Introducing PBL

• What is PBL?
• Why PBL?
• What are the activities in the PBL process?
• What are the 4 meetings?
• What is our PBL experience at CityU?
What is PBL?

A learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge.

Barrows (1982)
Problem-solving VS Problem-based Learning

PS
arriving at decisions based on prior knowledge and reasoning

PBL
the process of acquiring new knowledge based on the recognition of a need to learn
Subject-Based Learning: SBL

START

Given problem to illustrate how to use it

Learn it

Told what students need to know
Problem-Based Learning: PBL

- **Problem posed**
  - Students identify what they need to know

- **Learn it**

- **Apply it**

- **START**

  - Problem posed
  - Students identify what they need to know
  - Apply it
  - Learn it
Why PBL?

PBL provides a learning environment which are powerful to:

- Promote **deep** learning
- Empower students in **lifelong** learning
Promote deep learning

• Allow students to construct their own understanding in the process

• Encourage students to apply their prior knowledge to make sense of new knowledge

• Promote high order thinking ability

• Provide group and individual flexibility in learning, including what to learn and how to learn it
Deep learning involves 3 levels of learning:

- Add knowledge
- Apply knowledge
- Change concepts & behaviours
Empower students in lifelong learning

• Return power to the learners
• Allow learners to take more responsibilities of their own learning
• Develop students’ self-monitoring skills
• Encourage active participation and collaboration
• Enable students to learn not only content but also process skills
What are the activities in the PBL process?

Teachers’ activities

- Create a stimulating, supportive & self-directed learning environment
- Facilitate the learning process
- Ensure students to engage in learning
- Ensure students to make good use of time
- Explain the PBL steps
- Communicate expectations
- Challenge students’ thinking
- Ask students questions
- Give feedback
Students’ activities

• Work in small groups collaboratively
• Engage in discussion
• Analyse the problem
• Solve problems
• Share & learn knowledge
• Locate, collect & analyse information
• Teach their peers
• Assess themselves & their peers
• Give constructive feedback
• Reflect on the whole process for improvement
The PBL steps

1. Explore the problem
2. Solve the problem with what students know
3. Identify the areas students do not know
4. Set learning goals & allocate tasks
5. Collect, analyse & learn information individually
6. Share (small group) & teach (whole group)
7. Apply the knowledge to solve the problem
8. Assess & reflect on the whole process
## Eight tasks in PBL

<table>
<thead>
<tr>
<th>Task</th>
<th>Student Activity</th>
<th>Knowledge Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explore the problem. Create hypotheses. Identify issues. Elaborate.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Try to solve the problem with what you currently know.</td>
<td>1 (small group)</td>
</tr>
<tr>
<td>3</td>
<td>Identify what you do not know.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>As a group, prioritize your learning needs, set learning goals and objectives, and allocate resources, and identify tasks for each member.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Individual self-study and preparation.</td>
<td>2 (individual)</td>
</tr>
<tr>
<td>6</td>
<td>Return to the group, share the new knowledge effectively so that the entire group learns the information.</td>
<td>3 (small group) 4 (whole group)</td>
</tr>
<tr>
<td>7</td>
<td>Apply knowledge to solve the problem.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Assess the new knowledge, the problem solution and the effectiveness of the process used. Reflect on your own work and that of the group.</td>
<td></td>
</tr>
</tbody>
</table>
A self-directed learning model (From Hmelo & Lin, Becoming Self-Directed Learners: Strategy Development in Problem-Based Learning)
What are the 4 meetings?
The 4 meetings for each case are:

(1): Exploring Meeting (2-hour)
   Collecting information

(2): Preparing Meeting (1-hour)

(3): Teaching Meeting (2-hour)

(4): Assessing Meeting (1-hour)
(1) Exploring meeting
Meeting (1)

Exploring Meeting

• Students explore the case as a starting point of their learning. They share their prior knowledge and identify their learning needs.
The nature of a PBL problem

• Be divided from the learning objectives
• Ill-structured with no clear cut answers
• Challenge students to make justifications
• Encourage students to draw information from various subjects to help them make sense of the problem given
• Relate to real life situation
A Sample Case on Learning styles

