STUDENT TEACHERS' ATTITUDES ABOUT BASIC PHYSICS LABORATORY

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ABSRACT
In this study an attitude questionnaire was developed and applied to identify student teachers' interests and attitudes for basic physics laboratory. In physics laboratory practices run by a higher education institution a new attitude questionnaire was developed and applied twice in two terms by researchers to increase student teachers' success during the experimental process was going on. To that end sufficient number of students were interviewed, the findings were supported and the results were discussed. Although these students were successfull in undertaking basic physics laboratory experiments, it was found that the students performed unfavorable attitudes against laboratory experiments. The study was completed by suggesting that students/pupils' interests may be developed at earlier ages .

INTRODUCTION
Some researches emphasize such as [Akgün, 1976; Ayas & Demirbaş, 1997; Nakhleh, 1992: Çepni, 1997] state the difficulty of understanding science (physics, chemistry, etc.) lessons and that express that this concept is prevalent among the students. Some other researches [Hewson & Hewson, 1983; Stavy, 1991; Geban et al, 1998; Sanger, 2000; Weaver, 1998; Çepni et al, 2001; Özmen, 2002], indicating the difficulty of scienctific (physical, chemical, etc) concepts and students' negative attitudes about these concepts, also state the complexity of the topics explained during physics and chemistry lessons and reveal that these lessons require more mental thinking, include more abstract concepts and express the difficulty of understanding more advanced concepts without comprehanding the basic concepts.

This study was designed to identify the possibilty of students' developing negative attitude for physics laboratory experiments too. To do this chemistry attitude questionnaire developed by researchers [Yeşilyurt, 2003; Ayas, 1993; Akdeniz & Karamustafaoğlu, 2002; El-Gendy, 1984], having 0,83 reliability, 0,90 alpha value in the literature and 0,70 reliability calculated by split-half method in Turkey was adapted to physics laboratory.

This attitude questionnaire was designed to identify students' attitudes and to measure students' interest pre and post basic physics laboratory applications [Yeşilyurt, 2003; Ayas, 1993; Akdeniz & Karamustafaoğlu, 2002; El-Gendy, 1984].

METHODOLOGY
An experimental approach was used in undertaking the research. In this study two applications were projected in basic physics laboratory practices; in the first application quasi-experimental method was used because of not choosing experiment and control groups randomly [Özmen, 2002; Yeşilyurt, 2003; Çepni, 2001; Robson, 1998], in the second application randomly chosen experiment and control groups were used in the experimental method.

In the first application again one of the participant researchers executed the practices of basic physics laboratory of the experiment group and two of the lecturers executed the practices of basic physics laboratory of two other control groups. In the second application the above stated participant researcher employed an experimental approach in carrying out the practices of basic physics laboratory in which student teachers were chosen randomly to experiment and control groups.

The practices of experiment groups for basic physics laboratory were completed in both applications by using one of the contemporary laboratory models which is the constructivist model. The practices of control groups of basic physics laboratory were completed by using traditional triangulation method.

SCOPE OF RESEARCH
The student teachers in a higher education (physics, physics education, physics engineering, science education, mathematics education, chemistry education and computer education, etc.) taking basic physics laboratory lessons and basic physics experiments form the participants of the study in Turkey.

SAMPLING

For the first application the study included the student teachers registered with the computer and teaching technology department as experiment group (class 2/A) taught by one of the participant researchers and the student teachers registered with the science teacher education department as control groups (classes 1/A and 1/B) taught by other two lecturers for basic physics lesson laboratory practices.

Table 1. The following table indicates the samplings used

	I. Application 2001-2002	N	II. Application 2002-2003	N
Experiment group	Computer teacher 2/A	42	Science education 1/B and 1/A formal and private departments randomly formed 1st group	50
Control group	Science education 1/A (1st control group)	51	Science education 1/B and 1/A formal and private departments randomly formed 2nd group	51
	Science education 1/B (2nd control group)	50		

For the second application the student teachers registered with the science education (formal and *private departments) were chosen randomly from these two departments first and then they were divided into experiment and control groups for basic physics laboratory practices .*_The students in the formal department pay less tuition fee than those in the private department._ In both applications 5 classes included (244 students) in total.

FINDINGS

Two experimental applications were conducted in order to measure students'interests and attitudes; an attitude test consisting of 34 items was applied to the students in the experiment and control groups and the finding were noted down. Besides this, 14 students were interviewed and this data was tape-recorded.

