Original article

Students perception of an industry based approach problem based learning (PBL) and their performance in drug delivery courses

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A B S T R A C T
Objective: To investigate students perception of an industry based approach problem based learning (PBL) and their performance in drug delivery courses in pharmaceutics.
Methods: PBL was implemented within two drug delivery courses in 2015, in anticipation that the use of formulation or industrial instead of clinical or pharmacy practice based triggers, would open up student interest and understanding towards learning pharmaceutics in relation to industrial pharmacy. Two cohorts were monitored through final year examination results and PBL feedback to evaluate student perception and acceptance of the use of PBL. Previous cohorts were only exposed to conventional tutorials.
Results: Both cohorts showed better performance in their final examination results (2015 & 2016) compared to the previous year (2014) when students were only exposed to tutorials. The maximum and average marks obtained were also higher. There was significant difference between the maximum marks for Drug Delivery Systems 2 and the average marks for Drug Delivery Systems 1 with P < 0.05. It was also noted that although the cGPA of student intake for Cohort 2014 is higher than Cohorts 2015 and 2016, the performance of students were better seen in the two latter cohorts. In addition, student feedback showed positive acquiescence towards using PBL as part of the course.
Conclusions: Introduction of PBL in the drug delivery courses has shown to improve student academic performance either directly or indirectly by increasing student's interest and understanding of the subjects taught. It also enhanced student soft skills and confidence. Students were happy with the implementation of PBL which improved their understanding of the subject, enhancing their abilities to think critically and improved their time management abilities.

1. Introduction

Problem-based learning (PBL) has been introduced into pharmacy education in an effort to prepare future pharmacists to meet the challenging demands of the pharmacy profession (Abate et al., 2000; ACCP 2002; Haworth et al., 1998; Love et al., 1983). A literature review of pharmacy education disclosed a number of articles that discuss the implementation of PBL methods into course curricula, along with ways taken to implement this complex method. For example, in 1983, Love and Shumway described a Patient-Oriented Problem-Solving Instruction (POPS) module they developed to teach pharmacy students problem solving skills. This module is used in small student-led group discussions that focused on clinical cases and study questions. Haworth et al. also reported the utilization of PBL in a pharmaceutics course at the University of Southern California School of Pharmacy (Haworth et al., 1998). Student feedback suggested that from their viewpoint, the pharmaceutics course left them with broad knowledge and that they were able to access long after the course ended. They also state that the course simulated the collaborative nature of the “real world”, team-orientation and encouraged critical thinking. Various studies have been conducted to investigate the effects of PBL on academic achievement, assessed by final examination and post test scores, students' grades and GPA. Other studies conducted to ascertain the effects of PBL on cognitive outcomes such as knowledge acquisition, clinical reasoning, critical thinking and problem solving (Rebecca, 2010; Zhang, 2011; Nagge, 2018; Phungsuk, 2017; Alrahlah, 2016; Nasr, 2017; Yew, 2016; Loyens, 2015). All authors noted an improvement in students' preparation, active learning
and problem solving skills, performance on a cumulative final examination and motivation to study.

It has been reported that most students that enter a Bachelor of Pharmacy program have the perception of pharmacy as a clinical profession that will lead to a career in a community or hospital pharmacy. According to the Workforce Report of the International Pharmaceutical Federation in 2009 these expectations are consistent with the proportion of actively employed pharmacists working in community (50–95%) or hospital (10–20%) pharmacies in the Netherlands and Europe (Wulijli, 2009). In line with the expectations of the students, and fulfilling the licensing requirements for pharmacists, the contents of most curricula for Pharmacy degrees to a large extent focus on pharmacy practice and patient care. Based on interviews with representatives within the work field it was found that the pharmaceutical education and curriculum should be mainly adapted to address the increasing role of pharmacists as clinical or therapeutic consultants (Meijerman, 2007; Koster, 2007, 2009). As a consequence, students often do not have enough information to value the career opportunities within the industry (Smith, 2002).

2. Method

Two different cohorts of pharmacy students were followed for two consecutive semesters where they had to undertake drug delivery courses which were: PHC 471 Drug Delivery Systems I in Semester 4 (2nd year) and PHC 500 Drug Delivery Systems II in Semester 5 (3rd year). The final year examination results were compared with previous cohorts where students were only exposed to tutorials. PBL feedback forms were distributed to all students. They were asked to complete the form within one-week of the final PBL session with total anonymity. The collected feedback forms were analysed to evaluate student perception and acceptance of the use of the PBL method. Ethics approval was obtained for this study from the university’s Research Ethics Committee (REC/351/17).

