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The investigate attitude of primary pre-service teachers regarding science and technology laboratory

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Abstract

The aim of this study is to determinate primary pre-service teachers' attitude towards science and technology laboratory respect to the different variables such as gender, grade level, graduation type of high school. The study was carried out during spring semester of 2011 educational periods. The sample of the study consisted of 326 primary pre-service teachers at the Department of Primary Teacher Education in Faculty of Education at Artvin Çoruh University. Survey methodology was used in this study. In the study, science laboratory attitude scale was used as a data collection toll. Primary pre-service teachers' responses to the scale were statistically analyzed according to some variables via SPSS 11.5 software. In the study, some parametric tests such as t-test; one-way analysis of variance (ANOVA) based on p=0.05 significance level were used to clarify the significance of the differences on means. LSD test was used in order to determine source of the differences on means in ANOVA. At the end of study, there is not a significant difference between graduation type of high school and primary pre-service teachers' attitude towards science and technology laboratory, while there are significant differences between gender, grade level and their' attitude.

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Keywords: Science and technology, laboratory, attitude, primary pre-service teachers.

1. Introduction

Science and developing modern technology has been changing the world rapidly. Owing to this fact, the mainly objective of the societies is forming a community which produce technology and knowledge, researcher and have an academicals and researching way of thinking. The most important step in forming the information society requires that new generations be educated in a way which enables them to adapt to the change and development. And this can only be achieved by designing student-centred teaching environments in which students can learn through involving in the activity and experiencing it themselves (Böyük et al. 2010). As laboratories are places where student learn by carrying out and experiencing activities themselves, they are learning environments of highly valuable function in education. Laboratories also contribute to the students in developing their skills such as observation, thinking, interpreting, analyzing data and planning a research (Açışlı 2010). Furthermore scientific studies carried out in laboratories make significant contributions to the development of students' problem solving and psychomotor skills (Azizoglu & Uzuntiryaki, 2006; Hofstein, 2004).

Science education has been developing together with the changing world conditions. Therefore, both creating new teaching environments and choosing methods and materials for the effective learning of the subject as well as

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determining students' attitudes towards science and technology class and scientific experiments carry a great importance (Kaya & Büyük 2010).

In the study, it is aimed to examine the attitudes of primary pre-service teachers regarding science and technology laboratory in terms of gender, grade level and graduation type of high schools. The research plays an important role in determining the attitudes of primary pre-service teachers towards laboratory as they are going to teach science and technology and make use of the laboratories so that they can provide students with more permanent and more effective teaching. The attitude of the pre-service teacher can prove an important factor affecting students' interest and success in science classes

Purpose of the study

The aim of study is to determinate primary pre-service teachers' attitude towards science and technology laboratory respect to the different variables such as gender, grade level, graduation type of high school. In accordance with this objective, the study specifically focuses on the following research questions:

Is there a difference between science and technology laboratory attitudes and genders?
Is there a difference between science and technology laboratory attitudes and grade levels?
Is there a difference between science and technology laboratory attitudes and graduation types of high school?

2. Methodology

Survey methodology was used in this study. The study was carried out during spring semester of 2011 educational periods. The sample of the study consisted of 326 primary pre-service teachers at the Department of Primary Teacher Education in Faculty of Education at Artvin Çoruh University. In the study, science laboratory attitude scale developed by Yalvaç & Sungur (2000) was used as a data collection toll. The scale consists of 16 attributions. Additionally, the reliability coefficient of the questionnaire is 0.91. It's just like five point Likert Type scale and each statement were labeled as 5=strongly agree, 4=agree, 3=undecided, 2=disagree and 1=strongly disagree. Primary pre-service teachers' responses to the scale were statistically analyzed according to some variables via SPSS 11.5 software. In the study, some parametric tests such as t-test; one-way analysis of variance (ANOVA) based on p=0.05 significance level were used to clarify the significance of the differences on means. LSD test was used in order to determine source of the differences on means in ANOVA.

3. Finding

In this part, the data obtained as a result of data collecting tools were analyzed. In order to determine whether primary pre-service teachers' attitude regarding science and technology laboratory scores differed between genders of pre-service teachers, an independent-sample t-test was conducted. The independent-sample t-test scores can be seen in Table 1.