The findings of the first application

Table 2. The findings of attitude questionnaires before the first application

The scores of attitude questionnaires before the first application											
Experiment group				1st control group				2nd control group			
student numbers and scores				student numbers and scores				student numbers and scores			
D106666	154	D106695	142	K116678	127	K116704	116	K116729	150	K116757	110
D106667	127	D106696	129	K116679	150	K116705	115	K116730	148	K116758	102
D106668	139	D106697	116	K116680	127	K116706	125	K116731	143	K116759	108
D106669	129	D106698	126	K116681	147	K116707	132	K116732	139	K116760	112
D106670	146	D106699	112	K166682	142	K116708	110	K116733	146	K116761	115
D106671	142	D106700	125	K116683	126	K116709	117	K116734	150	K116762	142
D106672	138	D106701	123	K116684	135	K116710	112	K116735	151	K116763	102
D106674	132	D106702	121	K116685	143	K116711	116	K116736	137	K116764	135
D106675	145	D106703	125	K116686	120	K116712	126	K116737	133	K116765	129
D106676	134	D106704	116	K116687	115	K116713	120	K116738	139	K116766	125
D106677	132	D106705	125	K116688	153	K116714	152	K116739	152	K116767	115
D106678	135	D106706	125	K116689	119	K116715	145	K116740	150	K116768	113
D106679	143	D106707	143	K116690	129	K116716	102	K116741	150	K116769	105
D106680	170	D113980	107	K116691	117	K116717	113	K116743	136	K116770	124
D106681	152	D123780	135	K116692	150	K116718	130	K116744	170	K116771	126
D106682	126	D123781	122	K116693	107	K116719	124	K116745	103	K116772	123
D106683	125			K116694	135	K116720	130	K116746	138	K116773	134
D106684	124			K116695	115	K116721	114	K116748	116	K116774	125
D106686	134			K116696	154	K116722	112	K116749	136	K116775	134
D106688	126			K116697	103	K116723	151	K116750	156	K116776	146
D106689	117			K116698	105	K116724	115	K116751	110	K116777	138
D106690	124			K116699	160	K116726	128	K116752	116	K116778	128
D106691	116			K116700	125	K116727	118	K116753	132	K116779	146
D106692	152			K116701	116	K116728	115	K116754	120	K116780	115
D106693	110			K116702	140	K107208	125	K116755	104		
D106694	126			K116703	108			K116756	121		

Mean		130.7		Mean		126.1		Mean		129.9	

In order to determine these students' interests for physics laboratory chemistry and physics attitude tests developed by researchers [Özmen, 2002; Yeşilyurt, 2003; Ayas, 1993; Akdeniz & Karamustafaoğlu, 2002; El-Gendy, 1984; Akdeniz & Karamustafaoğlu, 2001] and included 34 items (see Appendix 1) were adapted to physics laboratory and applied to experiment and control groups before undertaking laboratory experiments. The findings of these tests were recorded in Table 2 in 2001-2002 calender year (at the beginning of the autumn term).

After transforming negative scores into positive scores, questionnaires were assessed and noted down by using the Quintet Likert scale [Özmen, 2002; Ayas, 1993; Akdeniz & Karamustafaoğlu, 2002; El-Gendy, 1984; Akdeniz & Karamustafaoğlu, 2001].

According to attitude questionnaire students had positive attitude towards physics laboratory pre-laboratories studies (experiment group mean: 130.7 control groups means: 126.1 and 129.9).

Table 3. The findings of attitude questionnaires (*F* test) before the first application

	N	Mean	Standard deviation	*F*	*P*	SD
Experiment group	42	130,714	13,0109	1,303	,275	140
1st control group	51	126,098	15,0735			
2nd control group	50	129,960	16,6512			
Experiment group	1st control group				,306	
	2nd control group				,969	
1st control group	Experiment group				,306	
	2nd control group				,403	
2nd control group	Experiment group				,969	
	2nd control group				,403	

As seen from table 3, there was no significant difference before application among the attitudes of groups towards physics laboratory [$F(42,51,50) = 1.303$ $p>0.05$]. The interests of groups included in this study towards physics laboratory were equal to one another. In the above stated table *P* means importance level and *SD* means degree of freedom.

Physics laboratory attitude questionnaire consisting of 34 items were applied to the students formed groups to idenfy their interests and attitudes after making laboratory experiments.