2.1. PBL design

The PBL design for both courses is summarised in Table 1. The PBL trigger was uploaded to the course webpage a minimum of 1 week before the first PBL session. Example of PBL triggers for both courses are given in the Appendix A. The numbers of PBL sessions offered were dependant on the students’ learning time (SLT) calculation of the course. During the first session, students were given 45 min to 1 h to discuss the trigger within each group, and come out with the learning objectives. Each group will then present their proposed learning objectives. Further discussions were executed to lead the students towards attaining the required and standardized learning objectives for the trigger.

The second, third and fourth sessions of the PBL involved group presentation of the set learning objectives. A conclusion or problem solving initiative was required in the final session of the PBL. This was followed by a short 15 min quiz to distinguish the students understanding of the PBL subject area.

Peer review form for students was distributed on the 1st PBL session and collected at the end of the 3rd or 4th PBL sessions. Evaluation was conducted within the group where one student will evaluate another student in the same group. Those who were evaluating the leader should indicate this on the form.

A PBL feedback form was distributed to each student at the end of the final PBL session. Students were required to fill in the form within 1 week and then hand over the forms to their class representative. The collected forms were handed over to the coordinator of the course.

2.2. Standardisation of examination

All examination questions were standardised using Test Specification Table. A specified cognitive level of difficulty which is easy, moderate and difficult had been identified and followed. Specified levels of difficulty for both courses are as shown in Table 2. Marks allotted for each topic mirrored the time spent teaching the topic.

2.3. cGPA of student intake

cGPA of student intake is as shown in Table 3. The overall cGPA of students entering the pharmacy course was shown to be higher for Cohort 2014 then Cohorts 2015 and 2016. The number of student intake was also higher for Cohorts 2015 and 2016.

2.4. Statistical analysis

The study results are presented in descriptive statistics such as tables and bar charts. Data analysis of examination results was undertaken using independent t-tests using the Statistical Package for the Social Sciences for Windows® (SPSS Inc, Chicago, IL). Cronbach alpha was used to assess the internal consistency in the study questionnaire with values of at least 0.7 indicating acceptable internal consistency. The nonparametric student feedback data was further analysed using the Mann-Whitney U test to evaluate any significance variation between cohorts, with p < 0.05 set as significant a priori.

| Table 2 |
| Specified levels of difficulty for Drug Delivery Systems I and II. |
| Level of difficulty | C1-C2 | C3-C4 | C5-C6 |
| Drug Delivery Systems 1 | 50% | 40% | 10% |
| Drug Delivery Systems 2 | 30% | 40% | 30% |

| Table 1 |
| PBL design for Drug Delivery Systems I and II. |
| Drug Delivery Systems 1 (PHC 471) | Drug Delivery Systems 2 (PHC 500) |
| Semester offered | Semester 4 | Semester 5 |
| Cohort 1: March-July 2015 | Cohort 1: Sept-Jan 2016 |
| Cohort 2: March-July 2016 | Cohort 2: Sept-Jan 2017 |
| PBL grouping | 15–17 students/group | 15–17 students/group |
| Further subdivided into 3 groups | Further subdivided into 3 groups |
| Each group is required to select a leader | Each group is required to select a leader |
| No of facilitator | 1 facilitator/group | 1 facilitator/group |
| [Facilitator rotated for each session] | [Facilitator rotated for each session] |
| PBL sessions | 4 sessions | 3 sessions |
| Each session 2 h | Each session 2 h |
| Evaluation tools | Presentations (2nd, 3rd and 4th sessions) | Presentations (2nd and 3rd sessions) |
| Short Quiz (4th session) | Short Quiz (3rd session) |
3. Results

3.1. Final examination

Final examination results for both cohorts are depicted in Figs. 1 and 2. Both cohorts showed better performance in the final examination results (2015 & 2016) compared to previous year (2014) when students were only exposed to tutorials. The performance graphs were skewed to the left showing students' improvement on their grades, with more students obtaining A for their results. The maximum marks obtained from 2014 to 2016 were also higher; 78, 79.3 and 78.13% respectively for Drug Delivery Systems I and 77.12, 81.28 and 81.00% respectively for Drug Delivery Systems II. Average marks were also improved for Drug Delivery Systems I, 61.5 ± 5.9, 64.04 ± 5.8 and 65.12 ± 6.2 respectively. However, the average marks obtained in Drug Delivery Systems II remained the same at 64%. Statistical analyses of the marks differences were performed using the paired sample t-test. There was significant difference between the maximum marks for Drug Delivery Systems II and the average marks for Drug Delivery Systems I with P < 0.05.

