



ORIGINAL RESEARCH



Implementation of problem-based learning in medical education in Korea

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Purpose: This study aims to identify how problem-based learning (PBL) has been implemented in Korean medical education, and how it is evaluated by each medical school.

Methods: For this study, a total of 40 medical schools in Korea were surveyed via e-mail. The survey tool was a questionnaire consisting of 22 questions which was developed independently by the researchers.

Results: Of the 40 medical schools, 35 schools were implementing PBL programs in their medical curriculum, while five were found not currently to be running the program. A large number of the schools which introduced PBL (30 schools, 85.7%) used a hybrid PBL model. In over 70% of the medical schools surveyed, professors evaluated the effects of PBL as positive. Most medical schools (85.7%) stated they would maintain or expand their use of PBL. However, the lack of understanding and skeptical attitude of the faculty on PBL, the lack of self-study time and passive attitude of students, insufficiency of good PBL cases, and the perfunctory PBL introduction for school accreditation interfere with the successful PBL.

Conclusion: PBL has been incorporated in Korean medical curriculum as hybrid PBL type. It is analyzed that intensive tutor training and good PBL case development are necessary for the success and effective operation of PBL.

Key Words: Problem-based learning, Medical education, Korea

Introduction

Problem-Based Learning (PBL) has been implemented in the official curriculum in Korea since the 1990s, after being introduced to medical schools in the 1980s as a new method that overcame the weakness of the subject-centered curriculum [1,2]. The University of Ulsan medical school became the first medical school in Korea to implement PBL in its official curriculum for second-year students in 1991, while Sungkyunkwan University

School of Medicine is Korea's only school that provides PBL curriculum for all first and second year courses starting from 1998. According to a survey conducted in 1999, 15 schools (37.5%) have implemented PBL, and 13 schools were scheduled to implement it [1]. The Korean Medical Education Report showed that 38 schools (95%) were implementing it [3]. Many schools are currently continuing to operate PBL, but some have not yet introduced it while others have suspended its implementation.

Although PBL has been implemented in many medical

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schools as a new learning method for several years, there has so far been a lack of nationwide researches to analyze and summarize the trends of PBL through a specific investigation into its current status. In terms of an overall investigation into PBL, the Research Group of PBL Tutorial (RGPT) conducted a “nationwide study on the status of PBL” in 1998, at a time when PBL started to be introduced in Korea [1]; and in the study on the status of education for the Korean Medical Education Report in 2013 [3], only a simple survey regarding PBL was carried out. As this survey was focused on identifying formal aspects such as whether to implement PBL, the implementation period, credit provision and PBL room, it was impossible to grasp in detail how the PBL courses were run. The lack of well-organized research results has made it difficult to understand the operation methods of other schools. In addition, schools that want to adopt PBL or other schools that want to know how to manage PBL in order to improve their PBL program often have to contact every single school that uses PBL.

For this reason, there is a need to identify the detailed current status of the overall operation, such as PBL operation mode, tutor participation and role, class environment, placement of lectures, assessment method, PBL efficacy, and obstacle factors. Now that it has been approximately 20 years since PBL was introduced in Korea, this study aimed to investigate the current status of PBL and analyze the current state of operation PBL in Korean medical schools.

Methods

1. Subjects

The survey targeted all 40 medical schools in Korea. Medical schools surveyed include 16 medical schools

with 6-year undergraduate program (40.4%), 15 medical schools with 4-year graduate program (37.5%), and nine medical schools with dual-mode program (22.5%). Professors in charge of PBL or belonging to the department of medical education were selected as survey respondents. All of the subjects responded to the survey, and then data of the 35 schools (87.5%) which answered they were implementing PBL were analyzed. For the five schools which answered that they had not introduced PBL or currently suspended the implementation, the reasons were investigated.