After transforming negative scores into positive scores, in this study questionnaires were assessed and noted down by using the Quintet Likert scale. According to attitude questionnaire students had quite negative attitude towards physics laboratory after laboratories studies (experiment group mean decreased from 130.7 to 98, control groups means decreased from 126.1 to 100.2 and from 129.9 to 98.9) (see Table 4).

Table 4. The findings of attitude questionnaires after the first application

The scores of attitude questionnaires after the first application											
Experiment group				1st control group				2nd control group			
Student numbers and scores				Student numbers and scores				Student numbers and scores			
D106666	104	D106695	121	K116678	96	K116705	105	K116729	100	K116757	80
D106667	72	D106696	82	K116679	105	K116706	105	K116730	122	K116758	82
D106668	119	D106697	83	K116680	88	K116707	112	K116731	119	K116759	100
D106669	109	D106698	120	K116681	117	K116708	90	K116732	119	K116760	92
D106670	83	D106699	85	K166682	105	K116709	87	K116733	123	K116761	105
D106671	112	D106700	87	K116683	86	K116710	102	K116734	108	K116762	72
D106672	61	D106701	129	K116684	105	K116711	66	K116735	130	K116763	75
D106674	119	D106702	89	K116685	113	K116712	106	K116736	121	K116764	105
D106675	74	D106703	80	K116686	102	K116713	100	K116737	97	K116765	109
D106676	81	D106704	126	K116687	107	K116716	82	K116738	91	K116766	80
D106677	105	D106705	70	K116688	126	K116717	103	K116739	106	K116767	95

D106678	115	D106706	84	K116689	107	K116718	102	K116740	114	K116768	83
D106679	123	D106707	103	K116690	109	K116719	78	K116741	103	K116770	84
D106680	94	D113980	87	K116691	107	K116721	98	K116743	121	K116771	106
D106681	91	D123780	85	K116692	120	K116722	85	K116744	104	K116774	105
D106682	106	D123781	117	K116693	89	K116724	100	K116745	83	K116775	109
D106683	105			K116694	124	K116726	108	K116746	112	K116776	112
D106684	102			K116695	88	K116727	98	K116748	100	K116777	105
D106686	105			K116696	108	K116728	75	K116749	68	K116778	101
D106688	91			K116697	83	K107208	105	K116750	79	K116779	106
D106689	91			K116698	95			K116751	80		
D106690	128			K116700	109			K116752	79		
D106691	96			K116701	102			K116753	112		
D106692	125			K116702	120			K116754	96		
D106693	91			K116703	98			K116755	83		
D106694	63			K116704	96			K116756	75		
Mean		98		Mean		100.2		Mean		98.9	

Table 5. The findings of attitude questionnaires (*F* test) after the first application

	N	Mean	Standard deviation	*F*	*P*	SD
Experiment group	42	98,0000	18,5696	,228	,797	131
1st control group	46	100,261	12,7757			
2nd control group	46	98,9348	15,7355			
Experiment group	1st control group				,781	
	2nd control group				,959	
1st control group	Experiment group				,781	
	2nd control group				,915	
2nd control group	Experiment group				,959	
	1st control group				,915	

As seen from table 5, there was no significant difference after application among the attitudes of groups towards physics laboratory [$F(42,46,46) = .228$ $p>0.05$]. The interest levels of groups from the first questionnaire were the same. After constructivist model was applied to experiment group, it was found that there was no significant difference among the interest levels of groups. However when the findings of the previous and last were compared, it was seen that the students in experiment and control groups developed negative attitudes against physics laboratory.

The interest mean of experiment group decreased from 130.7 to 98, the interest means of control groups decreased from 126.1 to 100.2 and from 129.9 to 98.9. In the above stated table *P* means importance level and *SD* means degree of freedom.

Findings of the second application

The attitude questionnaire (see Appendix 1) was applied to groups of the second application before undertaking laboratory experiments. The findings of these tests were recorded in 2002-2003 calender year (at the beginning of the autumn term). The same tests were applied again to the same groups at the end of the second term (spring term) and their final attitudes for physics laboratory were recorded in Table 6 in the same year.

