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An Investigation into Prospective Science Teacher' Attitudes towards Laboratory Course and Self-Efficacy Beliefs in Laboratory Use

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ABSTRACT

The aim of the current study is to identify the attitudes towards the laboratory course and self-efficacy beliefs in the laboratory use of prospective teachers who are attending Gazi University Gazi Education Faculty Primary Education Science Teaching program, and to investigate the relationship between the attitudes and self-efficacy beliefs. This descriptive survey study was conducted with 440 prospective teachers in the 2014-2015 academic year, fall term. "Attitude Scale towards Laboratory Lesson" and "Laboratory Self-Efficacy Beliefs Scale" which were developed by Ekici (2009) were used as the data collection tools. Means, lowest and highest scores and standard deviations were employed for the data analysis. Furthermore, independent samples t-test and one way variance analysis (ANOVA) were applied to see whether prospective teachers' attitudes and self-efficacy beliefs differ according to the gender and grade levels. Pearson product-moment correlations were computed to determine the correlation between attitudes and self-efficacy beliefs. SPSS 18.0 was used for the data analysis. Descriptive statistics findings showed that the prospective teachers' attitudes towards laboratory course were positive and self-efficacy beliefs into laboratory use were at a good level. Research findings illustrated that gender had no significant effect on prospective teachers' attitudes towards laboratory course and self-efficacy beliefs. No statistically significant difference was found between the scores of prospective teachers' attitudes towards laboratory course and self-efficacy beliefs in terms of grade levels.

KEYWORDS
Natural sciences, laboratory, attitude, self-efficacy

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Introduction

Laboratories in the field of natural sciences are application areas for the learned theoretical knowledge and physical spaces where meaningful learning

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activities can be carried out (Özdemir & Azar, 2004). Knowledge, skills and attitudes which are targeted to teach learners through laboratory applications are the same with those teachers possess. Science educators claim that laboratory has a central and special role in science teaching and using laboratory activities can provide rich learning outcomes (Hoffstein & Lunetta, 2004). In this regard, the necessity of laboratory applications can be never ignored (Lazarowitz & Tamir, 1994; Wellington, 1998). For this reason, it is suggested that it is favorable to conduct science teaching activities in the laboratories where learning is ensured by doing and experiencing (Güzel, 2001;Yeşilyurt, 2003). However, laboratory use in science teaching cannot be accomplished efficiently because of some reasons such as lack of materials, few class hours, inappropriate environment, lack of knowledge about laboratory use and difficulty of control in the laboratory (Kaya & Böyük, 2011). This situation suggests the question whether one of the reasons of inadequate laboratory use in science teaching can be teachers' attitudes towards laboratory course and their self-efficacy beliefs regarding laboratory use. Teachers' fulfilling competences that teaching profession requires is about their beliefs and self-efficacy that they can perform their tasks and responsibilities (Yılmaz et al., 2004b). Self-efficacy refers to one's beliefs or perceptions regarding the skills and capacity to cope with various issues and to achieve a certain task (Senemoğlu, 2005).

Riggs and Enochs (1990) assert that self-efficacy in teacher education needs to be inherent in the teaching domain instead of general self-efficacy beliefs. Hence, self-efficacy beliefs in the laboratory use, which are supposed to be included within the context of specific self-efficacy, are the beliefs of an individual regarding the efficient use of laboratories (Ekici, 2009). Tschannen-Moran & Hoy (2001) state that teachers' self-efficacy beliefs are related to their achievements, motivation and students' self-efficacy beliefs.

Lewitt (2001) remarks that teachers' beliefs in teaching and learning let them develop attitudes, and teacher beliefs have important roles on the behaviors of learners. Attitudes can be defined as positive or negative behaviors of individuals towards an object, a situation or an event (Turanlı, Türker & Keçeli, 2008). Attitudes are formed as a result of learning process with the experiences in life (Tavşancıl, 2006: 65). From this point, it is crucial to identify prospective teachers' attitudes towards field courses, to find the clues for teaching relevant subjects in his or her teaching life, to solve the possible problems by detecting them at the right time Doğan, 2004) and thus it is important in terms of steering the education programs. Increasing the number of classroom activities and giving priority to the laboratory activities allow students to develop positive attitudes towards science courses (Piburn & Baker, 1993).