Table 1. Independent sample t-test scores in terms of genders

	Gender					
	Male (n=124)		Female (n=202)			
	$\bar{x}$	sd	$\bar{x}$	sd	*t*	*p*
Liking	14.40	2.27	14.83	1.89	-1,819	.070
Fears	9.69	3.26	10.06	3.15	-,991	.322
Interest	14.44	3.02	15.29	2.27	-2,869	**.004**
Importance	14.20	1.87	14.63	1.52	-2,257	**.033**

The independent-sample t-test scores showed that in terms of gender there are no significant difference between liking and fears sub-scales of attitude scale regarding science and technology laboratory and gender variable (t=-1.819; p>0.05; t=-.991; p>0.05). But there are significant difference between interest and importance sub-scales of attitude scale and gender variable (t=-2.869; p<0.05; -2.257; p<0.05). According to results of study, female pre-

service teachers have more interest and importance regarding science and technology laboratory than male pre-service teachers.

In order to see whether elementary pre-service teachers' attitude regarding science and technology laboratory scores differed in terms of grade level, one-way between-groups ANOVA test was conducted. Table 2 provides the descriptive statistics on grade level.

Table 2. Summary of one way ANOVA on grade level

	Grade Level									
	freshman (n=106)		sophomore (n=110)		Junior (n=74)		Senior (n=36)			
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	F	p
Liking	**15.1**	1.92	14.2	2.26	14.7	1.89	15.0	1.82	3.19	**.024**
Fears	10.1	3.45	**10.2**	2.99	9.87	3.05	8.56	3.05	2.66	**.048**
Interest	**15.5**	2.58	14.6	2.63	14.5	2.80	15.2	1.86	3.13	**.026**
Importance	14.6	1.73	14.3	1.62	14.4	1.71	**14.9**	1.49	1.98	.117

According to the mean scores in Table 2, freshmen pre-service teachers have higher score on liking ($\bar{x}$ =15.02) and interest ($\bar{x}$ =39.85) sub-scales than the others pre-service teachers. Besides, sophomore pre-service teachers have higher score on fears ($\bar{x}$ =10.16) sub-scale than the others pre-service teachers. In addition to, senior pre-service teachers have higher score on importance ($\bar{x}$ =14.94) sub-scale than the others pre-service teachers. As seen result in Table 2, The ANOVA test scores showed that in the term of grade level, there are statistically difference at the $p<.05$ level in linking, fears and interest sub-scales.

In order to find out the source of the differences in pre-service teachers' attitude regarding science and technology laboratory scores in the term of grade level, LSD test was used and scores are shown in Table 3.

Table 3. LSD test scores on grade level

		Liking		Fears		Interest		Importance	
Grade level		Se	p	Se	p	Se	p	Se	p
Freshman	Sophomore	.276	**.004**	.431	.972	.351	**.010**	.226	.114
	Junior	.308	.246	.480	.525	.391	**.011**	.251	.343
	Senior	.392	.962	.611	**.009**	.498	.491	.320	.289
Sophomore	Freshman	.276	**.004**	.431	.972	.351	**.010**	.226	.114
	Junior	.305	.146	.477	.543	.388	.823	.249	.633
	Senior	.390	**.045**	.608	**.009**	.496	.253	.319	**.029**
Junior	Freshman	.307	.246	.480	.525	.391	**.011**	.251	.343
	Sophomore	.305	.146	.476	.543	.388	.823	.249	.633
	Senior	.412	.413	.644	**.043**	.524	.213	.337	.087
Senior	Freshman	.391	.962	.611	**.009**	.498	.491	.320	.289
	Sophomore	.389	**.045**	.608	**.009**	.496	.253	.319	**.029**
	Junior	.412	.413	.644	**.043**	.524	.213	.337	.087

According to the mean scores in Table 3 source of the difference in liking subscale arises from between sophomore pre-service teachers and freshman and senior pre-service teachers. Besides, source of the difference in fears subscale arises from between senior pre-service teachers and freshman, sophomore and junior pre-service teachers. In addition to, source of the difference in interest subscale arises from between freshman pre-service teachers and sophomore and junior pre-service teachers. Furthermore, source of the difference in importance subscale arises from between sophomore and senior pre-service teachers

In order to see whether elementary pre-service teachers' attitude regarding science and technology laboratory scores differed in terms of graduation type of high school, one-way between-groups ANOVA test was conducted.