Table 6. The findings of attitude questionnaires before the second application

Experiment group Student numbers and scores						Control group Student numbers and scores					
D1	126416	135	D27	126972	142	K1	126414	126	K27	126971	110
D2	126421	127	D28	126974	129	K2	126415	136	K28	126973	102
D3	126422	139	D29	126975	116	K3	126417	156	K29	126980	128
D4	126423	129	D30	126976	154	K4	126418	121	K30	126982	142
D5	126425	146	D31	126978	107	K5	126419	126	K31	126983	115
D6	126426	142	D32	126979	139	K6	126420	132	K32	126984	142

D7	126427	154	D33	126981	129	K7	126424	140	K33	126986	102
D8	126429	127	D34	126985	146	K8	126428	104	K34	126987	155
D9	126433	139	D35	126990	142	K9	126430	145	K35	126988	129
D10	126435	129	D36	126991	138	K10	126432	139	K36	126989	125
D11	126437	146	D37	126992	106	K11	126434	152	K37	126993	115
D12	126438	142	D38	126995	136	K12	126436	162	K38	126994	133
D13	126439	116	D39	126996	156	K13	126440	150	K39	126997	105
D14	126441	136	D40	126977	101	K14	126443	136	K40	126998	124
D15	126442	156	D41	126999	116	K15	126445	170	K41	127000	136
D16	126444	110	D42	127001	132	K16	126448	103	K42	127004	136
D17	126446	116	D43	127002	120	K17	126450	138	K43	127005	156
D18	126447	132	D44	127003	127	K18	126453	126	K44	127008	110
D19	126451	120	D45	127006	139	K19	126457	136	K45	127009	136
D20	126452	104	D46	127007	109	K20	126458	156	K46	127010	132
D21	126454	107	D47	127011	146	K21	126459	125	K47	127013	120
D22	126462	124	D48	127012	142	K22	126460	116	K48	127014	104
D23	126463	116	D49	127017	138	K23	126461	132	K49	127016	142
D24	126464	152	D50	127015	132	K24	126465	140	K50	127019	115
D25	126455	110				K25	126968	104	K51	127020	150
D26	126969	106				K26	126970	121			
	Mean				130,04		Mean				130,51

After transforming negative scores into positive scores, in this study questionnaires were assessed and noted down by using the Quintet Likert scale. According to attitude questionnaire students had quite positive attitude towards physics laboratory pre-laboratories studies (experiment group mean: 130.04 control group mean: 130.51).

Table 7. The findings of attitude questionnaires (*t* test) before the second application

Last Test	N	Mean	Standard deviation	*t*	*P*	SD
Experiment group	50	130,04	15,3250	14	,88	99
Control group	51	130,51	17,2097	5	5	

As seen from table 7, there was no significant difference among the attitudes of groups towards physics laboratory [$t(48,50) = ,885$ $p>0.05$]. The interests of groups included in this study towards physics laboratory were equal to one another in the first questionnaire. In the above stated table *P* means importance level and *SD* means degree of freedom.

Table 8. The findings of attitude questionnaires after the second application

	Experiment group				Control group			
	Student numbers and scores				Student numbers and scores			
D1	126416	100	126972	123	126414	102	126971	102
D2	126421	122	126974	108	126415	120	126973	107
D3	126422	119	126975	130	126417	98	126980	126
D4	126423	119	126976	121	126418	96	126982	107
D5	126425	123	126978	97	126419	105	126983	109
D6	126426	108	126979	91	126420	105	126984	107
D7	126427	130	126981	106	126424	112	126986	120
D8	126429	121	126985	114	126428	90	126987	89
D9	126433	97	126990	103	126430	87	126988	124
D10	126435	91	126991	121	126432	102	126989	88
D11	126437	106	126992	104	126434	66	126993	108
D12	126438	114	126995	83	126436	106	126994	83
D13	126439	103	126996	112	126440	100	126997	95
D14	126441	121	126977	100	126443	82	126998	109

D15	126442	104	126999	68	126445	103	127000	96
D16	126444	83	127001	79	126448	102	127004	105
D17	126446	112	127002	80	126450	78	127005	88
D18	126447	100	127003	79	126453	98	127008	117
D19	126451	68	127006	112	126457	96	127009	105
D20	126452	79	127007	96	126458	105	127010	86
D21	126454	80	127011	83	126459	88	127013	105
D22	126462	79	127012	75	126460	117	127014	113
D23	126463	100	127017	80	126461	105	127016	102
D24	126464	122	127015	82	126465	86	127019	107
D25	126455	119			126968	105	127020	126
D26	126969	119			126970	113		
			Mean	101,72			Mean	101,78

After transforming negative scores into positive scores, in this study questionnaires were assessed and noted down by using the Quintet Likert scale. According to attitude questionnaire students had quite negative attitude towards physics laboratory after laboratories studies (experiment group mean decreased from 130.04 to 101.72, control group mean decreased from 130.51 to 101.78) (see Table 8).