As a result of this relationship among attitudes, beliefs and behaviors, any changes in the attitudes can cause changes in the beliefs, behaviors and the context. The studies on self-efficacy beliefs highlight that it is quite important to identify the attitudes and the behaviors formed by these attitudes. While it is evident that teachers with positive self-efficacy beliefs in science adopt learner-centered strategies based on questioning and they have much more positive attitudes towards teaching profession and students, teachers with low self-efficacy beliefs develop negative attitudes towards science teaching because of feeling incompetent to teach science efficiently and hence their students will have negative self-efficacy beliefs in science (Czerniak & Lumpe, 1996; Riggs & Enochs, 1990; Tschannen-Moran et al., 1998). The number and the quality of the

classroom activities such as laboratory applications need to be increased to enhance teachers' self-efficacy beliefs in science teaching (Azar, 2010).

It can be claimed that the related literature is scarce with the research on self-efficacy beliefs especially in the specific domains in our country (science teaching, laboratory, mathematics teaching) (Kaya, Polat, Karamüftüoğlu, 2014; Temiz, 2012; Karakuş & Akbulut, 2010). National literature shows that there have been no studies to investigate the science teachers' self-efficacy beliefs in laboratory use. Moreover, this research has been figured by considering the genders and grade levels of prospective teachers. As gender is one of main variables and its effects are often investigated in the studies on attitudes and self-efficacy, it is also handled in the current study. Similar studies have proven that self-efficacy beliefs improve in time along with the enhancement of experiences and skills (Bandura, 1986). For this reason, grade levels have also been a variable for this study. Various studies have also revealed that there is a positive correlation between attitudes and self-efficacy (Hutzler, Zach & Gafni, 2005; Morgil, Seçken & Yücel, 2004). Therefore, it becomes necessary to examine the relationship between prospective teachers' attitudes towards laboratory course and laboratory self-efficacy beliefs. From this viewpoint, the present study is important in terms of ensuring the effective use of laboratories, an indispensable element of science teaching, by determining the relation between prospective teachers' attitudes and self-efficacy beliefs. Hence, the aim of this study is to identify prospective science teachers' attitudes towards laboratory course and their self-efficacy beliefs, and to probe into this relationship.

Problem Statement

The question of "What are the prospective science teachers' attitudes towards laboratory course and their self-efficacy beliefs in laboratory use?" is the main problem of this research. The other problem statement of the research can be remarked as "What is the correlation between prospective science teachers' attitudes towards laboratory course and their self-efficacy beliefs in laboratory use?".

Aim of the Study

It has been aimed to find out the relationship between prospective science teachers' attitudes towards laboratory course and their self-efficacy beliefs regarding laboratory use. On the basis of this aim, the following questions seek for answers.

1. What are prospective science teachers' attitudes towards laboratory course?
2. What are their self-efficacy beliefs in laboratory use?
3. Do their attitudes towards laboratory course and laboratory self-efficacy beliefs vary according to the gender and grade levels?
4. What is the correlation between their attitudes towards laboratory course and their laboratory self-efficacy beliefs?

Methodology

Research Design

This research is a descriptive survey study. According to Karasar (2005), survey studies are research approaches that aim at describing an already existing situation today or in the past as it is. By using this method, the current study

tried to find out the relationship between prospective science teachers' attitudes for laboratory course and their self-efficacy beliefs in laboratory use.

Participants

The sampling of this study consisted of total 440 prospective teachers attending the 1st grade (N=119), 2nd grade (N=115), 3rd grade (N=124) and 4th grade (N=82) undergraduate programs of Primary Education Science Teaching Department at Gazi University Gazi Education Faculty. 350 (80%) of the participants were females and 90 (20%) were males.

Data Collection Tools

Quantitative data collection tools of this study are as follows:

Attitude Scale towards Laboratory Lesson

"Attitude Scale towards Laboratory Lesson" (ASLL) developed by Gülay Ekici (2009) was used to determine prospective science teachers' attitude levels towards laboratory course. The questionnaire comprises of total 21 items - 11 positive and 10 negative items. KMO (Kaiser-Meyer-Olkin) value of the questionnaire was computed as 0.88 and Barlett Test value was 3367.79. Cronbach-Alpha value for the whole questionnaire was found as 0.93. The analysis showed that reliability coefficient of the questionnaire varied between 0.72 and 0.93 as determined for general and sub-scales. Cronbach-Alpha value for the pleasure dimension was 0.90, for the reliability dimension was 0.80, and Cronbach-Alpha value for the prominence dimension was 0.72.

