

Attitudes Toward Problem Based Learning in a New Turkish Medicine Curriculum

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Abstract: In this study PBL attitude scale was developed and compared students' attitudes toward problem solving, self-directed learning, group based learning, web supported environments and the role of facilitator. There is no significant difference between the points of attitude scale of two grades. There is no significant difference between males and females' points obtained from the attitude scale. Moreover, no significant main effect for gender by grades interaction is found out. Although students have positive attitudes toward PBL applications, more than half of the students do not want to study PBL in next years. Most of the students from both years can not use their previous knowledge to solve the problems. Second year students get more responsibility than the first year students. First year students both have more courage to develop hypotheses to solve the problems and have more ability to test and eliminate the hypothesis. The results suggest that even though they have positive attitudes toward PBL, students dissented on the PBL applications.

Key words: Problem based learning • Attitudes • Self directed learning • Problem solving • Web Enhanced environment • Facilitator

INTRODUCTION

Problem based learning is the most comprehensive and widely adapted approach and has been chosen for the curriculum delivery model at many professional schools around the world. It is an instructional approach that uses real world problems as a context for students to learn critical thinking and problem solving skills and to acquire knowledge and essential concept of the course. It uses real world problems, emphasizes problem solving skills, teaches critical thinking skills and develops self directed learning skills [1].

Since PBL applied widely as an instructional model, some attitudes toward PBL especially student attitudes has been searched. For instance, Carol [2] measured students' attitudes within the university and teacher education course. Student attitude and Activities Assessment Survey was administered at the beginning and end of the semester. Students in both PBL and non-PBL sections rated almost all items lower at the end of the semester at the beginning.

Another study revealed the value of collaborative problem solving in an online environment. By working

with a project like Expeditions, participants grew significantly in their confidence in collaborating online and competence in using the online communication tools in problem solving. There were no significant differences in the participants' attitudes about collaborative problem solving at school or online before and after the project [3].

Erlinda and Kaitell [4] asked four questions to determine students' perception of their learning using PBL. 1. Describe the thinking processes you used in this PBL course What knowledge did PBL demand? 2. What skills did PBL demand? 3. Describe the difference(s) between what you learned using PBL and what you learned using other teaching methods? What influenced your learning and performance in PBL? The most frequently identified factors that influenced performance and learning in PBL were positive attitude and group effort.

Silverstone [5] investigates whether Manchester's new course has brought about any improvements in medical students' attitudes according to the objectives defined by the GMC. A five-point likert type instrument was developed from existing attitude scales and was sent to students. It was found that on three attitude scales,

namely ability to cope with uncertainty, awareness of the need for continuing professional development allied to the process of continuing medical education and recognition of the importance of social and emotional factors in illness and treatment students on the new course had significantly higher scores than the other groups. There were no significant differences on other scores.

Attitudes among students and teachers on vertical integration between clinical medicine and basic science within a problem-based undergraduate medical curriculum were studied. The aim was to assess the importance of vertical i.e., integration between the clinical and basic science sections of the curriculum and horizontal integration between different subject areas in an undergraduate medical curriculum, according to opinions among students and teachers. Students scored horizontal integration slightly but significantly higher than the teachers, whereas teachers scored vertical integration higher than students [6].

Birgegard and Lindquist [7] measure the students' attitudes to and opinions of, their studies at medical school. They were asked to what extent the medical school encouraged independent, critical thinking, problem solving skills, decision making, studying outside the textbook and other behaviors and skills that teachers in higher education usually put forward as important.

Students' perceptions were evaluated at the PBL sessions during the third year surgery clerkship. It was measured to determine if there were differences among rotations, between years and among the various instructional components in terms of 1) quality of teaching 2) importance of content and 3) the degree to which learning was facilitated. The results appear that PBL can be just as positively accepted in clinical clerkship as previous research has indicated it to be accepted in basic science courses [8].

