Do learning approaches of medical students affect their satisfaction with problem-based learning?

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1Department of Medical Education, School of Medicine, Akdeniz University, Antalya, Turkey; 2Department of Medical Education, School of Medicine, Suleyman Demirel University, Antalya, Turkey; 3Department of General Surgery, School of Medicine, Pamukkale University, Denizli, Turkey; 4Department of Anatomy, School of Medicine, Pamukkale University, Denizli, Turkey; and 5Department of Medical Education School of Medicine, Akdeniz University, Antalya, Turkey

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Gurpinar E, Kulac E, Tetik C, Akdogan I, Mamakli S. Do learning approaches of medical students affect their satisfaction with problem-based learning? Adv Physiol Educ 37: 85–88, 2013; doi:10.1152/advan.00119.2012.—The aim of this research was to determine the satisfaction of medical students with problem-based learning (PBL) and their approaches to learning to investigate the effect of learning approaches on their levels of satisfaction. The study group was composed of medical students from three different universities, which apply PBL at different levels in their curricula. The revised two-factor study process survey was applied to the study group to determine their approaches to learning as “deep” or “surface” learning. In addition, another survey of 20 questions was used to determine satisfaction levels of students with PBL and other variables. Of the study group, 64.6% were found to adopt a deep approach to learning, and we confirmed that these students were reasonably more satisfied with PBL.

PROBLEM-BASED LEARNING (PBL) has been a useful and increasingly applied educational method since 1969 because of its benefits (7, 10). This educational method allows the student to acquire case-specific problem-solving skills and the ability to apply their own previous knowledge and gain new information while solving these problems using critical thinking skills. Thus, it allows the student to relate the new information to his or her own previous knowledge while learning and enhances independent learning skills in time. The knowledge gained in an independent study period could be consolidated in small group discussions (4, 9, 16). Consequently, PBL methodology is naturally expected to influence a student’s approach to learning by fostering meaningful, comprehensive, and deep learning on the basis of higher cognitive skills and collaborative learning actions in small groups.

In recent years, different approaches to learning have attracted increased levels of attention, especially with the expansion of student-centered/self-oriented learning strategies in higher education.

Biggs, who has extensively researched the various approaches to learning, believes that each student has a prior learning tendency, and this tendency depends on the students’ perception of the learning environment and meanings given to different aspects of the learning environment. He classified the approaches to learning in two main categories as “deep” and “surface” learning. Where the students are required to learn vast quantities of information in a limited time period, they generally tend to learn superficially by memorizing the facts without any concern to linking or integrating prior and new knowledge or fully understanding underlying mechanisms and principles. This kind of learning is called surface learning, and it is almost always preferred by students as they attempt to attain required scores from exams.

In contrast, the deep learning approach requires full understanding and comprehensive knowledge. The learner integrates new information with current knowledge structures in his or her mind meaningfully and transfers it into long-term memory to use when needed. A deep learner fully understands the studied material with underlying concepts, principles, or mechanisms and uses higher cognitive skills, such as the application of the knowledge, analysis, critical thinking, or synthesis. Consequently, high-quality learning and the associated potential for better academic achievement occur (11, 13, 14).

Considering the fact that the deep learning approach is essential for PBL, we hypothesized that deep learners should be more satisfied with PBL since their learning approach fits well with PBL methodology.

The objective of this study was to investigate the relation between students’ learning approaches and their satisfaction with PBL.

MATERIALS AND METHODS

Study group. Target groups were selected among year I and II medical students from three different Turkish medical schools that apply PBL at different rates in their curricula (n = 728). The curriculum characteristics of the three selected medical schools (Pamukkale University School of Medicine, Akdeniz University School of Medicine, Suleyman Demirel University School of Medicine) are described below.

Pamukkale University School of Medicine implemented a full PBL curriculum in preclinical years (the first 3 yr of medical education) since 1999. There are 17 PBL modules in each year supported by other teaching methods, such as lectures and practical hands-on sessions. Each module lasts 2 wk and includes three discussion sessions.