Laboratory Self-Efficacy Beliefs Scale

"Laboratory Self-Efficacy Beliefs Scale" (LSEBS) developed by Gülay Ekici (2009) was used to determine prospective science teachers' self-efficacy beliefs regarding laboratory use. The scale is designed as 5-point likert-type with two factors, Personal Factors and External Factors (Factors Based on the Atmosphere-Students). While the first factor includes 8 items, the other one consists of 10 items. KMO (Kaiser-Meyer-Olkin) value of the questionnaire was 0.86 and Barlett Test value was 3027.11. Cronbach-Alpha reliability coefficient of the whole questionnaire was computed as 0.90. Cronbach-Alpha reliability coefficient for the dimension of personal factors was 0.90 and it was 0.85 for the dimension of external factors.

Data Analysis

The objective of the current study is to identify prospective science teachers' attitudes towards laboratory course and their laboratory self-efficacy beliefs, and to examine the correlation between these two concepts thoroughly. Data were analyzed by using standard deviations, the highest and lowest scores, and means. Moreover, independent samples t-test and one-way variance analysis (ANOVA) were employed to see whether prospective teachers' attitudes and self-efficacy beliefs vary according to the gender and grade levels. To describe the correlation between attitudes and self-efficacy beliefs, Pearson product-moment correlation coefficient test was used. SPSS 18.0 was applied for the data analysis.

Findings and Discussion

This study aims at investigating prospective science teachers' attitudes against laboratory course and their self-efficacy beliefs in laboratory use, and

finding out the relationship between these two notions. On the basis of this target, the findings of the sub-questions are presented in tables and they are discussed in detail.

Table 1. Descriptive Statistical Findings of the Prospective Science Teachers' Attitude Scores towards Laboratory Course and Laboratory Self-Efficacy Belief Scores

	N	Lowest score	Highest score	x	ss
Scores of Attitudes towards Laboratory Course	440	70	101	85.44	7.40
Scores of Laboratory Self-Efficacy Beliefs	440	56	88	74.94	7.409

According to Table 1, the average score of prospective teachers' attitudes towards laboratory course is 85.44, standard deviation is 7.40, the highest attitude score is 101 and the lowest attitude score is 70. The attitudes of student teachers towards laboratory course are at a "positive" level. Average score of prospective teachers' self-efficacy beliefs in laboratory use is computed as 74.94, standard deviation is 7.409, the highest belief score is 88 and the lowest belief score is 56. As a result, prospective teachers' self-efficacy beliefs regarding laboratory is at a "good" level.

The following hypotheses are established to find out whether the attitudes of prospective science teachers towards laboratory course and their laboratory self-efficacy beliefs change according to their genders.

Null hypothesis: H0: Prospective science teachers' attitudes for laboratory course and their laboratory self-efficacy beliefs are not significantly different according to their genders.

Alternative Hypothesis H1: Prospective science teachers' attitudes for laboratory course and their laboratory self-efficacy beliefs are significantly different according to their genders.

Table 2 presents the independent samples t-test results to indicate whether prospective science teachers' attitudes towards laboratory course and their laboratory self-efficacy beliefs vary according to their genders.

Table 2. T-test results of the Scores of Attitudes towards Laboratory Course and Laboratory Self-Efficacy Beliefs

	Gender	N	x	ss	sd	t	p
Attitude	Female	350	85.75	7.305	438	1.724	.085
	Male	90	84.24	7.684			
Self-Efficacy Belief	Female	350	75.07	7.416	438	.732	.465
	Male	90	74.43	7.402			

