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DETERMINING AND COMPARING THE PHYSICS ATTITUDE STATE AT A SOCIAL SCIENCE HIGH SCHOOL: AN EXAMPLE OF DENIZLI IBRAHIM CINKAYA SOCIAL SCIENCE HIGH SCHOOL

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ABSTRACT: The purpose of this study is to investigate and determine the Physics Attitude Level of Social Science Secondary High School students, to compare them based on gender and grade variables and to determine correlation between physics achievement and physics attitude. The sample of the study was selected as an accessible population by using sample of convenience way. It covers 409 students of preparatory, ninth, tenth and eleventh grade levels, 246 were female and 163 were male, attending at Social Science Secondary High School in Denizli. Survey method, the most common descriptive study methods of quantitative approach, was used. There was only one instrument to get data, Physics Attitude Questionnaire, consisting of thirty questions. It was applied to subjects and analyzed with SPSS 17.0. In the analysis of the data, independent sample t-test for comparisons based on gender and class variable, one way ANOVA test for comparisons based on class variable and Pearson correlation were used. As a result of the study, average level of physics attitude was found at all the grade levels. According to gender variable, significant difference was found in favor of boys in general and for ninth and tenth grade levels. According to class level variable, significant difference was found between both eleventh and ninth and eleven and preparatory grade levels in favor of preparatory and ninth grades. In addition to them, correlation between physics achievement and physics attitude was found significant in general and for ninth grade students.

Key words: Physics attitude, social science high school, gender, class level

INTRODUCTION

Personal attitude level of a person plays very significant role in his or her interest and response to science and technology issues (OECD, 2013). Therefore, one of the major goals of physics education is to support students' motivation (Peşman, 2012), because interest is an important for deep conceptual understanding and students have some problems with physics lessons (Çapri, 2013). The less interest students have towards science, the less motivation they have and the less successful they are. If students are interested and motivated in learning physics, it may improve their learning of science (Peşman, 2012).

Nowadays, because of technological developments and advances, science and technology have a significant effect on people's living and lifestyle. This shows us how much the science and science education are important for the people's daily life. In every aspects of daily life, people can see the effects of technology and science on their living, because science, especially physical science, not only provide these technological advances and devices for us but only provides us to understand these technological developments, our world we are living on and events.

Science and its applications have particular value in improvement of both the quality of personal life and communities (OECD, 2013). So students have to get some scientific knowledge and skills to understand the life and use their knowledge of science related to science and technology. The main purpose of physical science education is to make people see the science everywhere in their living, understand the life is physics itself, solve problems by using scientific methods and foster scientifically literate person (MEB, 2011; MEB, 2013). In order to reach aims and gains above, physics lessons are to be made more understandable and effective. It mostly depends on students' interest and attitude (Nalçacı, Akarsu and Kariper, 2011), because attitude is one of the most important factors that has an important effect on the students' success in physics (Çapri, 2013).

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However, education is a lasting process in order to shape pupils' behavior and attitudes (Korur, 2001). Therefore, investigation of attitude level may be a good guide to make school education more effective and fruitful. This research aims at developing physics teaching by determining and showing attitude level and the relationship between achievement and attitude.
The purpose of this study is to investigate and determine the Physics Attitude States of Social Science High School students and compare them based on gender and class level variables and investigate correlation between physics achievement and physics attitude.

METHODS

This research is a quantitative research. In the research, the questionnaire method which is one of the mostly used methods is used for data collection (Fraenkal, Wallen and Hyun, 2012).

Problem Statement

What are the physics attitude levels of Social Science High School students and correlation between physics achievement and physics attitude?

Research Group

The accessible population of the study is decided as all the students at Denizli İbrahim Cinkaya Social Science High School. The sampling method is convenience sampling. The research group is a total of 409 students including 246 girls (60,1%) and 163 boys (39,9%). They are from four classes of preparation, ninth, tenth and eleventh grades. Number of the female students is higher than number of the male students. Descriptive statistics are shown at Table 1 below.

Table 1. Participants Of The Research Group

Variables		F	M	N	%
Grades	Preps	76	40	116	28,4
	9	68	50	118	28,9
	10	56	32	88	21,5
	11	46	41	87	21,3
TOTAL		246	163	409	100%

In the research, convenience sampling technique, which is one of the nonrandom sampling methods, is used to determine accessible population which is reachable (Fraenkel, Wallen and Hyun, 2012).