At Akdeniz University School of Medicine, the integrated-hybrid curriculum consists of five thematic blocks in the first 2 yr. The first week of each block has been completely allocated to PBL modules since 2002. Every PBL module includes three half-day discussion sessions, and the remaining of the week is composed of independent study hours, practicals, or supportive lectures for PBL objectives.

In the integrated-hybrid curriculum applied in Suleyman Demirel University School of Medicine, there are four thematic blocks in the first year and five thematic blocks in the second year. Two PBL
modules in the first year and three PBL modules in the second year have been implemented every year since 2006, consisting of five modules in total. These modules take place in the first weeks of related thematic blocks. The total duration of application of PBL modules is 1 wk, and every module contains three discussion sessions, practicals, supportive lectures, and independent study hours.

In all of the three faculties of medicine, student activities during the PBL modules (participating in discussions and generating learning objectives, sharing knowledge with the small group after independent study hours, respecting group dynamics, etc.) is assessed by tutors using structured summative assessment forms. At Pamukkale University, students sit for a multiple-choice question (MCQ) exam at the end of each module. At Akdeniz and Suleyman Demirel Universities, assessment of the PBL modules is performed separately at the end of the module. The MCQ exam and written clinical reasoning exam are performed in Akdeniz University, whereas a MCQ exam alone is performed at Suleyman Demirel University as the end of the module test. Fifteen percent of the total score (100 points) of the block in which the PBL module takes part is allocated to PBL assessment.

Materials for data collection. All students of years I and II at these three medical schools were invited to fill out the questionnaires in 2009. At the time of invitation, 128 of 728 targeted students were in years I and II at Pamukkale University, 363 students at Akdeniz University, and 237 students at Suleyman Demirel University.

To reveal the learning approaches of Turkish medical students, the “revised two-factor study process questionnaire” developed by Biggs et al. (5) in 2001 was preferred. This questionnaire is one-dimensional for each subscale (deep and surface), and the subscales are internally consistent. It is composed of 20 items about students’ attitudes toward studying and ways of studying. To calculate a student’s deep approach score, the sum of the scores of items related to the 1st, 2nd, 5th, 6th, 9th, 10th, 13th, 14th, 17th, and 18th questions are obtained. The sum of the remaining items’ scores provides the surface approach score. Odd-numbered questions probe and score the student’s motivation, and even-numbered questions probe and score the student’s learning strategy. The maximum possible score is 50 for each factor (motivation and learning strategy). Both deep and surface approaches can receive equal motivation and strategy scores, and, in this regard, the minimum possible score is 10 for each approach.

The validity and reliability of this questionnaire has been established in a previously performed Turkish survey (3) (see the Supplemental Material).1

Another questionnaire developed by the authors was used to determine the satisfaction levels of the study group with PBL. This satisfaction questionnaire includes 20 items investigating the contribution of PBL to student learning. The satisfaction questionnaire was answered and scored on a five-item Likert scale (where 1 = absolutely disagree, 2 = disagree, 3 = undecided, 4 = agree, and 5 = absolutely agree). One of the 20 items is the following direct question: “In total, are you satisfied with PBL application that is incorporated in the program?” which takes part at the end of the questionnaire. Eight items were about the attitudes of the students regarding the advantages of PBL, and eleven items were about the evidence-based advantages of PBL over other methods. Minimum and maximum scores could be attained from the questionnaire were 20 and 100, respectively.

Data analysis. Statistical analyses were done using SPSS for Windows (version 13.0). A $\chi^2$-test was used to determine the distribution of the deep and surface learners in the study group. Student’s $t$-test was used compare the PBL satisfaction scores of deep and surface learners at Akdeniz University and Suleyman Demirel University, where as a Mann-Whitney $U$-test was used with the same purpose since the number of surface learners was small at Pamukkale University. ANOVA was used to compare different curricula in terms of PBL satisfaction scores among surface and deep learners separately. To compute the correlation between the learning approach and the satisfaction level with PBL, we first needed to calculate the average score by adding all the points given to the questions divided by the number of students in each group categorized in PBL satisfaction (maximum of 100 points); the points of the students were then compared statistically according to their approach to learning.