Table 9. The findings of attitude questionnaires (*t* test) after the second application

Last Test	N	Mean	Standard deviation	*t*	*P*	SD
Experiment group	50	101,72	17,4871	,02	,98	99
Control group	51	101,787	12,5384	1	3	

As seen from table 9, there was no significant difference among the attitudes of groups towards physics laboratory [$t(50,51) = ,983$ $p>0.05$]. The interest levels of groups from the first questionnaire were the same. After constructivist model was applied to experiment group, it was found that there was no significant difference among the interest levels of groups. However when the findings of the previous and last ones were compared, it was seen that the students in experiment and control groups developed negative attitudes against physics laboratory.

The interest mean of experiment group decreased from 130.04 to 101.72 and the interest mean of control group decreased from 130.51 to 101.78. In the above stated table *P* means importance level and *SD* means degree of freedom.

Finding of interview

In the first application three students from experiment group and three students from control group were interviewed; in the second application four students from experiment group and four students from control group were interviewed and their views of basic physics laboratory were determined.

Six of the students included in the first application were talked about basic physics laboratory practices by using informal interview. The following questions were used and the findings were analysed.

The questions;

that investigates the students' marks from basic physics lesson and its laboratory practice,
that asks if the students employed an experiment abouts physics lessons or not,
that asks if the students believed the necessity of learning by doing experiment or not,
that explores the possibility of taking more physics laboratory lessons if the students have the chance of taking that lesson,
that questions the students' pleasurement if students themselves make physics laboratory experiment,
that asks if the students consider physics laboratory practices as attractive or not,
that asks if the students like making preparation in advance for physics laboratory or not,
that asks if the students like speaking to others about physics laboratory or not,
that asks if the students want to have an education based on physics laboratory or not.

1. Thirteen of the students interviewed stated that they got good marks from Basic Physics Laboratory applications and Basic Physics Lesson.

A student has stated that although s/he got good mark (50 or more scores in last exam) laboratory, that s/he got poor mark (final score is 43) from Basic Physics Lesson.

2. All of the students interviewed stated that they did not do any experiment on physics individualy or in groups during their secondary education.
Yet eight of these students stated that they observed their teacher's demonstration of experiment.
3. The students interviewed stated that they had acquired to have learnt by doing experiment and that believed in the process of physics laboratory practices the necessity of this skill which could not be achieved during their secondary education.
4. Most of the student teachers interviewed stated that they did not want to take more physics laboratory lesson if it were possible.
5. These students also uttered that they liked physics laboratory experiments if they themselves did these experiments.
6. More of the students *expressed that physics laboratory was not attractive.*
7. More of the students stated *that they did not do any preparation for physics laboratory in advance.*
8. *Most of the students expressed that they did not like talking about physics laboratory with others.*
9. *Twelve of the students interviewed stated that they did not want to have an education based on phsiys laboratory.*
Other two students stated inrelevant expressions about this subject.

As summary it was determined that the students who succeeded mostly had negative opinion against physics laboratory had had very few interest for physics laboratory during secondary education.

DISSCUSSION
In the first application there was no significant difference before application among the attitudes of groups towards physics laboratory [$F(42,51,50) = 1.303$ $p>0.05$]. Similarly, in the first application there there was no significant difference after application among the attitudes of groups towards physics laboratory [$F(42,46,46) = .228$ $p>0.05$]. Accoding to the findings of initial and last attitudes of groups included in the same application, their levels of interest for physics laboratory were equal pre and post-study in the study.

In the second application there was no significant difference before application between the attitudes of two groups towards physics laboratory [$t(50,51) = ,885$ $p>0.05$]. In the second application there was no significant difference after application between the attitudes of two groups towards physics laboratory [$t(50,51) = ,983$ $p>0.05$]. Accoding to the findings of initial and last attitudes of groups included in the second application, their levels of interest for physics laboratory were equal pre and post-study in the study.

That is, the findings of attitude questionnaire indicated no significant difference among groups and it might be claimed that this finding could be generalised. Yet, although there were no differences among the five groups of two applications, negative attitude developtment and negative attitude changes were seen in the students' behaviours compared to previous attitudes after the laboratory applications. From these findings it could be claimed that students may have developed some negative attitudes against physics laboratories themselves without having any connection with the new model (the constructivist laboratory model) used in the experiment groups and this finding could be generalised.

According to the findings of interviews conducted after the applications of attitude questionnaire, it could be claimed that some negative attitudes against physics laboratory may have developed without having any connection with constructivist model.