Data Collection Tool

Physics Attitude Questionnaire

In the research, Physics Attitude Questionnaire, which was developed by Nalçacı, Akarsu and Kariper (2011) and has Cronbach Alpha relability coefficient ,940, was used as data collection tool. In the research Cronbach Alpha reliability coefficient was found as ,923. It consists of twelve negative and eighteen positive totally thirty five-point likert type questions. In the questionnaire, "Absolutely Agree", "Agree, "Undetermined", "Disagree", "Absolutely Disagree" expressions were used. Scores for positive attitude items are scored as 5 for "Absolutely Agree", 4 for "Agree", 3 for "Undetermined", 2 for "Disagree" and 1 for "Absolutely Disagree". For negative attitude items, scoring is done reversely.

After the participants were informed about the importance of the research and application and sincerely given answers were wanted from the students, students were given 15-20 minutes to answer the questionnaire.

Data Analysis

After the application process, questionnaires were checked one by one and erroneous or incomplete data sets were removed and discarded. Remaining data sets were analyzed by SPSS 17.0 packet program. In order to make necessary decisions, one way ANOVA, independent sample t-test and Pearson correlation were used.

RESULTS AND FINDINGS

The results and findings of the research are presented here.

Results For Gender Variable

In this part data is analyzed in terms of gender differences at two parts. First part is about Physics Attitude Questionnaire and the second part is about physics achievement.

Physics Attitude Questionnaire

To determine the significance of the difference of means of Physics Attitude Questionnaire points in terms of gender variable, independent samples t-test is used. Firstly data is analyzed in terms of all students at school in general and secondly in terms of grade levels.

The result of the independent samples t-test in terms of all the students at school in general is given at Table 2 below.

Table 2. T-test For Gender Variable For All Students

Gender	N	X	S. D.	T	df	p
Female	246	2,79	,715	-2,531	407	,012*
Male	163	2,97	,655			

** The mean difference is significant at the level ,05*

As it is seen at Table 2, the difference between the means of Physics Attitude Questionnaire points in terms of gender variable is found significant in favor of male students (p<,05). That means, boys have significantly higher attitude points than girls at Physics Attitude Questionnaire.

The result of the independent samples t-test in terms of grade levels is given at Table 3 below.

Table 3. T-test For Gender Variable For Grade Levels

Grade	Gender	N	X	S. D.	t	df	p
Prep	Female	76	2,95	,756	-,913	114	,363
	Male	40	3,06	,530			
9	Female	68	2,85	,669	-2,511	116	,013*
	Male	50	3,15	,619			
10	Female	56	2,66	,601	-2,161	86	,033*
	Male	32	2,94	,559			
11	Female	46	2,60	,785	-,438	85	,663
	Male	41	2,67	,783			

** The mean difference is significant at the level ,05*

According to Table 3, the difference between the means of Physics Attitude Questionnaire points in terms of gender variable is found significant for ninth and tenth grade levels in favor of male students (p<,05). That means, boys have significantly higher attitude points than girls at ninth and tenth grades at Physics Attitude Questionnaire.

Physics Achievement

To determine the significance of the difference of the means of first term physics points in terms of gender variable, independent sample t-test is used. Firstly data is analyzed in terms of all students at school in general and secondly in terms of grade levels. At social science secondary high school, only ninth and tenth grades students are studying physics and their first term physics points are taken and used. At preparation and eleventh grade levels, physics is not studied and so there can't be any result and finding about these classes.

Table 4. T-test Of Physics Achievement For Gender Variable For All Students

Gender	N	X	S. D.	t	df	p
Female	124	74,56	9,276	2,693	204	,008*
Male	82	70,94	9,696			

** The mean difference is significant at the level ,05*

The result of the independent samples t-test in terms of all the students at school in general is given at Table 4 below.

According to Table 4, the difference between the means of first term physics scores in terms of gender variable is significant in favor of girls (p<,05). That means, girls have significantly higher attitude score than boys.

The result of the independent samples t-test in terms of grade levels is given at Table 5 below.

Table 5. T-test Of Physics Achievement For Gender Variable For Grade Levels

Grade	Gender	N	X	S. D.	t	df	p
9	Female	68	71,76		1,071	116	,286
	Male	50	73,00				
10	Female	56	74,33		2,970	86	,004*
	Male	32	67,73				

** The mean difference is significant at the level ,05*

According to Table 5, the difference between the means of first term physics scores in terms of gender variable is significant for tenth grade in favor of girls (p<,05). That means, girls have significantly higher attitude scores than boys at tenth grade.

Physics Attitude Questionnaire Results For Grade Level Variable

To determine the significance of the attitude test results in terms of grade levels variable, One Way ANOVA test is used. In order to use One Way ANOVA, firstly the equality of variances was checked by Levene's Statistics. Its result is given at Table 6.