2. Methods

The questionnaire of this study was prepared so that the researcher could identify the specific PBL status by referring to the existing literature [1,3,4]. It was also developed so that respondents could respond, on the basis of a 5-point Likert scale, to 22 items: whether PBL was implemented, and its operational characteristics (three questions); school years subject to PBL and how to proceed (nine questions); facility (one question); assessment method (one question); and satisfaction with and problems related to PBL (eight questions). Content validity of the developed questionnaire was secured through a review by two professors in charge of PBL and an education major. The primary survey was conducted by e-mail in December 2014, and subsequently, the 23 medical schools which did not give responses were asked to answer the questionnaire again from May to July, 2016. Frequencies and percentages were calculated for the answers to multiple-choice questions, while the responses to short essay questions were subject to content analysis. The analysis was performed using IBM SPSS ver. 22.0 for Windows (IBM Corp., Armonk, USA) and $p < 0.05$ was considered significant. This survey was conducted with the consent of each university.

Results

1. Current status of PBL and its operating mode

Of the 40 medical schools in Korea, 35 schools (87.5%) answered that they were implementing PBL. To be specific, all of the 15 medical schools with 4-year program (100%), 13 of the 16 medical schools with 6-year curriculum (81.3%), and seven of the nine medical schools with dual programs (77.8%) were running PBL. Based on the analysis of the periods of PBL introduction, 15 schools (37.5%) introduced PBL before 2000; 12 schools (30.0%) from 2001 to 2005; and

11 schools (27.5%) from 2006 to 2010 (Table 1).

Most of the type of PBL were hybrid curriculum in which PBL was used to support the traditional lecture-based classes. In 30 of the 35 schools (85.7%), lecture was the main stream and PBL was an additional form. Four schools (11.4%) answered that they were operating PBL in a proportion similar to the traditional lecture classes, and one school (2.9%) said were running a PBL curriculum (Table 2).

When schools were surveyed regarding whether their curriculum had PBL in parallel with lectures and clinical clerkship, it was found that over half of the schools, 23 schools (65.7%), conducted PBL in parallel with integrated courses or clinical clerkship. In contrast, 15

Table 1. Number of Universities Which Implemented PBL and Universities Which Suspended PBL by Implementation Year

Year	No. of universities which implemented PBL	University system		No. of universities which suspended PBL	Total
		National (10 schools)	Private (30 schools)		
1991–1995	2	-	2	-	2
1996–2000	13	3	10	-	15
2001–2005	12	3	9	-	27
2006–2010	11	4	7	-	38
2011–	1	-	1	4	35

PBL: Problem-based learning.

Table 2. Relative Weight of PBL in Curriculum, Operation Mode, and School Years Subject to PBL

School name	Relative weight of PBL in curriculum			Assignment of PBL class time			School years subject to PBL ^{a)}				
	PBL-centered	Addition of PBL to lecture	PBL and lecture have a similar level of importance	Not implemented	Block	In parallel with lecture	Autonomous operation	Premedical	Year 1	Year 2	Year 3
Ajou		○					○		○	○	
Catholic University of Daegu ^{a)}		○			○	○			○	○	
CHA		○				○			○	○	
Chonbuk		○				○			○	○	
Chonnam		○				○			○	○	○
Chosun		○			○				○	○	○
Chung-Ang		○				○			○	○	
Chungbuk				○							
Chungnam		○			○	○			○	○	

(Continued to the next page)

Table 2. (Continued)

School name	Relative weight of PBL in curriculum				Assignment of PBL class time			School years subject to PBL ^{a)}			
	PBL-centered	Addition of PBL to lecture	PBL and lecture have a similar level of importance	Not implemented	Block	In parallel with lecture	Autonomous operation	Premedical	Year 1	Year 2	Year 3
Dankook			○		○						○
Dong-A		○				○			○	○	
Dongguk		○			○				○	○	
Eulji		○			○				○		
Ewha		○				○			○	○	
Gachon		○				○			○	○	
Gyeongsang		○				○			○	○	○
Hallym				○							
Hanyang		○				○			○	○	
Inha		○				○			○	○	
Inje ^{a)}			○		○	○			○	○	○
Jeju		○			○				○	○	
Kangwon		○			○				○	○	
Keimyung		○				○		○	○	○	
Konkuk		○			○		○		○	○	
Konyang				○							
Korea				○							
Kosin			○		○				○	○	
Kwandong		○				○	○		○	○	
Kyung Hee		○				○			○		
Kyungpook		○				○				○	
Pusan		○				○			○	○	
Seoul				○							
Soonchunhyang		○			○						○
Sungkyunkwan	○					○					○
The Catholic University of Korea		○				○			○	○	
Ulsan ^{a)}		○			○	○			○	○	
Wonkwang			○			○		○	○		
Yeungnam		○				○	○		○	○	○
Yonsei		○			○					○	
Yonsei University Wonju		○			○				○		
Total	1	30	4	5	15	23	4	2	29	31	5

PBL: Problem-based learning.