Table 2 indicates that attitude scores of prospective science teachers regarding the laboratory course are not significantly different according to the gender. t-test results proved the null hypothesis, which claimed no significant difference for prospective science teachers ASLL scores according to the gender, instead of alternative hypothesis, $t(438)=1.724$, $p=.085>.05$. Average scores of female and male student teachers' attitudes for the laboratory course are $X=85.75$ and $X=84.24$ respectively. As a result, it can be asserted that gender does not

have an important role on prospective teachers' attitudes towards laboratory course as the average scores of female and male student teachers are close to each other. As shown in Table 2, prospective science teachers' laboratory self-efficacy belief scores are not significantly different according to the gender. t-test results verified the null hypothesis instead of alternative hypothesis, which claims that prospective teachers' LSEBS scores are significantly different according to the gender, $t(438)=.732$, $p=.465>.05$. Average scores of female and male student teachers for the laboratory self-efficacy beliefs are respectively X=75.07 and X=74.43. On the basis of these findings, it can be argued that gender has no role on prospective science teachers' self-efficacy beliefs in laboratory use as there is no significant difference in statistics and the average scores of female and male student teachers are close to each other.

Table 3 shows the descriptive statistics results regarding prospective science teachers' attitudes towards laboratory course and their laboratory self-efficacy beliefs according to grade levels.

Table 3. Descriptive Statistics Results Regarding Prospective Science Teachers' Attitude Scores towards Laboratory Course and Their Laboratory Self-Efficacy Belief Scores According to Grade Levels

Grade levels	Variable	N	*x*	ss
1st grade	Attitude	119	69.73	4.091
	Self-efficacy belief	119	74.82	7.364
2nd grade	Attitude	115	81.42	4.620
	Self-efficacy belief	115	76.31	6.087
3rd grade	Attitude	124	82.98	5.127
	Self-efficacy belief	124	77.33	6.952
4th grade	Attitude	82	87.30	3.087
	Self-efficacy belief	82	78.62	6.350

When the descriptive statistics results regarding the attitude scores towards Laboratory Course and laboratory self-efficacy belief scores are analyzed in Table 3, it is clear that these scores are respectively 119, 115, 124 and 82 according to the 1st, 2nd, 3rd, and 4th grades. ASLL average scores and standard deviations of the 1st, 2nd, 3rd and 4th grades are respectively 69.73 and 4.091; 81.42 and 4.620; 82.98 and 5.127; 87.30 and 3.087. It can be asserted that the 1st grade student teachers have the lowest average score for the attitude and they are followed with the 2nd, 3rd and 4th grades statistically. As pointed out in Table 3, LSEBS average scores and standard deviations of the 1st, 2nd, 3rd and 4th grade student teachers are 74.82 and 7.364; 76.31 and 6.087; 77.33 and 6.952; 78.62 and 6.350 respectively. In a similar vein, the 1st grade student teachers have the lowest self-efficacy belief average scores and the 2nd, 3rd and 4th grades follow the line. It is clear that average scores related to prospective teachers' laboratory self-efficacy beliefs are at a good level and the scores of grade levels are close to each other.

In order to ascertain whether the prospective science teachers' attitudes for the laboratory course and their laboratory self-efficacy beliefs are significantly different according to the grade levels, the following hypotheses are formed.

Null hypothesis H0: Prospective science teachers' attitudes for the laboratory course and their laboratory self-efficacy beliefs are not significantly different according to the grade levels.

Alternative Hypothesis H1: Prospective science teachers' attitudes for the laboratory course and their laboratory self-efficacy beliefs are significantly different according to the grade levels.

One-way variance analysis (ANOVA) is used to see whether prospective science teachers' attitudes for the laboratory course and their laboratory self-efficacy beliefs show changes according to the grade levels.

Table 4. ANOVA Results of Attitude Scores towards Laboratory Course and Laboratory Self-Efficacy Belief Scores According to Grade Levels

	Variance Source	Sum of Squares	Degree of Freedom	Sum of Squares	F	P
Attitude	Within-group	8398,954	436	19,264	316,410	.000
	Between-groups	18285,625	3	6095,208		
	Total	26684,580	439			
Self-efficacy belief	Within-group	19828,780	436	45,479	5,802	.001
	Between-groups	791,575	3	263,858		
	Total	20620,355	439			

As seen in Table 4, there is a significant difference between the laboratory course attitude scores of the groups formed according to the grade levels ($F(3-436)=316.410$, $p<.05$) and laboratory self-efficacy belief scores ($F(3-436)=5.802$, $p<.05$).

