

## High Satisfaction with Problem-Based Learning for Anesthesia

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**Background:** The aim of this study was to compare students' satisfaction between problem-based learning (PBL) and lecture-based traditional teaching of anesthesia.

**Methods:** One hundred and thirty-seven fifth-year medical students were enrolled in a course which used a hybrid curriculum for teaching about anesthesia. The hybrid curriculum included 9 essential lectures and 3 related PBL case discussions. A Linkert 5-point scale was used for to assess students' satisfaction levels between PBL and lecture-based traditional teaching. Data were collected through a year-end questionnaire over 2 academic years from 2002 to 2003. Scores regarding the satisfaction levels between these 2 teaching methods were analyzed using a 2-sided paired *t*-test.

**Results:** Most students preferred PBL over the lecture-based traditional teaching in the following 6 aspects: learning about anesthesia, understanding other medical knowledge, being interested in and motivated to learn, training for future work, training of personal abilities, and being confident and satisfied with the teaching method ( $p < 0.05$ ). However, traditional teaching was superior to PBL in enhancing the speed of learning with greater understanding of a basic knowledge of anesthesia, as well as in providing more solid content with understanding of a greater number of anesthetic techniques ( $p < 0.05$ ). Satisfaction levels with this curriculum did not generally differ between students enrolled in different classes in 2002 and 2003.

**Conclusions:** Although the assessment tools and content of PBL need to be modified, implementation of PBL for teaching anesthesia showed satisfactory results. (*Chang Gung Med J* 2004;27:654-62)

**Key words:** hybrid curriculum, problem-based learning, satisfaction, anesthesia.

Problem-based learning (PBL), first developed in 1969 at McMaster University's Faculty of Health Sciences in Canada, has been accepted as very important innovation in medical education in Western countries.<sup>(1,2)</sup> In 1993, the concept of PBL was also introduced into medical education in Taiwan, and was propagated with modifications by

Chang Gung University as a hybrid PBL-traditional curriculum for medical students.

This hybrid curriculum was designed to incorporate PBL in learning about anesthesia, while preserving some fundamental topic-based lectures (traditional teaching). A traditional medical curriculum provides most knowledge to students through a lec-

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ture-based and strictly discipline-oriented approach. However, the PBL curriculum primarily involves a series of learning processes including problem definition and identification, data gathering and interpretation, problem solving with clinical reasoning skills, critical analysis, and proposition of a management plan by applying newly gained knowledge.<sup>(3)</sup> Other traits for learning can also be improved such as communication skills, empathy, and attitudes. In various fields of medical education, PBL has proven to be provocative and to provide better learning results.<sup>(4,7)</sup> However, little has been reported on the effects of a hybrid curriculum on learning about anesthesia. Using a survey with 35 questions, the aim of this study was to evaluate the satisfaction of fifth-year medical students with the PBL curriculum for anesthesia, incorporated with lecture-based traditional teaching.

## METHODS

One hundred and thirty-seven fifth-year medical students beginning a new curriculum of anesthesia were enrolled in this study from July 2002 to June 2003. The new pathway, called a hybrid curriculum, was designed for medical students during their clerkship rotation in anesthesia (Table 1), which includes traditional lectures incorporated with 3 related case scenarios for PBL discussions. The traditional lectures were primarily organized on a discipline-specific basis, which utilizes topic-based lectures as the main teaching aid. We retained 9 major topics fundamental for the learning of anesthesia, and these were concise and had to be delivered within 60 min. As to the PBL discussions, 3 case scenarios were designed after discussion with the teaching staff. Before discussing each case, students were first exposed to a tutorial discussion for identifying problems. Students were divided into 6 small groups, each of which was facilitated by a tutor for the PBL discussion with a 2-h tutorial. To facilitate understanding of the lecture, the content of each lecture, formatted in Microsoft PowerPoint, was sent to students beforehand.