RESULTS
For the first application an attitude questionnaire at the beginning and at the end of 2001-2002 academic years, for the second application an attitude questionnaire at the beginning and at the end 2002-2003 academic years were applied and some results were found by analysing data.

1. There was no significant difference among the attitudes of groups [$F(42,51,50) = 1.303$ $p>0.05$] before the first application, in same way there was no significant difference among the attitudes of groups [$F(42,46,46) = .228$ $p>0.05$] after the application too,
2. There was no significant difference between the attitudes of groups [$t(50,51) = ,885$ $p>0.05$] before the second application, in same way there was no significant difference between the attitudes of groups [$t(50,51) = ,983$ $p>0.05$] after the application too,
3. Altough there were no differences among the attitude of groups, the students had negative attitude development after laboratory studies compared to their previous attitudes. Besides, according to students' attitudes they had before taking physics laboratory lessons, the negative attitudes developed after laboratory

experiments may have developed towards physics laboratory itself without having any connection with constructivist laboratory model,

4. The findings in the part three showed that the students who had not had the ability of learning by doing experiment at high schools did not like Basic Physics Laboratory based on doing experiment at the university,

5. As it is seen in this study although their success is higher, the reason for having negative attitude towards physics laboratory was that they did not take physics laboratory lesson which includes learning through experiment in the early phase of their education.

As seen from the findings of the interviews and attitude questionnaire it was found that although there was no significant difference among application groups, they did not like Basic Physics Laboratory contains learning through experiment.

SUGGESTIONS

The following suggestions can be posed with the hope that students' interest and attitude against physics laboratory in the early phase of their education may be constituted. Students themselves must do the practices of science, physics, chemistry and biology laboratory and develope the ability of learning via experiment at secondary educations. In-service cources on physics educations must be organised by either local education authority (LEA) in cities or by the ministry of educations (MOE) centraly. The teachers teaching physics lessons at the secondary education must participate in-service cources from time to time to increase their abilty and knowledge of physics.

Considering the statements of students about not doing laboratory in science lessons and not doing any experiment that student teachers should be provided with private laboratory training. Student to be teachers should have been graduated by having the ability of learning by doing. To increase students' interest higher education basic physics laboratory experiments and basic physics lessons should be taught successively.

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Appendix 1.
PHYSICS LABORATORY ATTITUDE QUESTIONNAIRE
The following scale was designed to learn your thoughts. Choose only one item from each statement. Correct answer of each statement changes from person to person. So the answer you choose must reflect your views. Read each statement carefully and tick off your choice.
1 means never
2 means partly
3 means undecided
4 means sometimes
5 means agree
Male Female Age:

		1	2	3	4	5
1	Physics laboratory does not frighten me					
2	Physics laboratory lesson is among my likes					
3	I like to study physics laboratory lesson in advance					
4	I will use the things learnt during physics laboratory in my life					
5	I feel tense while studying physics laboratory					
6	I feel confortable when I solve a new problem in physics laboratory					
7	Trying to understand physics laboratory experiments is waste of time					
8	There is no incentive side of physics laboratory studies					
9	It is worth doing to learn physics laboratory experiments					
10	It is not attractive to solve physics laboratory problems					
11	Facing problems in physics laboratory, I try to solve them until I find the answer					
12	I do not understand why some students enjoy physics laboratory					
13	I do not take physics laboratory lesson if it is optional					
14	While studying physics laboratory, I do not want to stop studying it					
15	I usuly take high marks from physics laboratory examinations					
16	I am not worried about studying physics laboratory					
17	I think that I can not do physics laboratory experiment by myself					
18	Succeeding in physics laboratory lesson is important for me					
19	I rely on my knowledge about physics laboratory lesson					
20	I enjoy talking about physics laboratory with others					
21	I enjoy physics laboratory lesson					
22	I do not want to hear even the name of physics laboratory					
23	I do not want to take physics laboratory lesson					
24	Tha lessons other than physics laboratory are more important for me					
25	The topics in the physics laboratory confuse my mind					
26	Physics laboratory is a boring lesson					
27	Physics laboratory is one of the frightening lessons					
28	I feel helpless while studying physics laboratory					
29	Physics laboratory is not an interesting lesson for me					
30	I would take more physics laboratory if I had that opportunity					
31	I enjoy doing physics laboratory experiment by myself					
32	Physics laboratory becomes more enjoyable if teachers do experiment					
33	I hate physics laboratory lesson					
34	I want to have an education based on physics laboratory					