be prepared to bring handouts concerning what you have learnt (reprints of articles, diagrams, personal notes, etc) because these will greatly help your colleagues later, when they review any learning issue that the group did not manage to discuss in depth during the tutorial.

As you will see later, mini-lectures should not occur if PBL tutorial processes are conducted effectively. The goal is that each member’s learning is incorporated into an ongoing review and discussion of the problem.
Dividing up the learning issues for deeper study allows each member of your group to do the following:

- Be well informed in a unique aspect of the problem
- Concentrate on areas of learning that are important to their own growth
- Have an important role in the follow-up discussions of the problem
- Formulate, share, and refine a logical search strategy for information using primary sources (journals, on-line documents, resource staff members, etc)
- Sort through relevant and irrelevant resources, and to check the reliability of resources
- Cross-check references and resources for opposing points of view
- Integrate learning with other knowledge

Your interpersonal skills will also develop when you study your assigned learning issues in depth and later share your knowledge with your group, because you will learn how to:

- Challenge and draw out knowledge from people with expertise; make notes and handouts
- Effectively inform your peers of your work
- Actively listen to your peers
- Discuss the problem from different perspectives

Assessing resources for reliability, weighing opposing points of view, and integrating your learning with other knowledge are essential skills in dental practice. You also need to effectively inform others of your findings, especially if your career involves educating fellow oral health care team members and maybe students.
Identifying learning resources

Towards the end of the first tutorial, after you have identified the learning issues you plan to tackle, the next step is to identify the learning resources you plan to use during your self-directed study. There is a wide range of possibilities:

♦ Textbooks
♦ Review articles and research papers
♦ On-line resources, such as the links in your year’s Web-learning Centre and other Internet resources
♦ Staff members who are experts (especially those listed as “resource staff members” for the problem under consideration and who may be contacted via the discussion groups in the Web-learning Centre)
♦ Experts in the professional community

You need to decide, before starting the self-directed learning stage, which resources will give you the best information for your assigned learning issues (the most effective and efficient resources). You will also need to describe them to the group in the first tutorial. You may try to develop a strategy in your studies, such as:

♦ Getting an initial overview of the learning issue in a textbook
♦ Performing a Medline or Internet search to narrow down specific issues or find the latest information
♦ Contacting a resource staff member via the Web-learning Centre to discuss as yet unresolved questions

As each member of the group discusses the resources that he or she plans to use, the other members in the group can question the rationale for the proposed strategy or suggest other resources.

Reality Check

In your professional career, you will need to be able to find up-to-date references quickly when working with urgent problems or when you have many patients to care for. You should know how to effectively use libraries, on-line resources, the Internet, and consultants and specialists, whatever branch of dentistry you choose.
5. Self-directed Learning

Self-study

The time between the first and second tutorials gives you the opportunity to find the information you need to study for your assigned learning issues, as well as to study and explore all the other areas of the problem that might be productive for you.

Since you have only a few learning issues, you can explore them in detail. However, always keep in mind the overall problem and your group’s agreement about its learning areas. You should also try to develop an effective strategy for self-study. For example, you might:

♦ Get an initial overview of your learning issue from a general textbook
♦ Get a more focused review from a specialist textbook
♦ Delve into particularly difficult or poorly understood areas with journal articles
♦ Have a discussion with a resource staff member, who, in addition to answering your questions, may give you other references that may be pertinent

These last two strategies are important because they allow you to be certain you have the most current and accurate information. The most recent textbook is usually already 3 to 4 years out of date, and if it is a general textbook, it will be superficial in its coverage. While you study, remember to include a critical assessment of your learning resources, which you can refer to when reporting back to your group in the second tutorial.

♦ Note: Remember, too, that some self-study time should be devoted to consolidating what you have learnt.