A self-administered survey was conducted using a structured questionnaire to assess satisfaction with the PBL and traditional lectures in this hybrid PBL-traditional curriculum. At the end of this curriculum, a survey with 34 "closed-ended" questions (Table 1) was given to the students immediately after the final

examination. The questionnaire consisted of 6 aspects including (1) learning about anesthesia, (2) understanding other medical knowledge, (3) being interested and motivated to learn, (4) training for future work, (5) training one's personal abilities, and (6) being confident and satisfied with the teaching method.

The fifth-year medical students were asked to rate the effect of these 2 teaching methods on the "learning of anesthesia" including increasing the ability to solve problems in anesthesia, increasing the speed of learning, providing intact content in teaching, offering clear teaching purposes, fostering understanding of anesthetic techniques, providing a greater understanding of the extent in the curriculum of anesthesia, and providing greater understanding of drugs used in anesthesia. Second, they were requested to evaluate the curriculum's effects on "understanding other medical knowledge" including increasing one's basic knowledge of medicine, and leading to better linkages with basic biomedical sciences. Third, students were asked to grade its effects on the "being interested and motivated to learn" consisting of cultivating an interest in anesthesia, increasing one's motivation to actively learn, and enhancing one's interest in anesthetic research. Fourth, they were required to rate its effects on "training for future work" that included providing better linkages with clinical anesthetic practice, providing better clinical practicalities, increasing one's ability to present case reports, enhancing one's writing skills for case presentations, enhancing one's competence to discuss academic sciences, augmenting one's power to do research, fostering better patient-doctor relationships, intensifying one's courage to express opinions during biomedical meetings, enhancing one's ability to make presentations during biomedical meetings, strengthening one's capacity for literature searches, deepening one's power to solve problems in medicine, and augmenting one's capacity for independent study of other non-medical knowledge. Fifth, they were asked to rate its effects on "training one's personal abilities" which included enhancing one's ability to organize and plan, increasing one's power to lead, increasing one's competence to moderate medical meetings, benefiting one's power of creativity, increasing one's capacity to engage in thinking processes, and increasing one's skills with human relationships.

**Table 1.** Comparison of Levels of Satisfaction between PBL and Traditional Teaching Methods

Questions	PBL discussion (n = 137)	Traditional lectures (n = 137)
<b>Learning about anesthesia</b>		
1. Increases one's ability to solve problems in anesthesia	4.04±0.62 *	3.59±0.77
2. Increases one's speed of learning	3.33±0.94	4.06±0.70 *
3. Provides intact content in teaching	3.07±0.90	4.19±0.67 *
4. Offers clear teaching purposes	3.41±0.92	4.18±0.62 *
5. Provides greater understanding of techniques in anesthesia	3.65±0.78	4.01±0.68 *
6. Provides greater understanding of the extent of the curriculum of anesthesia	3.90±0.75	4.10±0.61 *
7. Provides greater understanding of drugs used in anesthesia	3.61±0.86	4.10±0.60 *
<b>Understanding other medical knowledge</b>		
8. Increases one's basic knowledge of medicine	3.81±0.73	4.06±0.69 *
9. Leads to better linkages with basic biomedical sciences	3.84±0.81	3.71±0.73
<b>Being interested and motivated to learn</b>		
10. Cultivates one's interest in anesthesia	3.81±0.77 *	3.45±0.68
11. Increases one's motivation to actively learn	4.00±0.68 *	3.33±0.67
12. Enhances one's interest in anesthesia research	3.71±0.61 *	3.39±0.65
<b>Training for future work</b>		
13. Provides better linkages with clinical anesthetic practice	4.02±0.73 *	3.64±0.70
14. Provides better clinical practicalities	4.06±0.70 *	3.71±0.68
15. Increases one's ability to present case reports	3.67±0.91 *	3.06±0.80
16. Enhances one's writing skills in case presentations	3.42±0.93 *	3.00±0.83
17. Enhances one's competence in discussing academic sciences	4.17±0.65 *	3.10±0.88
18. Augments one's power to do research	3.76±0.81 *	3.10±0.83
19. Is liked by the student	3.71±0.79	3.73±0.76
20. Fosters better patient-doctor relationships	3.31±0.95 *	2.90±0.78
21. Intensifies one's courage in expressing opinions during biomedical meetings	4.13±0.64 *	2.86±0.78
22. Boosters one's ability to make presentations during biomedical meetings	4.17±0.61 *	2.83±0.75
23. Strengthens one's capacity for literature searches	4.26±0.57 *	2.96±0.79
24. Increases one's power to solve problems in medicine	4.16±0.52 *	3.18±0.69
25. Augments one's capacity for independent study of other non-medical knowledge	3.84±0.80 *	3.04±0.79
<b>Training one's personal abilities</b>		
26. Enhances one's ability to organize and plan	3.97±0.64 *	3.03±0.77
27. Fosters one's power to lead	4.00±0.71 *	2.88±0.78
28. Increases one's competence to moderate medical meetings	4.04±0.69 *	2.81±0.78
29. Increase one's power of creativity	4.04±0.65 *	2.96±0.73
30. Increases one's thinking processes	4.13±0.60 *	3.16±0.81
31. Increases one's skills in human relationships	3.77±0.79 *	2.91±0.86
<b>Being confident and satisfied with the teaching method</b>		
32. Not interested in this kind of teaching	2.95±1.12	2.90±1.06
33. Greatly satisfied with this kind of teaching	3.65±0.79	3.68±0.72
34. Augments one's confidence in learning	3.54±0.78	3.48±0.70