As mentioned above, there are many different attitude scales were developed. Besides these scales, this study measures the students' attitudes to some divisions of PBL that can be classified as Problem Solving, Self-Directed Learning, Group Based Learning (Cooperative Learning), Facilitator and web supported environments. Because it is assumed that problem based learning is a means to the end of acquiring problem solving skills. Once individuals have acquired problem solving skills that is become a successful problem-solver, they can go forth and tackle problems of all sorts, confident that they have the mental faculties to arrive at a successful conclusion. If they lack knowledge to solve

the problem, no difficulties arise since they have the self directed learning skills, acquired in the practice of problem solving skills, to go and find the knowledge [9].

Another important part of PBL is Self Directed Learning. It has been described as a process in which individuals take the initiative, with or without the help of others, to diagnose their learning needs, formulate learning goals, identify the resources for learning, select and implement learning strategies and evaluate learning outcomes [10].

The tutorial group has a central position in PBL. Here not only are the problems analyzed and the learning objectives formulated, but also the information obtained as a result of self study is exchanged in the report phase [11].

The tutor (facilitator) stimulates the learning process and helps ensure good group dynamics. A tutor is not a teacher and will not present direct information about the subject matter. In contrast, the tutor stimulates and activates individual thinking by asking questions, giving suggestions and clarifying matters where necessary [11]. The faculty tutors facilitate the problem solving process not by means of lectures but rather as guides or catalysts of the students' efforts [12].

Researchers in computer-supported collaborative learning (CSCL) maintain that Web-based tools can support learners' constructivist, problem-based collaborative learning [13-16]. Successful utilization of the internet and internet curriculum materials will require teachers and students to become more comfortable with constructivist based learning. Nicaise and Barnes [17] believe technology can facilitate constructivist methodologies through helping teachers' create information-rich environments that allow the students to explore and construct meaning. They also believe technology will promote higher level thinking because students will spend less time looking for information and more time analyzing it.

As Thomas [18] mentioned key attitudes which aid group functioning are positive attitudes to the group, positive attitudes towards interaction, readiness to be creative and readiness to be critical at the right time and in the right way. The aim of this study is to compare the students' attitudes toward problem solving, self-directed learning, group based learning, web supported environments and the role of facilitator.

The research questions are:

1. Does gender affect attitudes? That is, do females and males' attitudes differ significantly toward PBL and which group has a more positive attitude?

2. Does grade level affect attitudes? Do students' attitudes toward PBL in two years differ significantly and which grade level scored higher than the other?
3. Is there gender by grade level interaction? Is the influence of gender and grade levels idiosyncratic, such that, gender has one effect in a particular grade level but a different effect in a different grade level?

MATERIALS AND METHODS

Subjects: 313 first year students and 136 second year students attending Ankara University Faculty of Medicine participated in this study.

Materials: The *Problem Based Learning Attitude Scale* was used to evaluate the student's attitudes. The *PBL Attitude Scale* was administered to 452 students to analyze reliability, ($\alpha=0.86$) and validity. The *PBL Attitude Scale* consists of six main parts: Students' attitudes to Problem Solving, Self Directed Learning, Web supported Learning Environments, Collaborative Learning, Facilitator and subject.

Analysis: In order to discover the effect of gender, or grade level, or a gender by grade level interaction on attitudes of medical students Two-Way ANOVA for independent samples was used. Before data conducting ANOVA, the normal distribution was analyzed by descriptive statistics.

RESULTS

The data was analyzed by descriptive statistics to demonstrate normal distribution (Table 1).

The measurement of central tendency can be seen in Fig. 1 and Table 1. The mean is 162.15. The median of total attitudes' value is 162.00. The measurement of variability around the mean is given in Table 1. The variance is 476.50 and the standard deviation is 21.83 (Table 2).