Etiquette when contacting staff

Sometimes, you will run into conflicting opinions in your study and this will present you with the challenge of deciding for yourself. You will have to learn to evaluate the research methods used and the decisions based on that research. Initially, you may have to use experts to help you in this evaluation.
Before posting a question or contacting a resource staff member, be sure that you have already done your “homework” in the area of the learning issue. This will allow you to more readily understand the staff member’s information, to focus on the areas you are confused about, and to find out the latest information on the subject. It may certainly annoy staff members if you approach them without having first done your necessary homework to try to resolve issues yourself and become fully familiar with the subject matter.

Although there are resource staff members who are listed as being available to discuss each problem, take it upon yourself to find others in the University or professional community who might be valuable resources. Again, prepare yourself properly by doing your homework first before posing your questions.

You cannot learn everything there is to know about dentistry during your undergraduate programme. In addition, new information is constantly being generated in all fields of dentistry, and what you learn in dental school may not stand the “test of time”, eventually becoming outdated or even being considered “wrong”. Your patients will also present problems you have never encountered before, and there may be conflicting professional opinions as to the most appropriate treatment.

Therefore, you will always need to:
- Recognise when you need to learn more in your career
- Identify what you need to learn
- Choose the most effective, efficient, and accurate resources to obtain this information, including consultants and specialists
Group collaboration

The members of your group should be encouraged to collaborate on learning issues, working together to get a better understanding through discussion.

Self-directed learning does not imply that you need to do all the studying on your own. Study groups formed by friends in your year are a very effective way of ensuring deep learning and understanding of learning issues that you have been assigned to study.

Preparing for the second tutorial

During your self-directed learning, you should prepare notes of key points and make copies (one for each group member) of any of the following:

- Important articles
- Important diagrams, drawings, or charts
- Reference lists
- Your own personal notes, topic outlines, and/or diagrams that you created during your study

You can hand out this material to your colleagues during group discussions at the second tutorial, thereby eliminating the need for you to describe in detail what you have learnt. Your colleagues can also refer to the material during their own learning later.

You can also bring to the second tutorial any books that others might find useful. Very occasionally, it might even be useful to bring an “expert” (from the University, Faculty, or professional community) back to the group to review the group’s thinking with the problem and to answer questions. But remember, you are meant to be the new resident expert on your assigned learning issues.
6. Tutorial 2—Problem Follow-up and Tutorial Processes

Reviewing the resources that you used

All group members meet up again in the second tutorial, bringing with them any specially prepared materials. The first thing to happen is a discussion, not about what you learnt, but about the resources that you used during your self-directed learning. Each member of the group should briefly describe the target resources that they had mentioned in the first tutorial, and then the resources they ultimately used during self-study, with reasons why. They should critically assess resources and also discuss any problems encountered when looking for and using resources, such as:

- Resources with inadequate or superficial information
- Resources with too much detail
- Out-of-date resources
- Inaccurate resources
- Conflicting opinions in different resources
- Difficulty in contacting a resource staff member or expert

This is an opportunity for the members of the group to discuss how to access appropriate resources in the future for various kinds of learning issues. As the group becomes more sophisticated with identifying and using resources, this step will later provide an opportunity to also discuss how to evaluate the accuracy of information (the reputation of authors, research methods used, statistical methods used, etc).
Reassessing the problem

Now that you are better informed about the problem, you need to apply what you learnt during self-study back to the problem.

Reviewing the Ideas list

The group should at this point summarise the problem again. Next, the group reviews the ideas list that was recorded on the board in the first tutorial, and indicates where changes should be made. Relevant questions are: “What ideas should now be eliminated or altered?” and “What new ideas should be added?”.

Any suggestions for such changes, eliminations, or additions to the ideas should be supported with justifications based on the information from self-directed learning. Any handouts that were prepared for the group (copies of articles, personal notes, etc) can be distributed. Suggestions for any changes in the ideas list should be challenged, questioned, and discussed by the group as appropriate. Comments based on self-directed learning should be presented in this discussion.

In this way, the information gained from self-directed learning is applied back to the problem in an active, exciting way that expands everyone’s understanding of the problem and makes the new information memorable for everyone. It is not necessary for any group members to make presentations of all their findings, since all the relevant information will emerge during the discussions around the problem.