**Abbreviation:** PBL: problem-based learning

\*  $p < 0.05$ , PBL vs. traditional teaching by the unpaired *t*-test.

Sixth, they were requested to rate its effects on "being confident and satisfied with the teaching method" which consisted of not being interested in this kind of teaching, favoring with great satisfaction this kind of

teaching, and augmenting one's confidence in learning. Students completed the questionnaire unaided according to a 5-point Linkert scale, i.e., 1=completely disagree; 2=disagree; 3=moderately agree; 4=

agree; and 5=completely agree. The answer sheets were collected anonymously, and were analyzed by descriptive statistics. Data are presented as the mean  $\pm$  standard deviation (SD). Scores regarding the satisfaction between the PBL discussions and traditional teaching methods were analyzed using a 2-sided paired *t*-test.  $p < 0.05$  was accepted as being statistically significant.

## RESULTS

All of the recruited students completed the self-administered questionnaire. There were 93 males and 44 females. The results of the survey are shown in Table 1 and are divided into the following 6 aspects.

### 1. Learning about anesthesia

Compared to PBL, the lecture-based traditional teaching was thought to speed the learning of anesthesia ( $4.06 \pm 0.7$  vs.  $3.33 \pm 0.94$ ), and provide intact content about anesthesia ( $4.19 \pm 0.67$  vs.  $3.07 \pm 0.9$ ) with a clear educational purpose ( $4.18 \pm 0.62$  vs.  $3.41 \pm 0.92$ ) as well as understanding a greater number of techniques ( $4.01 \pm 0.68$  vs.  $3.65 \pm 0.78$ ) and drugs ( $4.1 \pm 0.60$  vs.  $3.61 \pm 0.86$ ) used in anesthesia. However, the PBL discussions enabled students to increase their ability to solve problems in anesthesia ( $3.59 \pm 0.77$  vs.  $4.04 \pm 0.62$ ). There was no significant difference between the PBL discussions and traditional teaching methods in the extent of understanding of anesthesia ( $4.10 \pm 0.61$  vs.  $3.90 \pm 0.75$ ).

### 2. Understanding other medical knowledge

The lecture-based traditional teaching was shown to more greatly increase the basic knowledge of medicine compared to the PBL discussions ( $4.06 \pm 0.69$  vs.  $3.81 \pm 0.73$ ). No difference was detected in these 2 teaching method in leading to better linkages with basic biomedical sciences ( $3.71 \pm 0.73$  vs.  $3.84 \pm 0.81$ ).