Table 6. Test Of Homogeneity Of Variances

Levene Statistics	df1	df2	p
	163	2,97	,060

According to Levene's Statistics for grade levels, equality of variances is provided (p>,05). After equality of variances is provided, One Way ANOVA test is done. Its result is given at Table 7.

Table 7. One Way ANOVA For Grade Levels

Variables		N	X	S.D.	Df	F	P
Grades	Preps	116	2,99	,064	3 405 408	6,248	,000*
	9	118	2,98	,663			
	10	88	2,77	,599			
	11	87	2,64	,780			

** The mean difference is significant at the level ,05*

According to One Way ANOVA results, average levels of attitude level were found for each class level. The difference among the means of Physics Attitude Questionnaire in terms of grade levels is significant (p<,05). In order to decide the tendency among grade levels, Tukey HSD is used as Post Hoc Test.

Table 8. Multiple Comparisons For Grade Levels

TUKEY HSD		Mean Difference	Std. Error	p
Preps	9	,015	,089	,998
	10	,226	,097	,092
	11	,356*	,097	,002*
9	Preps	-,015	,089	,998
	10	,211	,096	,128
	11	,341	,097	,003*
10	Preps	-,226	,097	,092
	9	-,211	,096	,128
	11	,130	,103	,590
11	Preps	-,356*	,097	,002*
	9	-,341	,097	,003*
	10	-,130	,103	,590

** The mean difference is significant at the level ,05*

Its result is given at Table 8 above.

According to Multiple Comparisons test for grade levels, the difference between prep grade and eleventh grade classes and between ninth grade and eleventh grade classes were found significant in favor of lower grade levels (p<,05). Also it was seen that attitude scores were getting lower when grade levels went up.

Correlation Between Physics Achievement and Physics Attitude

To determine the between physics achievement and physics attitude, Pearson Correlation was used. For this, firstly correlation is measured for all the students at school in general and secondly for grade levels.

Pearson Correlation for all the students at school in general is given at Table 9. According to Table 9, there is a significant correlation between physics achievement and physics attitude (p<,05).

Table 9. Correlation Between Physics Achievement and Physics Attitude

Pearson Correlation	N	p
,148	206	,033*

** The mean difference is significant at the level ,05*

Pearson Correlation for grade levels is given at Table 10.

Table 10. Correlation Between Physics Achievement and Physics Attitude

Grade	Pearson Correlation	N	p
9	,184	118	,047*
10	,073	88	,497

** The mean difference is significant at the level ,05*

According to Table 10, there is a significant correlation between physics achievement and physics attitude for only ninth grade level (p<,05).

CONCLUSION

At İbrahim Cinkaya Social Science Secondary High School, an average level of attitude was found. According to data analysis, for each grade level and for school, students' attitude level is between 2,60 and 3,15 points. Despite it is a social science secondary high school, students have positive ideas about physics course. It may be because they are generally successful and selected students by secondary schools enterance exam and they are really interested in their courses like a science secondary schools.

In terms of grade levels, lower grades have significantly higher attitude scores and the higher grade students are at, the lower points at Physics Attitude Questionnaire they have. Aktamış, Çalışkan and Aktamış (2012) found that attitude level is going down while grade level goes up.

Science education researches show that the gender may have influence on attitude towards science (Demirci, 2004). In this study, in terms of gender variable, male students have higher attitude scores than female students. That means, boys have more positive attitude level than girls at physics lessons. Peşman (2012) revealed clearly that males were observed to have significantly higher levels of attitudes towards physics. It is also found that boys have higher attitude points than girls by some other researches in the literature (Aktamış, Çalışkan ve Aktamış, 2012; Peşman, 2012; Demirci, 2004). It may be because of cultural expectations of parents, teachers and peers on males and females (Peşman, 2012).

Significant correlation is found except for tenth grade level. But in terms of physics achievement, female students have higher achievement points, while male students have higher attitude scores. Keskin (2008) found that there is no significant correlation between achievement and correlation.

RECOMMENDATIONS

In this study, it wasn't possible to make a research at other schools. It may be helpful and meaningful to do this study at different schools and school types.

In the literature, there weren't more studies about attitude and achievement levels in terms of gender difference. It can be studied in order to make clear the relationship between them at different grade levels.

In this study, it wasn't possible to make a research about the reasons of high or low physics attitude levels. It can also be studied in order to make physics courses more likable than now, because everybody may be in the need of knowledge of physics anytime.

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