The deviation from normality is defined as kurtosis is a measurement of the peakedness or the flatness of a distribution. A kurtosis value between -1.0 and $+1.0$ is considered excellent for most psychometric purposes. In this study the kurtosis value is 0.769. The distribution is more peaked than normal but it can be acceptable. The skewness of measurement is 0.003 and the standard error of skewness is 0.115. A value of zero (0) represents a symmetric or evenly balanced distribution.

Since the number of females and males are very different each year, the normal distributions of total

Table 1: Descriptive statistics results for normal distribution

Total	
N	449.00
Mean	162.15
Std. Error of Mean	1.03
Median	162.00
Std. Deviation	21.83
Variance	476.50
Skewness	0.003
Std. Error of Skewness	0.115
Kurtosis	0.769
Std. Error of Kurtosis	0.230
Range	147.00
Minimum	79.00
Maximum	226.00
Sum	72806.00

Table 2: Descriptive Statistics Results of Total Attitude Points for Gender and Grade Levels

Levels	Gender	Mean	Std. Deviation	N
1	Female	162.03	19.00	160
	Male	160.08	21.31	153
	Total	161.08	20.15	313
2	Female	162.56	23.53	87
	Male	168.29	27.75	49
	Total	164.63	25.18	136
Total	Female	162.21	20.66	247
	Male	162.07	23.23	202
	Total	162.15	21.83	449

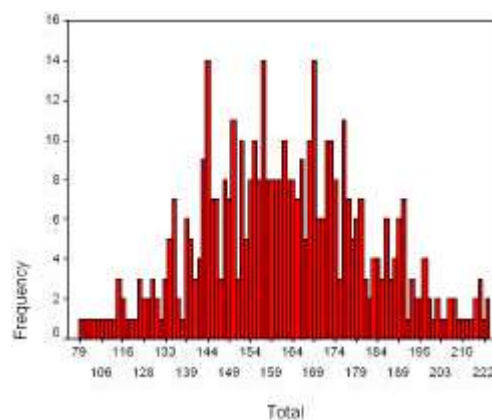


Fig. 1: Bar Graph for Frequency

attitude points for each year and each gender need to be analyzed. The mean of total attitude points of females in first year is 123 and its median and mode are also 123. The standard deviation of measurement is 14.71. Additionally its skewness is -0.117 and its kurtosis is 0.623. The mean of total attitude points of males in first year is 122; its median is 121 and its mode is 112. The standard deviation of measurement is 16.66. Additionally its skewness value is 0.48 and its kurtosis value is 0.359.

The mean of total attitude points of females in the second year is 125; its median is 125 and its mode is 138. The standard deviation of measurement is 18.32.

Table 3: The ANOVA Results of Attitude Total Points for Gender and Grade Levels

Source	Type III sum of squares	df	Mean square	F	Sig.
Corrected Model	2514.504	3	838.168	1.768	0.152
Intercept	9540634.034	1	9540634.034	20125.134	0.000
Grades	1708.935	1	1708.935	3.605	0.058
Gender	320.151	1	320.151	0.675	0.412
Grades * Gender	1313.862	1	1313.862	2.771	0.097
Error	210959.198	445	474.066		
Total	12019072.000	449			
Corrected Total	213473.702	448			

*R Squared = 0.012 (Adjusted R Squared = 0.005)

Table 4: Frequency distribution of first and second year students in PBL Attitude Scale