RESULTS

A total of 587 students (80.6%) in the target group completed both questionnaires completely and comprised the study group. The male-to-female ratio of the participants was close to each other (51.8% vs. 48.2%, respectively).

Of the participants, 379 (64.6%) were found to have a deep approach to learning (Table 1).

Satisfaction scores with PBL among the students with a deep approach to learning were significantly higher compared with those of students who adopted a surface learning approach ($P = 0.00$).

When the three medical schools were considered separately, no significant differences were found between deep and surface learners at Pamukkale University School of Medicine (Table 2).

When the three different curricula were compared in terms of student satisfaction with PBL among surface and deep learners, we found no significant differences among surface learners in different curricula. However, the difference was significant among deep learners of the three schools (Table 3).

DISCUSSION

Having information on students’ learning approaches is crucial to developing an educational program and to selecting proper teaching and learning strategies (1). When it is considered that the main objectives of education are to enhance a learner’s knowledge, psychomotor abilities, and attitude, it becomes obvious that the student’s approach to learning is an important factor that should be taken into consideration to achieve educational objectives.

The key goal for a learner in an ideal learning event is to understand new concepts and relate them with prior knowledge and experiences. Whether a learner actually does this or not, in

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1 Supplemental Material for this article is available at the Advances in Physiology Education website.

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Table 1. Distribution of learning approaches of the study group

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Deep Learning Approach</th>
<th>Surface Learning Approach</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of students</td>
<td>%</td>
<td>Number of students</td>
</tr>
<tr>
<td>Akdeniz University</td>
<td>191</td>
<td>63.6</td>
<td>109</td>
</tr>
<tr>
<td>Pamukkale University</td>
<td>75</td>
<td>82.4</td>
<td>16</td>
</tr>
<tr>
<td>Suleyman Demirel University</td>
<td>113</td>
<td>57.7</td>
<td>83</td>
</tr>
<tr>
<td>Total</td>
<td>379</td>
<td>64.5</td>
<td>208</td>
</tr>
</tbody>
</table>
other words his or her learning approach, is important for learning outcomes. Surface learning and deep learning are not mutually exclusive, and it is possible for the two to coexist. Which type of learning learners will pursue very much depends on the prior educational experiences of the learners and nature of the educational tasks. Assessment methods are also significant determinants of a student’s learning approach. Consequently, being a deep or surface learner is not a permanent characteristic of students since they just do what the conditions require. The learning approaches of students may also change depending on how teaching and assessment activities award deep or surface learning (8, 18).

Being interested in and curious about a learning subject, self-motivation, and personal responsibility are all additional factors supporting a deep approach to learning. On the other hand, little or no interest in the subject matter as well as time limitations to prepare for an exam or extensive learning content generally cause surface learning (2, 6).

We found that almost two-third of the students in our study adopted a deep approach to learning. According to the results of other studies, a deep approach helps the learner to understand new information, integrate prior knowledge and new information obtained from other resources, and develop analytic and creative abilities (for example, finding new practical solutions to problems).

Deep learners can keep basic and important concepts and information about any subject in their long-term memories over a longer duration of time, integrate new information with prior knowledge, develop new meanings and ideas, and learn independently. Also, these students often show higher levels of academic success and greater levels of satisfaction with the learning process (6).

Students with a deep learning approach might benefit more from the PBL process, and, accordingly, they may have a higher satisfaction level with PBL independent from the type of PBL application, as partly shown in our study. Other studies have shown that the application of PBL allows the learner to acquire skills on case-specific problem solving, to apply their own knowledge, and to obtain new information while solving these problems. This then allows for the analysis of the newly acquired information along with its interpretation. Thus, it allows the learner to relate the new information to his or her own knowledge while learning and gives them the capability of independent learning on a regular basis. Individual independent study consequences can be discussed in a small group to help consolidate knowledge structure (4, 9, 16).