Table 4. Provides the descriptive statistics on graduation type of high school

	Graduation type of high school									
	AHS (n=98)		ATHS (n=4)		GHS (n=212)		VHS (n=12)			
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	F	p
Liking	14.5	2.07	15.25	.96	14.68	2.07	**15.33**	1.56	.702	.551
Fears	9.83	3.13	9.25	.96	9.92	3.28	**10.83**	2.48	.412	.744
Interest	14.47	2.55	**16.75**	1.26	15.15	2.65	15.25	2.05	2.22	.085
Importance	14.41	1.59	**15.75**	.957	14.51	1.72	13.83	1.47	1.45	.229

AHS: Anatolia high school, ATHS: Anatolia teacher high school, GHS: General high schools. VHS: Vocational high school.

As a seen Table 4, according to graduation type of high school, pre-service teachers graduated vocational high schools have higher score than the others pre-service teachers in linking and fears sub-scales of attitude scale. Besides, pre-service teachers graduated Anatolia teacher high school have higher score than the others pre-service teachers in interest and importance sub-scales of attitude scale. But The ANOVA test scores showed that in the term of graduation type of high school, there are not statistically difference at the $p<.05$ level between pre-service teachers' attitude regarding science and technology laboratory and graduation type of high school variable.

4. Discussion and Conclusion

The aim of study is to investigate primary pre-service teachers' attitude regarding science and technology laboratories respect to the some variables such as gender, grade level and graduation type of high schools. For this aim, it was examined that whether there are effects primary pre-service teachers' gender, grade level and graduation type of high school on their attitude regarding science and technology laboratories.

T-test scores in table 1 showed that while there are significant difference between interest and importance sub-scales of attitude scale and gender variable, there are no significant difference between liking and fears sub-scales of attitude scale regarding science and technology laboratory and gender variable. According to results of study, attitude of female and male prospective teachers liking and fears sub-scales of attitude scale regarding science and technology laboratory are similar. In the literature, it was revealed that there are not a significant difference between attitude of students towards science lesson and science experiments (Yeşilyurt et al, 2005; Kaya & Böyük, 2011; Yalvaç & Sungur, 2000). Another result of this study, female pre-service teachers have more interest and importance regarding science and technology laboratory than male pre-service teachers. It can be thought that The reason why the females scored more than the males from the items for interest and importance sub-scales of the attitude scale can be that the female students were more eager to learn new knowledge and to use this knowledge than males at science and technology laboratory classes.

In the term of grade level, there are statistically difference in liking, fears and interest sub-scales. It was understood that source of the difference in liking subscale arises from between sophomore pre-service teachers and freshman and senior pre-service teachers. According to results, it can be said that sophomore pre-service teachers have less liking towards science and technology laboratories than others. The result was supported study of Demir (2005). The researchers expressed that pre-service teachers' liking towards science and technology laboratories decreased from one to four grades. Besides, source of the difference in fears subscale arises from between senior pre-service teachers and freshman, sophomore and junior pre-service teachers. This result showed that senior pre-service teachers have less fears concerning science and technology laboratories than others. Reasons of this finding might be academicians' attitude towards laboratory activities, quantity of experiment practice. When pre-service teachers practice to many experiment, they remove some deficiencies and concern or fears (Tamir,1996; Altun,1996). In addition to, source of the difference in interest subscale arises from between freshman pre-service teachers and sophomore and junior pre-service teachers. As a result, freshman pre-service teachers have more

interest regarding science and technology laboratories than others. Similar result was expressed by Demir (2005). Demir (2005) asserted that freshman pre-service teachers have more interest than the others. Furthermore, source of the difference in importance subscale arises from between sophomore and senior pre-service teachers. It was seen that senior pre-service teachers have more importance towards science and technology laboratories than sophomore pre-service teachers. The reason for this can be explained as: The 1st grade students, who have just started to attend the university, seem more excited and eager when compared with the students at other levels, and this reflects in their attitudes, while those attending last grade put more importance on subjects, for they know they will soon be teachers thus feel closer to the working life.

According to graduation type of high school, pre-service teachers graduated vocational high schools have higher score than the others pre-service teachers in linking and fears sub-scales of attitude scale and pre-service teachers graduated Anatolia teacher high school have higher score than the others pre-service teachers in interest and value sub-scales of attitude scale although But there are not statistically difference between pre-service teachers' attitude regarding science and technology laboratory and graduation type of high school variable. This result, no matter what type of high school they graduated from, can be considered to be a positive result for realizing the aim to train teachers of the similar efficiency. This result was supported study of Yıldız et al (2006).

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