		1	2	3	4	5
		%	%	%	%	%
Problem solving						
2. I can develop different hypothesis to solve the problem	First year students	11.5	47.9	13.1	24.3	3.2
	Second Year Students	6.6	45.6	13.2	32.4	2.2
3. I don't have any difficulties to eliminate the hypothesis before starting the problem solving	First year students	2.9	8.9	12.8	64.5	10.9
	Second Year Students	2.9	12.5	7.4	63.2	14.0
4. I can integrate my prior knowledge to solve the problem.	First year students	2.2	21.4	23.0	46.3	7.0
	Second Year Students	3.7	16.2	19.9	47.8	12.5
5. I'm motivated when I study the problems getting from the real life.	First year students	4.8	11.2	8.3	57.2	18.5
	Second Year Students	.7	14.0	5.1	60.3	19.9
6. I can not combine the different disciplines to solve the problem.	First year students	4.5	8.9	11.8	44.4	30.4
	Second Year Students	3.7	8.8	8.8	50.0	28.7
7. I can get the responsibility to learn	First year students	2.9	12.5	18.8	50.2	15.7
	Second Year Students	3.7	11.0	12.5	51.5	21.3
10. I can not evaluate by myself the information that is collected to solve the problem.	First year students	9.9	30.4	23.0	31.6	5.1
	Second Year Students	2.9	19.1	19.1	52.2	6.6
Cooperative Learning						
11. I like to study with peers in a group	First year students	14.7	26.8	16.0	33.2	9.3
	Second Year Students	5.9	28.7	16.9	36.0	12.5
12. It doesn't bring better learning about listening my peers in a group	First year students	7.0	26.5	17.9	40.6	8.0
	Second Year Students	3.7	22.1	16.2	49.3	8.8
13. I don't like to compute with others to solve the problem	First year students	6.1	10.9	17.9	50.2	15.0
	Second Year Students	5.1	14.7	16.2	45.6	18.4
14. I don't want to study with my peers when the problem has different solutions.	First year students	5.1	11.8	16.9	55.0	11.2
	Second Year Students	2.9	11.8	16.9	53.7	14.7
15. Studying with peers means time loosing.	First year students	25.2	43.8	14.7	12.5	3.8
	Second Year Students	15.4	39.0	18.4	16.9	10.3
16. I don't want to have active role in group studies.	First year students	13.4	24.9	20.8	30.7	10.2
	Second Year Students	12.5	21.3	21.3	32.4	12.5
17. I want to study with my peers to solve the problem	First year students	4.2	12.1	16.9	52.7	13.7
	Second Year Students	5.9	13.2	11.8	46.3	22.8
19. I'm uncomfortable that facilitator follow us when discussing the problem with my peers	First year students	22.4	31.9	13.1	24.9	7.7
	Second Year Students	16.9	34.6	21.3	20.6	6.6
20. I don't want to get different responsibilities in group studies.	First year students	3.8	9.9	25.9	48.9	11.5
	Second Year Students	2.9	14.7	23.5	46.3	12.5
21. I like to study PBL in next years	First year students	8.3	17.9	23.3	41.9	8.6
	Second Year Students	3.7	13.2	22.8	48.5	11.8
Self Directed Learning						
22. I can find the objects of the Scenario in every time	First year students	24.3	39.0	15.3	17.9	3.5
	Second Year Students	13.2	36.8	22.1	21.3	6.6
23. I can find the appropriate resources related with objects.	First year students	5.4	14.4	16.0	49.8	14.4
	Second Year Students	4.4	17.6	10.3	44.9	2.8
24. I can't learn by myself the instructional materials if facilitator doesn't help me.	First year students	4.8	14.1	25.6	48.9	6.7
	Second Year Students	6.6	22.1	16.2	45.6	9.6
27. I can learn the new subjects with my efforts.	First year students	5.4	16.9	20.8	45.4	11.5
	Second Year Students	3.7	16.2	22.8	44.9	12.5
29. I prefer to reach the objects by myself instead of facilitators' helps	First year students	2.2	12.5	24.9	49.5	10.9
	Second Year Students	3.7	15.4	22.1	47.8	11.0
30. I don't believe that peers do all one can to solve the problem	First year students	9.3	18.8	21.1	40.9	9.9
	Second Year Students	5.9	16.9	21.3	44.1	11.8
Web Environment						
32. I can find the information from the web searching tools.	First year students	30.4	26.2	21.1	14.4	8.0
	Second Year Students	16.2	31.6	21.3	19.1	11.8

1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Disagree, 5 = Strongly Disagree