^{a)}University gave multiple responses.

schools (42.9%) conducted PBL in a block form. The remaining five schools (14.3%) autonomously implemented PBL in an integrated course (Table 2).

In terms of the school year in which PBL is implemented, 31 schools (88.6%) implemented it in the second year, 29 schools (82.9%) in the first year, five

schools (14.3%) in the third year, and two schools (5.7%) in the premedical course (Table 2).

2. Number of PBL sessions per week and connection to related lectures

When PBL sessions per week were surveyed, it was

found that 11 schools (31.4%) had one session per week; five schools (14.3%) two sessions per week; and 10 schools (28.6%) three sessions per week.

When the placement of related lectures in the hybrid PBL was examined, it was found that 16 schools with one or two sessions per week were operating PBL in parallel with lectures; nine of the 10 schools which had three sessions per week were operating PBL in a block form; one school was implementing PBL in parallel with lectures three times per week.

To the survey question on whether PBL was provided before or after the related lecture, it was found that PBL was provided before the related lecture in seven schools (20.0%), while the related lecture was followed by PBL in six schools (17.1%). In 22 schools (62.9%), the order of lecture and PBL was not connected.

3. PBL class environment, operation, and management

When PBL case exposure methods were surveyed, it was found that 33 schools (94.2%) were using paper printouts. In addition to printed materials, videos showing real patients were used in six schools (17.1%), videos showing simulated patients were used in two schools (5.7%), and simulated patients were provided in two schools (5.7%). This means that various encounters with case materials were used for PBL. When the number of students per group was surveyed, it was found that the number of students per group in 11 schools (31.4%) was five to seven, but over half of schools, 24 schools (68.6%), organized groups of eight to 10 students.

When the number of rooms used for PBL was surveyed, it was found that three schools (8.6%) had less than or equal to five PBL rooms; 13 schools (37.1%) had six to 10 PBL rooms; 18 schools (51.4%) had 11 PBL rooms or more. When the number of nominal PBL rooms was calculated considering the number of students per

PBL group and the total number of students of each school, the result was that there was 100% or higher exclusive space compared to the number in 27 schools, and approximately 70% to 95% exclusive space in other schools.

To the question regarding who was in charge of PBL course operation, it was found that the department of medical education, the administrative office, and a dedicated professor or the PBL tutorial committee were operating PBL in 25 schools (71.4%), three schools (8.6%), and seven schools (20.0%), respectively. This shows different entities were in charge of PBL in different schools.

4. PBL tutor participation and role

In all the schools that responded, tutors were participating in the class. One school had a small number of tutors managing several groups. Respondents stated that the course was led by students, with the tutor mostly acting as an observer and an evaluator.

5. PBL evaluation method

All schools were using “student assessment by tutor” as a PBL evaluation method. In response to the question on which evaluation items were being used in each school, it was found that evaluation items included attendance (31 schools, 88.6%), written examination (22 schools, 62.9%), team presentation (19 schools, 54.3%), learning tasks (17 schools, 48.6%), peer evaluation (12 schools, 34.3%), and others, including a reflective journal (16 schools, 45.7%). When the score distribution of each evaluation item was calculated on the basis of 100 points, it was found that the score of student assessment by tutor was 41.6 points, which was the highest, while 27.8 points were allotted to written examination; 23.3 points to learning tasks; 18.8 points to team presentations; 16.5 points to attendance; 15.0 points to concept mapping;

Fig. 1. Problem-Based Learning Evaluation and Distribution of Scores Which Are Chosen by Each University