♦ Note: As mentioned before, mini-lectures are to be avoided at all costs, because they significantly stifle the PBL process.
As this process of sharing information goes on, everyone in the group should keep an eye on the Learning Issues and who they were assigned to, as previously listed on the board, in order to make certain that all members of the group have been able to contribute the findings of their self-directed learning. There is nothing more frustrating than for a student to have discovered some valuable information for the group during self-study and then to have no opportunity to apply it to the problem.

Reassessing the problem in the second tutorial is one of the most important and exciting steps in PBL, as a number of very important processes are occurring:

♦ You are all able to critique and correct your prior knowledge and understanding on the basis of your new learning
♦ You are all able to critique your prior reasoning with the problem
♦ The new facts you all learn are associated in your mind with the problem
♦ The new facts you all learn are enmeshed with “real-life” situations
♦ All these ensure the retention and recall of what you learn

Reality Check

In your professional career, you need to apply what you have learnt during research/study periods back to the problem and the oral health care delivery setting. By using what you have found to reassess your original ideas and the original problem, the new facts you learn become associated in your mind with the specific problem, making them more memorable.
Making final decisions about the problem outcome

The second tutorial ends with the conclusion of the problem and an Assessment and Evaluation Session. The steps in these stages are often difficult for the members of the group and for the facilitator initially, but they become easier with practice. Although they come at the end, these stages are key components of the PBL process that are necessary for PBL to have its full educational value.

Knowledge summary

The group comes to a final decision about the problem by attempting to describe what has been learnt from its work with the problem. Group members do this both verbally and graphically. This stage promotes deep and contextual learning and aids long-term memory retention and recall of information.

First, the members of the group should, in turn, try to describe the following (the sample quotes refer to a problem about a case of malocclusion):

♦ What new things were learnt as the group worked with the problem?
♦ How has this learning extended knowledge in related subjects?
  ○ “I learnt that dental malocclusions can be managed by means of dental extractions, oral rehabilitation, orthodontics, orthognathic surgery, or any combination of these.”
♦ What new concepts have been learnt?
  ○ “The malocclusion may have resulted from an inherited dento-alveolar disproportion.”
♦ How does learning in this problem relate to what was learnt in past problems?
  ○ “Similar malocclusions may present with a variety of signs in different patients.”
♦ How will the things learnt with this problem help with future problems?
  ○ “I realise that malocclusions may be prevented from fully developing through interceptive management.”
Each student’s comments may be followed by questioning and discussions within the group. When this cycle has finished, the group should try to summarise their learning. An effective tool for guiding these discussions in the group is the development of a “concept map”.

The group may also be requested by the facilitator to work on a “product” (eg, group presentation, summary chart) to bring the problem to a conclusion.

Further self-directed learning

In this problem reassessment process during the second tutorial, you need to be aware of any new areas of learning that may arise. There may be new, unanswered questions and new Learning Issues that need to be recorded on the board and assigned among the group. If new learning issues do arise, an additional self-directed learning period followed by a return to the problem (a third tutorial) may be required. Alternatively, the learning issues may be addressed by group members without the need to meet again on the problem.
7. Assessment and Evaluation Session

To conclude the PBL process, at the end of the second tutorial, each member of the group needs to assess his or her own progress and the progress of the other group members.

The three areas that are covered in the assessment are as follows:

♦ Progress as a problem solver
♦ Progress as a self-directed learner
♦ Progress as a group member

Self-assessment

1. As a problem solver

Problem-solving skills were challenged in the first tutorial, when the problem was encountered as an unknown entity. At that stage, ideas were generated, enquiry was undertaken, facts were assembled on the board, and decisions were made.

Although problem-solving was a group effort, each member of the group must recall and evaluate the quality of his or her own reasoning.

2. As a self-directed learner

Self-directed learning skills were challenged when target resources were chosen for assigned learning issues in the first tutorial, when the resources were actually used during self-study, and when resources were critiqued in the second tutorial. Most importantly, the quality and quantity of the information obtained in the time available, its usefulness to the group and the group member, and how effectively it was applied to the problem and presented to the group should be commented on.