### 3. Being curious and motivated to learn

Students favored the PBL discussions much more than traditional teaching with regards to being curious and motivated to learn. The PBL discussions were thought to cultivate curiosity about anesthesia ( $3.81 \pm 0.77$  vs.  $3.45 \pm 0.68$ ), increase one's motivation to actively learn ( $4.00 \pm 0.68$  vs.  $3.33 \pm 0.67$ ), and enhance one's learning interest ( $3.71 \pm 0.61$  vs.

$3.39 \pm 0.65$ ) about anesthesia.

### 4. Training for future work

All students recognized that the PBL discussions provided better linkages with clinical anesthetic practice ( $4.02 \pm 0.73$  vs.  $3.64 \pm 0.70$ ) and clinical practicalities ( $4.06 \pm 0.70$  vs.  $3.71 \pm 0.68$ ). It increased one's ability to present case reports ( $3.67 \pm 0.91$  vs.  $3.06 \pm 0.80$ ), enhanced one's competence to discuss academic sciences ( $4.17 \pm 0.65$  vs.  $3.10 \pm 0.88$ ), augmented one's power to do research ( $3.76 \pm 0.81$  vs.  $3.10 \pm 0.83$ ), fostered better patient-doctor relationships ( $3.31 \pm 0.95$  vs.  $2.90 \pm 0.78$ ), intensified one's courage to express opinions in meetings on biomedical sciences ( $4.13 \pm 0.64$  vs.  $2.86 \pm 0.78$ ), boosted one's ability to make presentations during clinical discussions ( $4.17 \pm 0.61$  vs.  $2.83 \pm 0.75$ ), strengthened one's capacity for journal searches ( $4.26 \pm 0.57$  vs.  $2.96 \pm 0.79$ ), and increased one's power to solve problems in medicine ( $4.16 \pm 0.52$  vs.  $3.18 \pm 0.69$ ). The preference of students for the 2 teaching methods did not differ. There was no significant difference in enhancing one's capacity to write case presentations between these 2 teaching methods ( $3.42 \pm 0.93$  vs.  $3.00 \pm 0.83$ ). Compared to the PBL discussion, the lecture-based traditional teaching was graded as producing lower satisfaction for most related questions.

### 5. Training one's personal abilities

The PBL discussions were shown to yield better satisfaction in augmenting one's capacity to independently search for other knowledge ( $3.84 \pm 0.80$  vs.  $3.04 \pm 0.79$ ), enhancing one's ability to organize and plan ( $3.97 \pm 0.64$  vs.  $3.03 \pm 0.77$ ), building up one's power to lead ( $4.00 \pm 0.71$  vs.  $2.88 \pm 0.78$ ), increasing one's competence to moderate medical meetings ( $4.04 \pm 0.69$  vs.  $2.81 \pm 0.78$ ), edifying one's power of creativity ( $4.04 \pm 0.65$  vs.  $2.96 \pm 0.73$ ), increasing one's thinking capacity ( $4.13 \pm 0.60$  vs.  $3.16 \pm 0.81$ ), and increasing one's skills in human relationships ( $3.77 \pm 0.79$  vs.  $2.91 \pm 0.86$ ).

### 6. Being confident and satisfied with the teaching method

Students expressed great satisfaction with both PBL discussions and the lecture-based traditional teaching ( $3.65 \pm 0.79$  vs.  $3.68 \pm 0.72$ ).

**The temporal effect on students enrolled from different years (Table 2)**

The levels of satisfaction with this hybrid cur-

riculum of students enrolled in different classes in 2002 or 2003 generally did not differ.