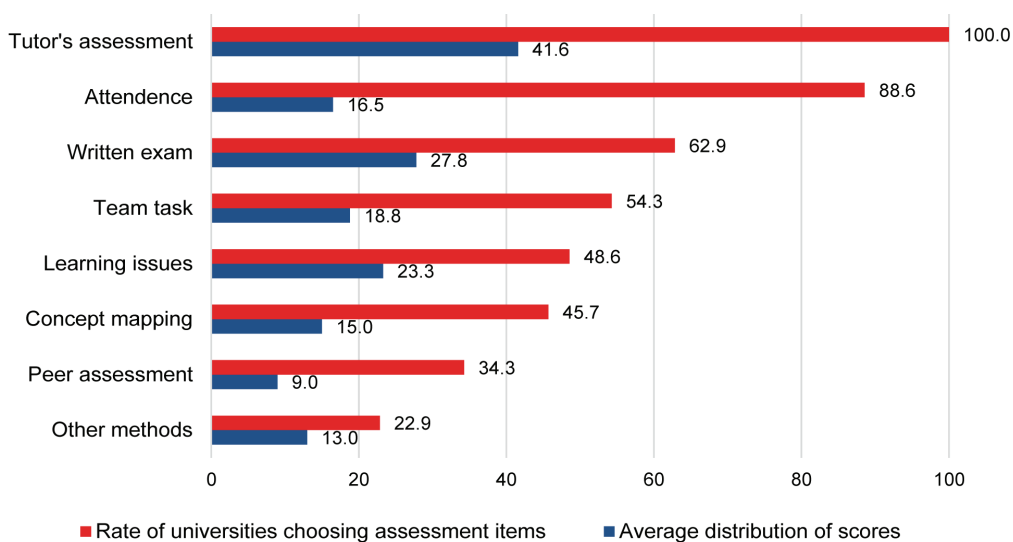
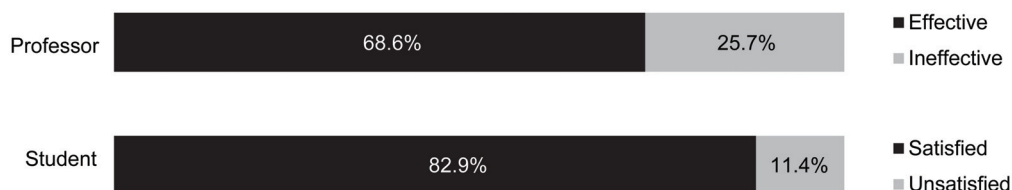


Fig. 2. Evaluation of Problem-Based Learning Effects



and 9 points to peer review assessment. Other PBL evaluation methods included satisfaction survey response and oral test (Fig. 1).

6. Opinions about PBL's effects

When professors were surveyed on PBL's effects, 24 schools (68.6%) answered that PBL was effective. To the question "Do students seem satisfied with PBL?" 29 schools (82.9%) answered "yes" (Fig. 2). In relation to the question "Which part of the PBL seems to be effective?" nine items were presented and respondents were asked to give multiple responses on a scale of 1 point to 4 points (1 point=not important at all, 2 points=not important, 3 points=important, 4 points=very important). Based on the total score of each item, the items that were evaluated as effective included "collaborative learning"

(3.44±1.19 points), which obtained the highest score, followed by "discussion and communication skills" (3.32 ±1.04 points), "ability to deal with the authentic problems of patients" (3.32±0.98 points), "ability to analyze, synthesize and criticize patient problems" (3.26±0.79 points), "learning motivation" (3.12±0.84 points), "self-directed learning" (3.09±0.73 points), "retention and application of knowledge" (3.06±0.74 points), "integration of basic and clinical knowledge" (2.91±0.83 points), and "in-depth knowledge learning" (2.82±0.85 points) (Table 3).

To find out what items made PBL ineffective, on the other hand, 11 items were presented and respondents were asked to give multiple responses to them on a scale of 1 point to 4 points, as mentioned above. As a result, the evaluation score ranged from 2.85 points to 1.41

Table 3. Items for Which It Is Evaluated That PBL Is Effective

Opinion	N	Score
Enhancement of collaborative learning skills	34	3.44 ± 1.19
Enhancement of discussion and communication skills	34	3.32 ± 1.04
Enhancement of ability to deal with the authentic problems of patients	34	3.32 ± 0.98
Enhancement of analysis, synthesis and criticism skills regarding patient problems	34	3.26 ± 0.79
Provision of learning motivation	34	3.12 ± 0.84
Enhancement of self-directed learning	32	3.09 ± 0.73
Enhancement of knowledge retention and application	34	3.06 ± 0.74
Integration of basic and clinical knowledge	34	2.91 ± 0.83
In-depth knowledge learning	33	2.82 ± 0.85

Data are presented as mean ± standard deviation of the 4-point scale.
PBL: Problem-based learning, N: Number of responding schools.