3.2. Student feedback

Table 4 summarises the students' feedback towards the use of PBL in the drug delivery courses. Questions 1–3 were to perceive the students' attitude and group work during the PBL sessions. More than 80% of students completed their assigned work and stated that working in a group helped them to understand the subject better. Questions 4–7 cover the aspect of presentation during the PBL sessions. As shown in Table 4, more than 2/3 of the respondents from both cohorts admitted that presentation either by their own group or by other groups helped them with understanding the course material given. Questions 8–10 enquire about the students' perception of PBL compared to tutorials. More than 60% of students think that PBL is more effective and a better method of delivery of the course materials, with 80% stating that it helped them to understand the course material better. Lastly, questions 11–13 inquire about the students' acceptance of PBL. Although 50% or more students were positive about PBL, a higher number of students were found to be either neutral or disagree with regards to their preference of using PBL as their learning tool compared to tutorial. It was also shown that Cohort 1 has a higher preference to PBL than Cohort 2. In general, it is clear that student responses between the two cohorts appear similar, with scores remaining relatively consistent for the majority of questions. Focusing on the responses for questions 11, 12 and 13, it appears that students in cohort 2015 seem to express a greater preference for PBL sessions, with 61% of students preferring PBL over tutorials sessions, compared with 50% for cohort 2016. This is also reflected in a greater number in cohort 2015 professing to enjoy PBL almost 59%, compared with 53.4% in cohort 2016. Thus in general, cohort 2015 seems to present a more positive outlook towards the use of PBL sessions as a learning tool, compared with cohort 2016. Overall, the responses between cohorts do not reveal any statistical difference, however this percentage variation warrants further investigation, and may be attributed to the competency of the facilitators involved within the PBL sessions, and the resulting student experience.

4. Discussion

Problem based learning was introduced to the pharmaceutics department curriculum in 2015 in an attempt to improve teaching and academic performance of students. In addition, in order to inculcate in students the ability to communicate in English, presentations were incorporated as one of the evaluation tools used within the PBL sessions. Students were divided into groups to introduce them to team-work as well as leadership skills. Triggers based on formulation problems were used in order to stimulate student interest towards other areas of pharmacy besides clinical.

Although examination results reveal that the introduction of PBL has improved student academic performance; there were a number of weaknesses observed in the implementation of the

![Fig. 1. Final examination results for Drug Delivery Systems I for Cohort 1 (2015) and Cohort 2 (2016).](image)
PBL sessions. Ideally, each PBL session for all groups should be conducted simultaneously. However, due to manpower limitations, each session was divided into 2 and conducted at different days depending on the timetable. The students were advised not to disclose the learning objectives (LOs) to the second set of groups to ensure that they obtained the LOs themselves during their 1st session. Although it was noted that the students seemed to do their own discussion, to come up with the LOs, we were not 100% sure that this was the case or whether they had obtained hints or information beforehand. Nonetheless, from the students’ presentations, information presented by each group was found to be different. One way to address this issue; however, is either to combine all groups to conduct the 1st sessions at one time, or to devise separate triggers for each session. Standardising the methods in which PBL sessions were conducted was also an issue. The use of difference facilitators during the sessions has confused the students during presentations as some facilitators were better versed on the subject matter, hence could provide a better discussion with the students. Although a detailed set of facilitator notes were given to each facilitator, those with more work experience were seen to be able to better satisfy students in terms of providing additional knowledge and context of pharmacy related issues. Thirdly, the commitment and passion from each facilitator were different and this issue was raised by the students. Though most of the facilitators were professional and passionate, there were one or two facilitators who were less interested in doing the PBL as well as others.