Of the five courses Jack is taking in this semester, he likes statistics the best and history the least. This may have something to do with how the two courses are taught. This history professor lectures all the time and Jack has difficulty concentrating in class. On the other hand, the statistics professor always gives his students a chance to solve a short problem in class. He then discusses the solution with the students. Interestingly Cindy, Jack’s friend who is also taking these two courses, prefers history to statistics.
(2) Preparing meeting
Meeting (2)

Preparing Meeting

- Students share with peers in own small group their new knowledge.
(3) Teaching meeting
Meeting (3)
Teaching Meeting

• Students teach and learn from their peers.
(4) Assessing meeting
Meeting (4)

Assessing Meeting

• Students reflect on the whole learning process, evaluate their success and seek directions for future improvement.
What is our PBL experience at CityU?

- *Use PBL in L2L* as the arena for both student & teacher development
- More 1500 students have completed the PBL version of the Course
- Over 50 teaching staff members have facilitated the Course at least one semester
- Over 10 courses and 1 programme use PBL
Background

• *Learning to Learn* was first offered in 1996 to develop students as more effective students.

• **PBL** was introduced in 1999 to put more emphasis on developing students as *lifelong/self-regulated* learners.
Course aims

To develop **effective students & lifelong learners**

Course outcomes

- Attitude
- Cognitive
- Skills
Organisation

- Use **total PBL**
- Students work in **small groups** to discuss cases and help their peers to be better learners
- Students are expected to **learn on their own**
- Tutors are **facilitators**
Course activities

- **PBL small group tutorials** (3 hours per week, students work on 4 cases, share weekly schedules & reflective journals)
- **Pre- and post-testing**
- **Lifelong learning skills workshops**
- **A Learning to Learn Web /Bb Course Website** as a communication platform
- **Individual and group consultations**
Assessment

• Students’ performance is graded pass/fail

• Students are assessed by a combination of attendance, performance in tutorials, learning portfolios, case reports, and other tasks (e.g., weekly time schedules and reflective journals)

• Includes self, peer & tutor assessment
Course impact

After the Course, the students:

• Tend to *use deep approach* of learning
• Tend to *take a more active role* in their learning
• Improve their *study strategies* in all important areas. In particular in *time management, searching & analysing information, discussion, oral presentation, problem solving & critical thinking.*
• Have *higher GPAs* than their peers
## LASSI results of L2L students (2004-05 Semester A)

<table>
<thead>
<tr>
<th>Area</th>
<th>Time 1 Mean (SD)</th>
<th>Time 2 Mean (SD)</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use of support technique</strong></td>
<td>52.64 (26.48)</td>
<td>69.79 (25.24)</td>
<td>-7.212</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Information processing</strong></td>
<td>51.79 (24.70)</td>
<td>69.05 (24.11)</td>
<td>-7.714</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td>47.70 (26.12)</td>
<td>69.01 (21.71)</td>
<td>-11.469</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Self-testing &amp; reviewing</strong></td>
<td>47.22 (26.46)</td>
<td>63.89 (24.10)</td>
<td>-7.464</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Selecting main ideas</strong></td>
<td>45.72 (25.04)</td>
<td>65.75 (20.95)</td>
<td>-10.542</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Concentration</strong></td>
<td>44.81 (25.29)</td>
<td>63.45 (23.26)</td>
<td>-9.693</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Time management</strong></td>
<td>43.75 (23.34)</td>
<td>60.09 (21.82)</td>
<td>-8.084</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Test strategies</strong></td>
<td>41.36 (26.25)</td>
<td>60.17 (24.14)</td>
<td>-8.743</td>
<td>145</td>
<td>.000*</td>
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<tr>
<td><strong>Motivation</strong></td>
<td>27.27 (24.36)</td>
<td>47.41 (27.22)</td>
<td>-9.089</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Attitude</strong></td>
<td>18.16 (20.34)</td>
<td>33.32 (25.62)</td>
<td>-7.774</td>
<td>145</td>
<td>.000*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>420.42 (158.32)</td>
<td>601.92 (168.69)</td>
<td>-12.899</td>
<td>145</td>
<td>.000*</td>
</tr>
</tbody>
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*Significant at .05 level, p < .05
## LASSI results of non-L2L students (2004-05 Semester A)