Table 4. Items Which Inhibit the Effectiveness of PBL

Opinion	N	Score
Passive attitude of students in PBL class	27	2.85 ± 0.82
Lack of PBL tutor training	27	2.70 ± 0.91
Feeling of discomfort during PBL discussion due to social and cultural differences compared to the West	28	2.36 ± 1.06
Students' insufficient understanding of PBL	27	2.33 ± 0.88
Shortage of autonomous learning time for PBL due to schedules including lectures and exams	27	2.19 ± 1.18
PBL tutor's insincere attitude	27	2.15 ± 1.10
Shortage of PBL tutors	27	2.15 ± 1.23
Shortage of PBL cases	27	2.07 ± 1.11
Concern about the uncertainty of learned knowledge	27	1.85 ± 0.82
School's formal PBL implementation for medical school accreditation	28	1.71 ± 0.94
Lack of PBL facilities	27	1.41 ± 0.69

Data are presented as mean ± standard deviation of the 4-point scale.
PBL: Problem-based learning, N: Number of responding schools.

points: "students' passive attitude" (2.85 ± 0.82 points), "lack of tutor training" (2.70 ± 0.91 points), "discomfort at PBL discussion" (2.36 ± 1.06 points), "lack of understanding of PBL among students" (2.33 ± 0.88 points), "lack of self-learning time" (2.19 ± 1.18 points), "insincere attitude of tutor" (2.15 ± 1.10 points), "shortage of tutors" (2.15 ± 1.23 points), "lack of cases" (2.07 ± 1.11 points), "uncertainty of PBL learning with no correct answers" (1.85 ± 0.82 points), "perfunctory PBL practice for school accreditation" (1.71 ± 0.94 points), and "shortage of PBL learning facilities" (1.41 ± 0.69 points) (Table 4).

7. Tasks for the successful implementation of PBL

To the question on whether there were plans to maintain the operation of the PBL, 19 schools (54.3%) answered that PBL would remain at its current levels; 11 schools (31.4%) answered that they would expand PBL; two schools (5.7%) answered they would entrust the operation of PBL to professors in charge; two schools (5.7%) answered that they would reduce the operation of PBL; and one school (2.9%) answered that it would use PBL along with team-based learning.

Table 5. Prioritized Tasks for the Success of PBL

Opinion	No. of times mentioned
Tutor training	14
Orientation for students	10
Resolution of tutor shortage	8
Difficulties in case development	8
Students' passive attitude towards PBL	6
Professors' skepticism about PBL	4
PBL class time	3
Lack of PBL space	1

PBL: Problem-based learning.

To the question on the highest priority task for the successful implementation of PBL, respondents mentioned tutor training (15 times), orientation for students (10 times), resolving the tutor shortage (10 times), resolving the difficulties in case development (9 times), improving the passive attitude of students in PBL discussion (6 times), changing professors' skepticism about PBL (4 times), and securing PBL class time in the curriculum (3 times). In addition to these, the issue of a lack of space was mentioned (once), the lowest in the priority order (Table 5).

8. Opinions of the schools which did not implement PBL

Of the five schools which said they did not implement PBL, four schools had suspended PBL after implementing it, and the remaining one school had never implemented PBL. To the question regarding why these schools did not implement PBL, they mentioned insufficiency of professor participation, professors' negative perceptions regarding PBL, and reduced motivation and efficacy of learning due to PBL cases' transfer to next school year and their exposure to students prior to class. The four schools that had suspended their implementation of PBL said that they replaced PBL with evidence-based medicine or a clinical presentation (CP) course.

Discussion

According to the results, 35 of the 40 Korean medical schools (87.5%) that responded to the questionnaire were confirmed as implementing PBL. In a study of the status of PBL in several Asian countries, it was found that PBL was being implemented in over 90% of medical schools in Japan [5], 50% to 70% of medical schools in Indonesia [6], and 100% of medical schools in Taiwan: a total of 12 schools [7]. Considering this, the status of PBL implementation in Korea is similar to that of other Asian countries.