When the average scores of the groups and variance analysis results in Tables 3 and 4 are assessed together, it can be concluded that the difference between average laboratory course attitude scores of prospective teachers at different grade levels and laboratory self-efficacy belief scores is significant statistically. Tamhane's T2 test is used in this research to determine the difference among the groups (Table 5).

Table 5. Tamhane's T2 Test Results Regarding the Scores of Attitude Scale towards Laboratory Course According to Grade Levels

	(I)grade level	(J)grade level	Average difference (I-J)	Error	p
Attitude	1	2	-11.69*	.57	.000
		3	-13.25*	.59	.000
		4	-17.57*	.50	.000
	2	1	11.69*	.57	.000
		3	-1.55	.63	.084
		4	-5.87*	.54	.000
	3	1	13.25*	.59	.000
		2	1.55	.63	.084
		4	-4.31*	.57	.000
	4	1	17.57*	.50	.000
		2	5.87*	.54	.000
		3	4.31*	.57	.000

According to Table 5, ASLL average scores of student teachers attending the 1st, 2nd, 3rd and 4th grades are significantly different. The analysis results indicate that there are significant differences between the 1st and 2nd grades [p=.000, p<.05], the 1st and 3rd grades [p=.000, p<.05], and the 1st and 4th grades [p=.000, p<.05]. It is clear that there is no significant difference between the 2nd and 3rd grades [p=.084, p>.05]. Thus, it is seen that the maximum difference for the average scores of the groups is between the 1st and 4th grade levels, and the minimum difference is between the 2nd and 3rd grades. As a result, it can be argued that the higher the grade levels are, the higher the ASLL scores of student teachers are, and this increase is statistically significant.

Table 6 presents the Tamhane's T2 test results regarding the LSEBS scores of prospective teachers according to grade levels.

Table 6. Tamhane's T2 Test Results Regarding the Scores of Laboratory Self-Efficacy Beliefs Scale According to Grade Levels

	(I)grade	(J)grade	Average difference	Error	p
Self-efficacy belief	1	2	-1.48	.88	.442
		3	-2.50*	.92	.041
		4	-3.80*	.97	.001
	2	1	1.48	.88	.442
		3	-1.02	.84	.790
		4	-2.31	.89	.064
	3	1	2.50*	.92	.041
		2	1.02	.84	.790
		4	-1.29	.93	.672
	4	1	3.80*	.97	.001
		2	2.31	.89	.064
		3	1.29	.93	.672

Table 6 highlights that there are significant differences between the 1st and 3rd grades [p=.041, p<.05] and the 1st and 4th grades [p=.001, p<.05] according to average scores of Laboratory Self-Efficacy Beliefs Scale. No significant difference has been detected between the 1st and 2nd grades [p=.442, p>.05], the 2nd and 3rd grades [p=.790, p>.05], the 2nd and 4th grades [p=.064, p>.05), and the 3rd and 4th grades [p=.672, p>.05].

While the maximum difference among the groups is between the 1st and 4th grades and the minimum difference is between the 2nd and 3rd grades, the average difference values are close to each other. On the basis of these findings, it can be suggested that the higher the grade level is, the higher the scores of prospective teachers' *Laboratory Self-Efficacy Beliefs Scale* are, and this increase is not statistically significant.

Table 7 gives the results of Pearson Product-Moment Correlation Test which is conducted to see whether there is a correlation between the prospective teachers' laboratory attitudes and their laboratory self-efficacy beliefs.

As it is clear in Table 7, the correlation between the prospective teachers' attitudes towards laboratory course and their laboratory self-efficacy beliefs is computed as .202. Therefore, it is evident that there is a positive and significant correlation between the prospective teachers' attitudes towards laboratory course and their self-efficacy beliefs in laboratory use (r=0.20, p<0.01). Hence, it can be

claimed that when the prospective teachers' attitudes for the laboratory course gets more positive, their laboratory self-efficacy beliefs get stronger, as well.