<table>
<thead>
<tr>
<th>LASSI (04-05 Semester A)</th>
<th>Non-L2L students (n=37)</th>
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<th></th>
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<td>df</td>
<td><strong>Sig. (2-tailed)</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Use of support technique</strong></td>
<td>55.27 (24.32)</td>
<td>61.08 (24.44)</td>
<td>-1.392</td>
<td>36</td>
<td>.172</td>
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<tr>
<td><strong>Information processing</strong></td>
<td>50.16 (23.32)</td>
<td>55.00 (25.69)</td>
<td>-1.195</td>
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<td><strong>Self-testing &amp; reviewing</strong></td>
<td>50.70 (26.51)</td>
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<td><strong>Concentration</strong></td>
<td>51.51 (26.00)</td>
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<td>-.386</td>
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<td>.702</td>
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<td><strong>Time management</strong></td>
<td>51.49 (20.98)</td>
<td>52.03 (23.38)</td>
<td>-.143</td>
<td>36</td>
<td>.887</td>
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<tr>
<td><strong>Selecting main ideas</strong></td>
<td>43.46 (23.57)</td>
<td>53.38 (26.82)</td>
<td>-2.828</td>
<td>36</td>
<td>.008*</td>
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<tr>
<td><strong>Anxiety</strong></td>
<td>45.00 (25.47)</td>
<td>56.51 (28.10)</td>
<td>-3.203</td>
<td>36</td>
<td>.003*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Test strategies</strong></td>
<td>38.43 (21.76)</td>
<td>45.32 (26.94)</td>
<td>-1.628</td>
<td>36</td>
<td>.112</td>
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<tr>
<td><strong>Motivation</strong></td>
<td>36.14 (27.14)</td>
<td>42.84 (27.65)</td>
<td>-1.771</td>
<td>36</td>
<td>.085</td>
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<tr>
<td><strong>Attitude</strong></td>
<td>25.27 (24.08)</td>
<td>23.27 (23.39)</td>
<td>.537</td>
<td>36</td>
<td>.594</td>
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<tr>
<td><strong>Total</strong></td>
<td>447.43 (148.99)</td>
<td>490.68 (186.02)</td>
<td>-1.806</td>
<td>36</td>
<td>.079</td>
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## LASSI results of L2L students (1998-2004, Semester A)

<table>
<thead>
<tr>
<th>Year</th>
<th>Time 1 Total scores</th>
<th>Time 2 Total scores</th>
<th>Scored increased</th>
<th>No. of L2L students</th>
</tr>
</thead>
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<tr>
<td>1998</td>
<td>489.03</td>
<td>560.60</td>
<td>71.57 (14.64%)</td>
<td>75</td>
</tr>
<tr>
<td>1999</td>
<td>453.49</td>
<td>535.21</td>
<td>81.72 (18.02%)</td>
<td>143</td>
</tr>
<tr>
<td>2000</td>
<td>466.56</td>
<td>556.02</td>
<td>89.46 (19.17%)</td>
<td>258</td>
</tr>
<tr>
<td>2001</td>
<td>473.86</td>
<td>593.58</td>
<td>119.72 (25.26%)</td>
<td>213</td>
</tr>
<tr>
<td>2002</td>
<td>383.73</td>
<td>587.35</td>
<td>203.62 (53.06%)</td>
<td>171</td>
</tr>
<tr>
<td>2003</td>
<td>415.19</td>
<td>589.61</td>
<td>174.42 (42.00%)</td>
<td>160</td>
</tr>
<tr>
<td>2004</td>
<td>420.42</td>
<td>601.92</td>
<td>181.50 (43.17%)</td>
<td>146</td>
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### LASSI results of non-L2L students (1998-2005, Semester A)

<table>
<thead>
<tr>
<th>Year</th>
<th>Time 1 Total scores</th>
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</tr>
<tr>
<td>2005</td>
<td>458.38</td>
<td>586.76</td>
<td>128.40 (28.03%)</td>
<td>58</td>
</tr>
</tbody>
</table>
Students’ comments

“The cases in L2L stimulate our thinking which cannot be easily achieved in other courses.

Through working with the cases, we developed our discussion, problem solving and information searching skills. These skills are all valuable to my future studies”
Tutors’ comments

“PBL is the key factor for the success of this Course. I think it is a very ideal learning environment in which students can explore what they want to learn and learn it on their own. They improve a great deal in self-regulation”