The analysis on the introduction period shows that 27 of the 35 schools (77.1%) introduced PBL in Korea from 1999 to the mid-2000s. This is consistent with the findings of the study conducted by Servant [6] who reported that there was explosive growth in the introduction of PBL by medical schools from 1990 to the early 2000s. In consideration of this, it can be concluded that Korean medical schools have tried to grasp the trend of global medical education and adapt to its changes.

The reason why medical schools in Korea introduced PBL can be attributed to changes in the educational philosophy of the educational institutions themselves, but this study evaluates the effect of medical school accreditation as one of the major causes. Similarly, in her study of PBL status in Asian medical schools, Servant [6] also evaluated that one of the factors influencing the proliferation of PBL in Asia was each government's demand for the reform of medical education. According to the analysis, as a result of each government's request, schools reorganized their own curricula and introduced new teaching methods such as PBL [6]. As in Asian universities, the rate of use of non-lecture classes in the medical curriculum has been selected as evaluation criteria for medical school

accreditation in Korea, and for this reason, each university has adopted PBL as a matter of policy to meet such criteria. In other words, it was evaluated that each medical school worked to introduce PBL as one of the non-lecture learning modalities to improve on the traditional lecture-centered curriculum. Considering this situation, the researchers expect that medical schools in Korea will continue to increase a number of their non-lecture classes, including PBL.

In terms of the position of PBL in the curriculum of Korean medical schools, 30 of the 35 schools added PBL to the traditional lecture-centered curriculum, a model referred to as “hybrid” PBL, combining traditional lectures and PBL. This tendency was similar to other Asian schools. According to a study by Servant [6], most of the Asian schools have adopted a hybrid PBL curriculum. With regard to why hybrid PBL is being widely operated in Korea medical schools, this study analyzes that there are three reasons: First, professors try to convey as much knowledge as possible during class time, thinking that what the professor has not taught the students in class will not be learned. In other words, because they perceive the most effective means of transmitting knowledge as “lectures”, they are worried that if lectures are reduced and PBL classes are increased, students will not acquire sufficient medical knowledge. Second, professors point out that there may be some inaccurate knowledge among the contents that students learn through PBL discussion. Citing the concern that students collect data from unreliable blogs on Internet instead of referring to verified medical literature, PBL tutors are concerned that the information students bring up during discussions or submit as assignments may be not accurate medical knowledge. In other words, professors tend not to trust in the accuracy and depth of the knowledge students learn through PBL. In that sense, professors who view PBL with skepticism

consider lectures as the most reliable way to acquire accurate medical knowledge from an expert. This is interpreted as consistent with the result of opinion of professors giving the lowest score to the “in-depth learning” survey question related to the effectiveness of PBL. Third, some professors say that the process of discussion among students during PBL is a waste of time. Professors think that students can acquire knowledge easily and quickly through lectures. In the PBL, however, students have to gather for a few hours to gather the same knowledge they can get from the lecture, and this discussion sometimes goes in the wrong direction. Professors will negatively view a series of learning processes through the PBL. The researchers estimate that such professors and schools with negative stance on PBL will hesitate to introduce a PBL-oriented curriculum.

Through analyzing the factors that inhibit the effects of PBL, the following two points were noted: First, students felt uncomfortable with discussion in PBL. In particular, students tended to be cautious about expressing their opinion in front of a tutor who has authority. They were also reluctant to speak in class unless they were completely sure of something, because they sometimes get negative feedback when they say the wrong thing in class. This leads to a learning climate in which it is better to stay still than to speak incorrectly, which also hinders active discussion. In fact, tutors point out that students tend to talk less when learning topics in PBL that had not been dealt with previously in a lecture than when learning topics that had already been taught in a lecture, because in the former case they are dealing with a lot of information that they do not know. Second, students said they felt uncomfortable contradicting or criticizing other students’ views. They were worried that such criticism might hurt other students’ feelings because they are peers who have to share much

time during lectures, PBL courses, and clerkship until graduation. In that sense, the researchers interpret that such a cultural climate can influence the activeness of discussion during a PBL course.