**Table 2.** Comparison of Levels of Satisfaction between 2002 and 2003 for the 2 Teaching Methods

Questions	PBL discussion		Traditional lectures	
	2002 (n = 53)	2003 (n = 84)	2002 (n = 53)	2003 (n = 84)
<b>Learning about anesthesia</b>				
1. Increases one's ability to solve problems in anesthesia	4.10±0.60	4.00±0.62	3.42±0.75	3.70±0.76*
2. Increases one's speed of learning	3.36±0.90	3.30±0.98	4.00±0.68	4.10±0.71
3. Provides intact teaching content	2.94±0.86	3.15±0.92	3.96±0.73	4.33±0.59*
4. Offers clear teaching purposes	3.38±0.92	3.44±0.92	4.06±0.63	4.27±0.61
5. Provides greater understanding of techniques in anesthesia	3.47±0.77	3.77±0.77*	3.85±0.69	4.11±0.66*
6. Provides greater understanding of the extent of the curriculum of anesthesia	3.83±0.75	3.94±0.75	4.00±0.68	4.16±0.55
7. Provides greater understanding of drugs used in anesthesia	3.68±0.87	3.57±0.85	3.96±0.62	4.20±0.58*
<b>Understanding other medical knowledge</b>				
8. Increases one's basic knowledge of medicine	3.64±0.79	3.93±0.68*	4.02±0.80	4.09±0.61
9. Leads to better linkages with basic biomedical sciences	3.75±0.81	2.36±0.82	3.68±0.80	3.73±0.69
<b>Being interested and motivated to learn</b>				
10. Cultivates one's interest in anesthesia	3.92±0.68	3.74±0.81	3.40±0.79	3.49±0.59
11. Increases one's motivation to actively learn	3.96±0.65	4.02±0.70	3.25±0.68	3.39±0.66
12. Enhances one's interest in anesthesia research	3.81±0.59	3.65±0.62	3.36±0.65	3.41±0.65
<b>Training for future work</b>				
13. Provides better linkages with clinical anesthetic practice	3.96±0.65	4.06±0.78	3.68±0.70	3.62±0.70
14. Provides better clinical practicalities	4.13±0.62	4.01±0.75	3.60±0.63	3.78±0.70
15. Increases one's ability to present case reports	3.51±0.93	3.78±0.89	2.94±0.79	3.13±0.80
16. Enhances one's writing skills in case presentations	3.23±0.90	3.54±0.93	2.89±0.87	3.07±0.79
17. Enhances one's competence to discuss academic sciences	4.15±0.60	4.18±0.68	3.00±0.92	3.17±0.86
18. Augments one's power to do research	3.77±0.87	3.75±0.78	2.96±0.90	3.20±0.78
19. Is liked by the student	3.74±0.76	3.69±0.81	3.53±0.80	3.86±0.72
20. Fosters better patient-doctor relationships	3.12±1.00	3.44±0.90	2.85±0.77	2.94±0.79*
21. Intensifies one's courage to express opinions during biomedical meetings	4.19±0.65	4.09±0.63	2.75±0.81	2.93±0.77
22. Boosts one's ability to make presentations during biomedical meetings	4.13±0.68	4.20±0.55	2.72±0.84	2.90±0.68
23. Strengthens one's capacity for literature searches	4.28±0.66	4.25±0.51	2.91±0.86	2.99±0.74
24. Increases one's power to solve problems in medicine	4.09±0.53	4.20±0.51	3.09±0.69	3.23±0.69
25. Augments one's capacity for independent study of other non-medical knowledge	3.79±0.84	3.87±0.78	2.85±0.74	3.16±0.80*
<b>Training one's personal abilities</b>				
26. Enhances one's abilities to organize and plan	3.77±0.64	4.10±0.62*	3.02±0.72	3.04±0.80
27. Builds up one's power to lead	3.92±0.76	4.05±0.68	2.77±0.80	2.94±0.77
28. Increases one's competence to moderate medical meetings	3.96±0.73	4.08±0.67	2.68±0.83	2.89±0.75
29. Edifies one's power of creativity	4.11±0.58	3.99±0.69	2.96±0.77	2.95±0.72
30. Increases one's capacity for thinking processes	4.15±0.53	4.12±0.64	3.19±0.81	3.15±0.82
31. Increases one's skills in human relationships	3.72±0.77	3.80±0.81	2.75±0.96	3.01±0.77
<b>Being confident and satisfied with the teaching method</b>				
32. Not interested in this kind of teaching	2.89±1.17	2.99±1.09	3.06±1.07	2.81±1.04
33. Greatly satisfied with this kind of teaching	3.72±0.79	3.61±0.78	3.60±0.72	3.72±0.72
34. Augments one's confidence in learning	3.45±0.75	3.60±0.80	3.34±0.71	3.57±0.68