Table 4: Continued

		1	2	3	4	5
Problem solving		%	%	%	%	%
33. I don't like to take a test in web environment.	First year students	10.9	21.1	21.1	34.8	12.1
	Second Year Students	7.4	21.3	18.4	40.4	12.5
37. I don't like to get information from handouts and reading passages in web.	First year students	8.0	24.3	29.7	29.4	8.6
	Second Year Students	5.9	27.9	30.9	29.4	5.9
38. I can remember for a long time the information about by the searching the objects of scenario.	First year students	3.5	13.4	30.7	40.9	11.5
	Second Year Students	3.7	14.7	31.6	41.9	8.1
39 *I don't want to solve the problems about Searching in web.	First year students	4.5	6.1	22.4	50.8	16.3
	Second Year Students	2.9	15.4	18.4	47.1	16.2
40. I'm motivated to study the.....in web environment.	First year students	4.2	15.0	25.6	46.6	8.6
	Second Year Students	4.4	7.6	22.8	44.9	10.3
Subject						
41. *I believe that I can use in future most of the information about ...	First year students	3.8	7.7	14.1	47.0	27.5
	Second Year Students	2.9	14.0	14.7	55.1	13.2
42. *The information about is useful for my medicine education.	First year students	4.5	13.7	21.1	46.0	14.7
	Second Year Students	3.7	14.0	22.1	44.1	16.2
43. *The new informations getting from..... support my prior informations.	First year students	14.4	21.7	29.4	26.8	7.7
	Second Year Students	7.4	25.7	24.3	33.8	8.8
44*I've got new information about	First year students	12.8	31.6	33.2	17.9	4.5
	Second Year Students	9.6	22.1	34.6	28.7	5.1
45*The new informations about Are not interesting for me	First year students	15.7	15.7	32.6	28.1	8.0
	Second Year Students	11.8	16.9	25.7	33.1	12.5
Facilitator (Guide/Coach)						
46.Our facilitator provide us positive instructional environment	First year students	4.8	12.5	24.0	38.3	20.4
	Second Year Students	5.1	19.1	27.9	33.8	14.0
47. Our facilitators help us to find resources that are related to topic.	First year students	7.7	26.5	32.6	24.6	8.6
	Second Year Students	3.7	24.3	25.7	38.2	8.1
48. I don't believe to communicate with my facilitator outside of PBL sessions.	First year students	10.2	22.0	20.4	27.8	19.5
	Second Year Students	7.4	15.4	21.3	39.7	16.2
49. The facilitator didn't provide the affective participation of all peers.	First year students	6.4	17.3	24.9	35.1	16.3
	Second Year Students	8.1	14.7	22.1	36.8	18.4

1 = Strongly Agree, 2 = Agree, 3 = Somewhat Agree, 4 = Disagree, 5 = Strongly Disagree

Additionally its skewness value is -0.61 and its kurtosis value are 0.78. The mean of total attitude points of males in second year is 130; its median is 131 and its mode is 116. The standard deviation of measurement is 21.40. Additionally, its skewness value is -0.64 and its kurtosis value is 0.055.

As shown in Table 3 there is no significant difference between the points of attitude scale of two grades. [$F(1-445) = 3.60, p > .05$]. There is no significant difference between males and females' points obtained from the attitude scale. [$F(1-445) = 0.675, p > 0.05$]. Moreover, no significant main effect for gender by grades interaction is found out. [$F(1-445) = 2.771, p > 0.05$].

Although there are no significant differences between first year and second year students, it can be observed some frequency differences in Table 4.

DISCUSSION AND CONCLUSION

Although second year students have met PBL for the second time and for the first year students have met at first time, they do not have different attitudes toward PBL. Both classes have a positive attitude to PBL. In addition, both male and female students have positive attitudes toward PBL.