Table 4
Students feedback on the implementation of PBL for Cohort 2015 (C1) n = 131 and Cohort 2016 (C2), n = 133.

| Feedback questions                                                                 | Agree (%) | Neutral (%) | Disagree (%) | P value *  |
|-----------------------------------------------------------------------------------|-----------|-------------|--------------|------------|
| 1. I always complete the preparatory work set by the facilitator for a PBL session | 82.7      | 86.26       | 17.3         | 13.74      |
| 2. I enjoy completing the preparatory work for a PBL session in a group           | 63.9      | 67.94       | 33.8         | 31.30      |
| 3. I have better understanding of the course material by doing PBL group work     | 88.7      | 88.55       | 11.3         | 11.45      |
| 4. I have better understanding of the course material by presentation of the required learning objectives. | 87.2      | 83.97       | 12.8         | 16.03      |
| 5. I have better understanding of the course material by taking part in the question and answer session and presentation delivered by my group | 84.2      | 75.57       | 15.8         | 24.43      |
| 6. I have better understanding of the course material by listening to other groups’ presentation. | 74.4      | 75.52       | 24.8         | 24.48      |
| 7. I have better understanding of the course material by taking part in the question and answer session and presentation delivered by other groups | 78.9      | 78.63       | 21.2         | 21.37      |
| 8. PBL is a more effective way of learning compared to tutorials                   | 63.9      | 69.47       | 31.6         | 26.73      |
| 9. PBL is a better method of delivery of the course materials compared to tutorials. | 66.2      | 62.60       | 28.6         | 34.35      |
| 10. PBL allows me to understand the course materials better.                      | 80.5      | 76.34       | 18.0         | 21.37      |
| 11. I enjoy learning using PBL compared to tutorials.                              | 53.4      | 58.78       | 39.8         | 38.17      |
| 12. I feel that I learn better with PBL compared to tutorials.                    | 58.6      | 60.31       | 34.6         | 34.35      |
| 13. I prefer to learn using PBL compared to tutorials.                             | 50.4      | 61.07       | 41.4         | 31.30      |

Table 5
Student emotions after PBL sessions for both cohorts.

|                          | Positive emotions (%) | Negative emotions (%) |
|--------------------------|-----------------------|-----------------------|
| Relaxed, happy, stimulated | 89.9                  | 10.1                  |
| Tense, bored, frustrated, tired, angry, depressed | 89.2                  | 10.8                  |
Studies done on pharmacy students learning styles also found that they would know how to answer the questions during examinations. Some students had indicated that they want examples of answers to the test or exam questions so that they usually provided. This may be due to the fact that in conventional tutorial sessions, answers are not provided. Scoring in examinations due to ‘spoon-feeding’ will not produce good pharmacists.

Highly positive student comments on the PBL sessions were good and positive. Table 6 lists down some of the comments written by the students. Most of the responses stated that the introduction of PBL in the courses improved their understanding of the course material, communication skills, confidence and teamwork. The triggers also stimulated them to think critically in order to come up with a solution. A study conducted on active learning (AL) at Appalachian College of Pharmacy (ACP) pharmacy students also found that in general ACP students have favorable opinions toward AL. Most students (59.4%) agreed/strongly agreed that AL improved their understanding of the material covered in the course. However, the author stated that there were a few limitations to the study and there is significant room to improve the amount and quality of AL at ACP for the betterment of student learning outcomes. Other studies done also reported students’ positive acceptance towards PBL and the improvement of their performance and interest in the subjects or courses given.

Table 6
Open remarks of students about PBL.

| Remarks                                                                 | Percentage |
|-------------------------------------------------------------------------|------------|
| Improves presentation skills and better learning.                       | 74.3%      |
| More knowledge and improve confidence to do presentation.              | 79.5%      |
| Better understanding of the theory and problem solving skills.          | 74.3%      |
| Now I feel like I want to work in the pharmaceutical industry.          | 56.8%      |
| Help with better presentation skills and am able to improve myself.    | 71.4%      |
| Introduces teamwork, critical thinking and application of what we had learned. | 60.5%      |
| The sessions showed me how important extensive reading is on the given topics. | 56.8%      |
| I get to understand the materials better and learn to improve my communication skills. | 60.5%      |
| I get more confident in talking in front of a crowd and I also get more information on the subject area. | 56.8%      |
| Pushed students to think beyond what they have been taught in lectures. | 56.8%      |
| During PBL discussion, we were stimulated to come up with solution based on the cases, create new ideas and improved our understanding on what we learn in lectures. | 56.8%      |
| PBL require students to think critically to satisfy the learning outcomes and drawing a conclusion out of it. Designing learning outcomes actually helps students to focus on the subject and find sources around them which are more specific, getting new information that does not rely on existing course syllabus. | 56.8%      |
| I gained deeper understanding of the subject as PBL requires us to do thorough research on the given subject and know the application in real life situation. I also learned how to work with team mates and improve my presentation skills. The question session at the end of the PBL also triggered critical thinking among students. | 56.8%      |