In addition, individual learning progress needs to be assessed: was significant progress made in learning by the individual, considering the other problems involved in the current module?
3. As a group member

How effective was each group member as a part of the team when working on the problem? Was the group member too quiet, too assertive, or controlling? Did the member feel that he or she took an active role in the problem discussions and made a full contribution to the group? Did each member communicate well? Were there any interpersonal problems with members of the group? Did each member help others with their interpersonal problems?

Peer-assessment

After each member’s self-assessment as a problem solver, self-directed learner, and group member, the rest of the group needs to comment. Were these assessments accurate? Do they view a member’s performance differently and if so, in what way? Is there anything to add to the individual’s self-appraisal?

It is naturally a challenge for each member to provide honest and accurate feedback to peers, while keeping it constructive and helpful. Everyone in the group wants to be an effective oral health care professional and to do well in his or her learning. Accurate feedback—positive or negative—is of great value.

When giving feedback, it is especially important that you support your comments with specific examples. It does little good to tell a member in the group, for instance, that he or she “seemed to treat things too superficially” or that you felt someone “was being too critical of the performance of others”, without giving examples.

♦ Note: Facilitators may also add to the feedback if they feel that appropriate comments have not been made by others in the group.
Facilitator-assessment

Facilitators must also assess themselves at the end of every problem. They should discuss how they felt they performed in the facilitator role, in enabling the group’s thinking and discussion, and in guiding the entire PBL process. Just as with each student’s self-assessment, the student group should discuss a facilitator’s self-assessment and provide feedback—positive or negative—about their perception of the facilitator’s performance. This is the only way your facilitators can improve their skills.

Group evaluation

At the end of this process, the group should discuss how they feel they are performing as a group and what improvements need to be made for the group to function optimally.

All working groups inevitably develop interpersonal problems. Values, personal goals, ease and difficulty of learning in different areas, personality styles, and ways of doing things vary among different group members, so conflict can arise within the group. When conflicts do arise, they should be discussed openly and frankly. Every member of the group has a responsibility to help resolve these difficulties. It is not just the facilitator’s job. The members of the group should work smoothly and effectively as a team. They do not necessarily have to like each other; they should, however, be able to work together.

Reality Check

The value of the Assessment and Evaluation Sessions to your future is immense and may not be fully recognised by you at this point in your career. Appraisals, conflict resolution, and professional collaboration are part of teamwork in the real world. That is why these sessions are very important and should not be neglected, for lack of time or for whatever other reason.
8. Conclusions

Problem-based learning has proved to be a very effective way of developing skills needed by health care personnel and of promoting learning and reasoning, which occur at deep levels.

To help you adjust to the PBL process, all first-year students are required to keep a Learning Journal for each module and to record their learning experiences in it periodically. Your journal is confidential and will enable you to reflect on your learning as well as what has been learnt, and to monitor your own progress throughout the course.

In addition, every student in the HKU Faculty of Dentistry has an assigned Personal Tutor. Although a Personal Tutor may never actually be a facilitator of your PBL tutorial group, he or she can be approached by individual students to discuss how to get the most out of this new mode of learning.

We are aware that PBL is a learning style that is probably very different from what you have previously been exposed to and perhaps have become very comfortable with. Many students new to PBL initially find that they miss the “good old ways” of being taught directly and being told what was important to learn thoroughly to do well in examinations.

PBL will require patience for you to come to terms with the completely new ways of learning involved in the PBL process. Accordingly, you should be prepared for an initial period of getting used to a wholly fresh approach to learning. This may be, for many, a period of discomfort. Do not panic—most of your group will be in the same position. So, also be prepared to support and encourage each other to become actively engaged in the PBL process and to embrace this new learning approach. In this way, you can all fully reap its benefits during the course and will be able to apply the same process throughout your professional career.
“Problem solving leads to a solution but not necessarily to an understanding. Problem-based learning leads to understanding but not necessarily to a solution...”

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