**Abbreviation:** PBL: problem-based learning

\*  $p < 0.05$ , 2003 vs. 2002 by the unpaired  $t$ -test.

## DISCUSSION

The principle idea behind PBL, an instructional method, is to challenge students to 'learn to learn,' starting with a problem, or a query that the learner wishes to solve cooperatively in small groups. These problems are designed to simulate real clinical situations in order to spark students' curiosity in activating their contextual learning during their professional life.

This is the first report from Taiwan on evaluating satisfaction with a hybrid PBL-traditional curriculum for learning about anesthesia which was tested using fifth-year medical students. Our hybrid curriculum was generally well received by students as a means of nurturing good clinicians, and can be regarded as a catalyst for recruiting future medical graduates to become anesthesiologists. Through interactive discussions in small groups during the case scenario exercises, we found that active learning with open-ended discussions in PBL can help medical students develop problem-solving and critical-thinking skills as well as lifelong learning habits including the ability to find and assess appropriate learning resources, all of which are important in the practice of anesthesia. Also, PBL provides students with ideal linkages for obtaining knowledge between medical school and the hospital, i.e., medical education and clinical practicalities. Persons who are dedicated to clinical anesthesia usually encounter various challenges during their professional life such as doctor-patient relationships and the ability to present and intelligently discuss issues during meetings. To this end, PBL cases are praised as an option of learning to integrate and consolidate basic science and clinical science as well as preferably incorporating the psychosocial, moral, ethical, and legal aspects of medicine.<sup>(8-10)</sup>

The reserved nature of ethnic Chinese people appears to be inherited from their traditional culture, which should exchange for a more open-minded approach during medical education and in clinical settings. The learning behavior of Taiwanese medical students is somewhat passive and even inactive during the learning process compared to that in Western countries. Thus, training in PBL can help learners develop broader perspectives of case scenarios in developing their curiosity and lifelong learning habits. Our results are in agreement with those of

Claramita<sup>(11)</sup> in which PBL was found to provoke the interest of medical students in participating in academic research related to anesthesia in their future professional careers.

It is interesting to note that our students regarded PBL as a means of improving their power of creativity and critical thinking skills. The lecture-based traditional approach adversely restricts the development of those abilities. The greatest concern with a lecture in its traditional form taking place in a large class is that it only plays a passive role in delivering knowledge during the learning process, and does not incorporate skills and attitude development. High levels of cognitive functions are not exercised during large class lectures. However, we demonstrated that the traditional lecture-based curriculum as integrated in our hybrid program can provide well-organized content with clear goals that allow students to more easily learn about anesthesia.<sup>(12-14)</sup> Regarding the understanding of anesthetic techniques or drugs, PBL was relatively weak in providing content compared to the lecture-based approach. As such, further improvements can be expected in our hybrid PBL-traditional program. First, teaching materials for the PBL case discussions need to be revised to contain knowledge and analytical learning skills matched to individual lectures. Special lectures can be arranged to supplement the inadequacy of learner-centered learning for some special occasions.<sup>(15)</sup> Second, the case scenarios should clarify the learning goals and objectives incorporated in the lectures. Third, communication on the content of PBL should be enhanced among facilitators. The directions for PBL should be given to all tutors and facilitators through a provisioning methodology for problem solving. Whatever the differences which exist between PBL and lecture-based teaching methods, both generated high satisfaction with confidence from fifth-year medical students in learning about anesthesia. Similar results were also found in other studies assessing PBL and lecture-based teaching.<sup>(16,17)</sup> These results are primarily consistent with an investigation reported by Yoshida,<sup>(18)</sup> suggesting the wide acceptance of PBL by medical students.