This was indicated from student’s responses in confidential questionnaires submitted a week after the final PBL session (Appendix B), allowing students to score facilitator performance and also provide written feedback, with some facilitators being preferred by students. Poor tutorials were also reflected by the students’ feedback, where they stated their emotions after the PBL sessions with either being “tense, bored, frustrated, tired, angry or depressed” and they rated the facilitator low. Table 5 shows the percentage of responses from students with regards to how they felt after the PBL sessions. Only 10% of students reported ‘negative emotions’ after the PBL sessions and this was connected to the same facilitators. A total of six facilitators were involved in the PBL sessions, all with varied backgrounds, both Western and Eastern educated, and different levels of exposure to formal PBL training, thus in order to further standardize the student experience, additional training may be required for the facilitators in the form of formal training sessions from external parties. Adherence to the PBL learning system is important to the students’ learning process. During this problem understanding phase that students organize their knowledge in order to understand the subjects and try to mould the knowledge towards solving the problem given (Wosinskic, 2018). To ensure fairness to the students, a rotation of facilitator for each session was implemented. Another issue noted was that the presentation time was not enough to accommodate longer questions and answer session which was seen to be beneficial for the students. Lastly, trigger development was not an easy task. We admit that there is still room for improvement for us to produce better triggers to ensure better outcomes. Developing triggers was found to take time, practice and devotion to the concept. It was important that a team approach involving academics and practitioners is adopted to ensure that the triggers reflect “real life” situations (Roberts, 2004).

From the student feedback listed in Table 4, 7.6% Cohort 2015 and 8.3% Cohort 2016 students preferred tutorials. This may be due to the fact that in conventional tutorial sessions, answers are usually provided. Some students had indicated that they want examples of answers to the test or exam questions so that they would know how to answer the questions during examinations. Studies done on pharmacy students learning style also found that the change from traditional lecture-based instruction and teaching to a more independent discovery type of learning may be uncomfortable for some students and they may resist (Williams, 2013; Shuck, 1999). We would like to emphasise here that this request was not entertained as we believe that as future pharmacists, students need to be able to resolve problems both independently and within a team as in the working environment, he/she need to be a problem solver through critical thinking. All elements found in PBL not tutorials. Scoring in examinations due to ‘spoon-feeding’ will not produce good pharmacists.

5. Conclusion

Introduction of PBL in the drug delivery courses has shown to improve the students’ academic performance either directly or indirectly by increasing the student’s interest and understanding of the subjects taught. It also enhances the students’ soft skills and confidence. Students were happy with the implementation of PBL which improved their understanding of the subject, enhance their ability to think critically and improve their time management abilities. Although there were some limitations, specifically with regards to the standardization of the student experience, in order to ensure that all facilitators involved in the sessions give a similar standard of interaction and stimulation and also due to the limited manpower available within the pharmaceutics department to ensure small class sizes to cater for the growing number of students. PBL has been demonstrated to be a better alternative to tutorials to produce well rounded pharmacy students.

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Disclosure

The authors declare no conflicts of interest.

Appendix A

A.1. Trigger for Drug Delivery System 1

Progesterone is a naturally occurring endogenous sex hormone synthetic involved in pregnancy, and the menstrual cycle. Pharmacologically, progesterone can be used orally as a contraceptive and also in hormone replacement therapy (HRT) in both cream and patch formulations. Creams can be used to treat hot flushes associated with the menopause and to treat breast pain, intra vaginal gels can be used to expand the cervix during pregnancy. In addition, Intravenous formulations can be utilized to treat infertility and also the symptoms of premenstrual syndrome (PMS).

Your group is part of a team that is developing a number of formulation systems of progesterone. The new formulations must consist of: an external formulation (cream) for use for HRT and menopausal symptoms, an intra vaginal formulation (gel) for the cervix, a sustained release tablet to be used for contraception and an aqueous injection for infertility.

To perform this task, you will need to gather and interpret relevant data regarding the uses, physiochemical properties, dose and routes of administration of progesterone. Using this information, you will need to propose in detail the required formulation systems.

Learning Objectives:

PBL Session 2 (Introduction)

a. The uses of progesterone in Pharmacy
b. Discussion of the physiochemical properties of progesterone and their implications for formulation
c. Describe the various routes of administration used for progesterone and the advantages/disadvantages of each.