The scale includes six subscales and students' attitudes points display some differences. One of the very critical results is that more than half of the students do not want to study PBL in next years. The ratio of the second year students is higher than the first year students which can be explained by the fact that the second year students follow the PBL for a second time and therefore, they may be less willing than the first year students. This result should be considered in different ways and we should ask: why do more than half of the students not want to study PBL in next years? Don't they adapt to the new approach? Why? When discussing the results the following may be concluded:

First year students both have more courage to develop hypotheses to solve the problems and have more ability to test and eliminate the hypothesis. Therefore, the second year students who have more knowledge may be more hesitant to eliminate hypothesis without discussing them in detail.

It is surprising that most of the students from both years can not use their previous knowledge to solve the problems. For the first year students the medical topic may have been new. However, the second year students may or should have some prior knowledge about related problem but they may not realize that the prior knowledge

is related to the new subject or new discipline. They should be made aware of the relations between the prior knowledge and the new subjects about the problem. On the other hand, most of the students can make use of their knowledge from different disciplines to solve the problems. Although, they may not combine their prior knowledge with the problem, at the same time they can combine the different disciplines to solve the problems. In addition most of the students are motivated to study with real life problems but the second year students' motivation is higher than that of the first year.

Taking responsibility in PBL is one of the main important things that students have to do, for example they should do research, discuss and eliminate the hypothesis and write the findings by themselves. Since more experiences results taking in more responsibility, second year students get more responsibility than the first year students.

More than half of the first year students and half of the second year students can achieve the objects of the PBL problems at all times. The others may not easily find the aim of the scenario and they need more supports to solve the problem. At the same time, about half of the first year and more than half of the second year students can evaluate the findings from the resources to solve the problem by themselves. It is considered that about forty percent of first year students can not evaluate by themselves and may need to discuss with their peers or with their facilitators. Looking at the preference of group studies, about the same percentages of the students from first year like to study with their peers. It may be concluded from this result that if the students can not arrive at the solution by themselves, they need to discuss with others. However, when the ratios are taken into the consideration, most of the students do not want to study with their peers and they think that working in a group is a waste of time. On the other hand, though they are not sure whether they want to take an active role in a group or not, most of them want to get different responsibilities in group studies.

Although half of all the students involved in this study (around 45%) do not prefer to study with their peers, they accept to study with their peers when there are different solutions of the problem. They want to study alone until finding the different results. In order to solve the dilemma they need discussions with others and some encouragement during the problem solving. On the other hand, whether they like to study with their groups or not, it is clear that they like competition with each other.

Most of us agree that search tools on the web have many advantages for solving the problems. However half

of the students do not agree or just some-what agrees that they may prefer to search the books or other sources. There may be many reasons listed here but it is clear that more than half of the students want to search the web to solve PBL problems but about half of the students are not motivated to study in web environment. In addition, about half of the students do not want to take any exam via internet or are not sure about that item. It can be deduced that most of the students prefer to search in web but do not prefer to study with web based learning.

Another remarkable result is that more than seventy percent of students don't believe that in future, they can use most of the information about PBL subject. Again around sixty percent of students are not sure about usefulness of the PBL subject for their medicine education. On the other hand, some students believe that they have got new information from PBL study but the others are not sure they have got new information or not. At the same time, less than half of the students believe that the new information from PBL is interesting for them.

Since they have a different facilitator for each problem session, the effect of facilitators to learning environments may be varied. Some students say need a facilitator help them when they are solving problems. Some other students believe that their facilitators' help them but about the same ratios of the students say that facilitators do not help them and again others are not sure. Students are not certain about how much their facilitator supported them. At the same time about half of the students are not aware that they can contact with their facilitator outside of PBL session. Another remarkable result is that more than half of the students are uncomfortable when their facilitators observe them during their discussion of a problem with their peers. It can be concluded that because the role of instructors changes, students may not adapt to the new type of instructor.

Whether students want to study with groups, whether they need facilitator's support, whether they combine the different disciplines, whether get new information in PBL applications and integrate prior knowledge or not, they still do not want to study PBL in next years. These results indicate that we should continue to investigate how they adapt to the new approach!

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