Gender differences were demonstrated in the initial experience of inter-professional PBL.<sup>(19,20)</sup> However, we were able to illustrate no differences in this study because in Taiwan, male medical students greatly outnumber their female counterparts.

Interpretation of the results of this survey requires acknowledgment of some of its limitations. First, some questions in the survey were too vague to answer. For instance, "increasing one's capacity for learning about medicine" is essentially a future issue that can only be answered subjectively. Second, the students' performance in their future professional life is primarily an unforeseen outcome, which cannot be measured by subjective self-assessment. Some investigators tend to use different objective indices for predicting outcomes. For example, tests such as multiple choice questions or short essays are used for assessing knowledge. The percentages who graduate from medical school and who pass the medical licensing examination are also widely accepted as useful assessment tools. PBL and lectures do not differ in these objective indexes.<sup>(2,16,21)</sup> However, opposite results have also been found.<sup>(22)</sup> Third, our questionnaire failed to include an immediate assessment of students' reactions or feedback towards the PBL discussion. Lai et al. reported that good attitudes toward PBL case discussions naturally emerge once students become familiar with this skill. However, the results of this questionnaire only reflected the medical students' opinions of these 2 teaching methods. Their thoughts can offer important ideas for the re-engineering of Taiwanese medical education. Finally, some have argued that our medical students should be divided into 2 groups for comparing PBL and lecture-based traditional teaching. However, to separate the class into 2 different teaching groups, i.e., a pure PBL group and a pure lecture-based traditional group, is impossible with our single-tiered curriculum. The school authorities would not accept a 2-tiered curriculum in a single class.

It should be mentioned that a comparison of students' satisfaction levels between classes in 2 different years was made in our survey. Satisfaction with many items was higher in the 2003 class than in the 2002 class. This difference is possibly attributable to the progressive improvement in the skills of our teaching staff over the 2-year period.<sup>(23-25)</sup> Better skills may have arisen from improvements in the pre-program training or tutorials of our faculty members. The content of our curriculum remained unchanged in 2002 and 2003, suggesting that our PBL-traditional program exhibits stability and consistency.

In conclusion, although the assessment tools and content of problem-based learning need to be modi-

fied, implementation of this teaching method for anesthesia showed satisfactory results.<sup>(26)</sup>

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# 高滿意度之麻醉學混合式問題導向教學

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**背景：** 本論文旨探討學生對麻醉學採用問題導向式教學（PBL）與傳統式大班章節教學方式滿意度之比較。

**方法：** 137位醫學系五年級學生參與麻醉學混合式教學的研究。混合式教學課程包含九節必修的大班授課及三節相關的PBL病例討論。學生對於問題導向式教學（PBL）與傳統式大班章節教學方式課程的滿意度以Linkert 5-point scale來評估，資料收集從2002到2003兩個學年，統計是以two-sided t-test比較， $p < 0.05$ 有統計上的意義。

**結果：** 對於麻醉教學，培養興趣與動機，未來工作與個人能力的訓練，及教學方式之滿意度等，大部份的學生對PBL有較高的滿意度（ $p < 0.05$ ）。然而在學習速度，基本知識的了解，及內容的充實度方面，傳統式大班章節授課比較受學生的肯定（ $p < 0.05$ ）。至於兩組不同學年的學生對此混合式授課方式的滿意度，除對問題解決的能力，教學內容完整性與麻醉藥物及技術上之了解外，大體上並沒有統計差異。

**結論：** 長庚大學醫學系五年級學生對於麻醉學採用問題導向教學表達滿意與肯定。  
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**關鍵字：** 混合式問題導向教學，滿意度，麻醉學。

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