PBL Session 3 (Dispersions)

a. A discussion of the formulation strategy for aqueous injections and creams (dispersions).

PBL Session 4 (Polymers)

a. A discussion of the formulation strategy for a sustained release tablet and the polymers required.
b. A discussion of the choices and excipients used to produce an external gel formulation.
c. Overall conclusion

A.2. Trigger for Drug Delivery System 2

A batch of 100 mg sumatriptan (Imigran) tablets, produced by IntelliPharma Ltd, failed a number of USP quality control tests for tablets. An investigation revealed numerous issues during tablet formulation. Due to on-going production problems, the company decides to switch to sumatriptan capsules. In addition, a decision is made to begin production of a novel transdermal delivery system containing sumatriptan.

As the new section head, you have been assigned responsibly for these two new products, to ensure they meet all standards of safety, quality and efficacy.

Learning objectives

PBL Session 2 (Oral Delivery)

a. Types of BP quality control tests for tablets (Official tests only). Dissolution, Disintegration, Uniformity of Content
b. Role of excipients in ensuring tablets conforms to official tests. Diluent/Binder (plastic & elastic behavior), Disintegrants, Lubricants.
c. Capsule production and quality control; tablets vs capsules

PBL Session 3 (Drug Delivery)

a. Nasal vs buccal vs transdermal delivery: advantages and disadvantage
b. Transdermal delivery systems: emphasis to be given on iontophoresis and microneedles.
Appendix B

PHARMACEUTICS TUTORIAL/PBL FEEDBACK FORM

Course: ..............................

Date: ..............................

| Tutorials/PBLs | Facilitator/s |
|----------------|---------------|
| Tutorial/PBL 1: | .............................. |
| Tutorial/PBL 2: | .............................. |
| Tutorial/PBL 3: | .............................. |
| Tutorial/PBL 4: | .............................. |

- How did you feel at the beginning of the tutorial session/s? (please circle all that apply)

| Tutorial/PBL 1 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
|----------------|---------|-------|------------|-------|-------|------------|-------|
| Tutorial/PBL 2 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
| Tutorial/PBL 3 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
| Tutorial/PBL 4 | relaxed | happy | stimulated | tense | bored | frustrated | tired |

- How do you feel now at the end of the session/s? (please circle all that apply)

| Tutorial/PBL 1 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
|----------------|---------|-------|------------|-------|-------|------------|-------|
| Tutorial/PBL 2 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
| Tutorial/PBL 3 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
| Tutorial/PBL 4 | relaxed | happy | stimulated | tense | bored | frustrated | tired |
• How do you rate the session as a whole? (please circle a number)

| Tutorial/PBL | 1 | 2 | 3 | 4 | 5 | very good |
|--------------|---|---|---|---|---|-----------|
| PBL 1        |   |   |   |   |   | very poor |
| PBL 2        |   |   |   |   |   | very poor |
| PBL 3        |   |   |   |   |   | very poor |
| PBL 4        |   |   |   |   |   | very poor |

• How do you rate your facilitator’s input during the session (Please insert a number in the appropriate section)

| Punctuality | Facilitator’s involvement in discussion | Facilitator’s enthusiasm and interaction during the tutorial |
|-------------|----------------------------------------|-----------------------------------------------------------|
| PBL 1       |                                        |                                                            |
| PBL 2       |                                        |                                                            |
| PBL 3       |                                        |                                                            |
| PBL 4       |                                        |                                                            |

• Did you find the tutorial sessions helpful or satisfied your needs?

|       | Not Really | Not Sure | Maybe | Yes |
|-------|------------|----------|-------|-----|
| PBL 1 |            |          |       |     |
| PBL 2 |            |          |       |     |
| PBL 3 |            |          |       |     |
| PBL 4 |            |          |       |     |

Comment: 

• Did the tutorial sessions help to stimulate your thinking skills?

|       | Not Really | Not Sure | Maybe | Yes |
|-------|------------|----------|-------|-----|
| PBL 1 |            |          |       |     |
| PBL 2 |            |          |       |     |
| PBL 3 |            |          |       |     |
| PBL 4 |            |          |       |     |

Comment: 

• What important things did you get out of the sessions? This might be key take home messages or other facts. You might have acquired new skills. Or it might have changed your attitude towards something.

Comment: 

• How can the tutorial be improved?

Comment: 

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