In relation to this, a study by Mahbubani [8] pointed out that the cultural climate of Asian countries could affect the PBL class. In his study, he argued that students from Asian universities were passive because of their cultural backgrounds, making PBL difficult and, in extreme cases, PBL impossible. Hofstede [9] describes the distance of the power of each country in numerical terms by explaining how the weak accept the inequality as the norm. The figures in Asia are generally higher than those in Europe or the United States, suggesting that Asia is a more authoritarian society. The cultural differences could be one of the reasons why Korean students have a somewhat passive attitude in the PBL discussion [9]. However, while acknowledging that cultural characteristics play a role, Khoo [10] insisted that the characteristics found in PBL at Asian medical schools, such as passive discussion participation, are likely a phenomenon that will be limited to the beginning of its implementation, and if the class atmosphere changes, even Asian students can be expected to actively join in PBL discussion. We agree with opinion of Khoo [10]. The changed learning atmosphere is highly likely to lead Korean medical school students to involve themselves in PBL discussion. Indeed, during PBL training at an overseas medical school, we witnessed Korean students actively participating in the discussion and enjoying PBL without the pressure of the test.

PBL and traditional curriculum have different student evaluation systems. In other words, students are evaluated as pass or fail in the PBL, and ranked by grades in the traditional curriculum. Therefore, if the existing curriculum and the PBL curriculum are

competing, students are likely to consider PBL section of the curriculum to be optional time as the conventional course is already too demanding [11]. Students are expected to want tutors to act as a facilitator rather than an evaluator. The authors suggest that in order to create a safe atmosphere, the tutor should be present in class but minimize their intervention. Yeo and Chang [4] reported that according to a survey of student preference regarding the presence of a tutor in PBL class, students did not want authoritative tutors but considered the presence of a tutor was helpful in creating an academic atmosphere. A study by Chung et al. [12] also showed that 59.5% of students did not want their tutors to intervene in discussion, and wanted them only to make final comments. Khoo [10] proposed a method of conducting class without tutors. The results of such studies imply that creating a safe academic atmosphere is necessary for active discussion.

In addition, it was confirmed again that faculty development and tutor training and case development are the tasks that should be prioritized to successfully implement PBL. As for the many schools which have implemented hybrid PBL, different tutors are assigned according to the group, and tutors change every time cases change. Whenever the tutor changes, the class proceeds could also change. Thus, many students often feel confused about the progress of the class, and tutors also worry about how to lead the class when they undertake PBL for the first time or deal with cases irrelevant to their major. In addition, such difficulties have not yet been sufficiently resolved because even if the tutor training is performed, the attendance rate of the tutor is low. Therefore, the researchers suggest as a solution that tutor education videos be produced and shared via e-mail, and a PBL online library is made so that such videos are available at any time if necessary.

In terms of case development, there were difficulties

in developing a good case suitable for PBL class because individual schools had little experience in case development. To address this, the researchers suggest that the schools, which have difficulty in developing cases, download and utilize the cases in the PBL Case Bank which has been developed and operated by the Korean Society of Medical Education RGPT. The PBL Case Bank is a web-based data bank which provides this service in order to encourage medical schools to upload the cases they have developed and allow member schools to download and use accumulated cases free of charge. It is easy to find useful cases, because cases can be searched by diagnosis name and clinical department. However, it is necessary to download the applicable case and convert it into the PBL form which is suitable for each school, considering that the forms each university uses when it develops cases are different.

In addition, it is noted that there are schools that present PBL materials in the form of videos, simulated patients and other materials, rather than papers. We evaluate that this change suggests that PBL can be connected with CP curriculum. In other words, it would be meaningful to suggest a new integrated learning model of presenting PBL cases in the form of videos or simulated patients, learning the relevant CP, and then learning the relevant clinical skills.

The significance of this study can be evaluated largely in terms of two points. First, it identified the operation status of PBL in all medical schools on a national basis. Now that many schools, which have implemented PBL or are trying to introduce it, are wondering how PBL is being run in other schools, this study may be of great significance in that it can help each school address questions by providing detailed data in relation to the current status of PBL courses implemented in all medical schools since the 1990s. Second, this study could be useful in that it suggested the results of survey on the

various operating methods which schools can choose as their PBL operation method; problems in the implementation of PBL; and directions for improvement. The results of this study will be able to be used as a useful tool for school trying to introduce or improve PBL and to determine the appropriate approach to PBL.

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