PBL requires active instead of passive learning by developing alternate hypotheses, learning new information to explain these hypotheses, searching, and using and evaluating various sources to reach new information (12, 13, 15). The conclusion of all these studies is that they believe that PBL develops a deep approach to learning in the student. From this viewpoint, it is reasonable to expect that students with a deep approach to learning will be more satisfied with PBL. The findings of our study provided support to this hypothesis in that the scores of the students with a deep approach to learning were higher than those with a superficial approach. Also, the similarities between the findings of three different faculties that apply different levels of PBL suggested that students with a deep approach to learning were satisfied with PBL in any case.

At Pamukkale University, no significant differences were found between PBL satisfaction scores of deep and surface learners, possibly due to contextual factors. Some hidden factors might be responsible, which were not considered in this study, e.g., the group dynamics during PBL sessions, the set objectives for each PBL session, the faculty development programs for preparing faculty staff for PBL sessions, or the case scenarios.

In surface learning, the main objective of the learners is to fulfill the minimum requirements with the minimum level of effort that is required to be successful. It therefore leads to low-quality learning and learning without the integration of new information with prior knowledge and additional information obtained from other sources. Surface learning also reflect that students tend to choose the shortest and fastest ways to achieve a goal: they do not ask intensive questions, they memorize without understanding, and they deal with the material with minimum interest. Students that adopt surface learning can only understand limited information in different cases; as a result, they therefore tend to forget newly learned material after a short period of time (17).

The PBL process does not match with the surface learning approach. This provides us an answer as to why we can expect

Table 2. Comparison of PBL satisfaction scores of deep and surface learners at each school

<table>
<thead>
<tr>
<th>School</th>
<th>PBL Satisfaction Score</th>
<th>Average</th>
<th>SD</th>
<th>Student’s t-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suleyman Demirel University</td>
<td>Deep learning approach</td>
<td>71.3</td>
<td>12.9</td>
<td>466.0*</td>
<td>0.16</td>
</tr>
<tr>
<td>Akdeniz University</td>
<td>Deep learning approach</td>
<td>68.6</td>
<td>14.9</td>
<td>2.200</td>
<td>0.02</td>
</tr>
<tr>
<td>Pamukkale University</td>
<td>Surface learning approach</td>
<td>63.4</td>
<td>18.6</td>
<td>2.393</td>
<td>0.01</td>
</tr>
<tr>
<td>Total</td>
<td>Deep learning approach</td>
<td>73.7</td>
<td>12.2</td>
<td>3.467</td>
<td>0.00</td>
</tr>
</tbody>
</table>


Table 3. Comparison of three different curricula (schools) in terms of PBL satisfaction scores among deep and surface learners

<table>
<thead>
<tr>
<th>School</th>
<th>PBL Satisfaction Score</th>
<th>Average</th>
<th>SD</th>
<th>F-test (by one-way ANOVA)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep learners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akdeniz University</td>
<td>68.6</td>
<td>14.9</td>
<td></td>
<td>5.083</td>
<td>0.00</td>
</tr>
<tr>
<td>Pamukkale University</td>
<td>71.3</td>
<td>12.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suleyman Demirel</td>
<td>73.7</td>
<td>12.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface learners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akdeniz University</td>
<td>64.7</td>
<td>14.3</td>
<td></td>
<td>2.618</td>
<td>0.07</td>
</tr>
<tr>
<td>Pamukkale University</td>
<td>63.3</td>
<td>18.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suleyman Demirel</td>
<td>69.2</td>
<td>14.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
surface learners to have lower levels of satisfaction with PBL than deep learners. In all studies and observations that aim to assess PBL satisfaction, it has been shown that some students are not satisfied with this method. The learning approach of these students may be an important reason for their dissatisfaction with PBL.

Conclusions. In medical education, the student’s desire is to achieve and maintain a deep approach to learning. It is known that the student’s approach to learning takes shape according to the applied program, assessment techniques, and expectations. There are appropriate student-centered educational methods, like PBL, that allow students to adopt a deep approach to learning, and teachers are responsible in creating learning opportunities that facilitate and enhance students’ skills in deep learning. The results of the present study suggest that students with a deep approach to learning may be more satisfied with PBL. To obtain more definite results, studies considering more comprehensive variables are needed on this subject.

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DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

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