Table 7. The Correlation between Prospective Teachers' Attitude Scores towards Laboratory Course and their Laboratory Self-Efficacy Belief Scores

	Attitude		
	N	r	p
Self-efficacy belief	440	.202	.000*

*p< .001

Results and Discussion

The present study investigates the laboratory course attitudes, laboratory self-efficacy beliefs and correlation between these two notions with the participation of 440 prospective teachers attending the undergraduate program of Science Teaching Department at Primary Education, Gazi Education Faculty, Gazi University in the 2014-2015 academic year, fall term. The results of the research have been discussed in the light of the findings. Accordingly, it was concluded that prospective teachers' attitudes for the laboratory course were at a "positive" level and their laboratory self-efficacy beliefs were at a "good" level.

According to Hofstein and Lunetta (2004), laboratory applications provide the students with positive attitudes towards natural sciences and are efficient in the choice of a job related to science. The literature involves research studies (Musheno & Lawson 1999; Ergin, Ünsal, Tan, 2006) which highlight the importance of laboratory applications in order to develop positive attitudes towards science, chemistry and laboratories.

Another finding of the research was that prospective science teachers' attitudes towards laboratory course and their laboratory self-efficacy beliefs are not significantly different according to the gender. This finding indicates that the gender cannot affect enough to make a difference on prospective teachers' attitudes towards laboratory course and their self-efficacy beliefs. Moreover, this difference may be the result of studying with different sampling groups or using different questionnaires. When the literature related to the effect of gender on the attitudes for laboratory course is reviewed, it is possible to come up with the studies having similar findings (Saracaloğlu & Yenice, 2009; Azar, 2010; Taşlıdere & Eryılmaz, 2012). On the other hand, this finding is not compatible with the findings of Demirci's (2004) and Hançer's (2008) research studies. The review of the studies regarding the influence of gender on self-efficacy beliefs shows that there are findings which points out that prospective teachers' self-efficacy beliefs are not significantly different according to gender (Güvenç, 2011; Taşkın & Hacıömeroğlu, 2010; Oğuz, 2012). On the contrary, there are also some research studies which prove that self-efficacy beliefs show significant differences according to gender variable (Demirtaş, Cömert & Özer, 2011; Durdukoca, 2010).

It was also found out that when the grade level gets higher, prospective teachers' attitude scores for the laboratory course rise as well, and this increase is statistically significant. The literature has related studies which share the same results with the current study (Türkmen & Bonnstetter,1999). Özdemir and Azar (2004) assert that senior science teachers have more positive attitudes towards laboratory than novice science teachers. Their positive attitudes, which can be

gained throughout their education at the university, may be the reason for this situation as student teachers are considered to experience the laboratory for the first time at the universities.

The current study also sets forth that the higher the grade levels of prospective teachers are, the higher their laboratory self-efficacy beliefs are, and this increase is not statistically significant. This finding supports the argument that special efficacy beliefs of the individuals increase in time (Bandura, 1994). When the teachers are given the opportunity to learn about and use the laboratory equipment, their self-efficacy beliefs in using the laboratory are enhanced (Yener, Aydın, & Köklü, 2012). No particular changes in prospective teachers' self-efficacy beliefs in the laboratory may be the result of the lack and inefficiency of laboratory courses during their undergraduate education. Although the related literature indicates a positive correlation between the grade levels and self-efficacy beliefs (Durdukoca, 2010; Oğuz ,2012; Bümen & Özaydın, 2013), there are also some other research studies having different findings (İpek & Acuner, 2011; Berkant & Ekici, 2007).

The last finding of the research is that there is a positive and significant correlation between the prospective teachers' attitudes for the laboratory course and their laboratory self-efficacy beliefs. This signifies that attitudes towards the laboratory course are a significant predictor for the self-efficacy beliefs in laboratory use. As a result, it can be asserted that when prospective teachers care for the laboratory course more, they trust in themselves about using the laboratory more, as well. In their study, Kurbanoğlu and Akın (2010) investigate the relationship among prospective teachers' chemistry laboratory anxieties, attitudes and self-efficacy beliefs and conclude that there is a positive correlation between their attitudes and self-efficacy beliefs.

Implications

According to the findings of the present study, the following implications can be suggested for the researchers and practitioners:

- Student teachers developing positive attitudes towards laboratory course during their undergraduate education can take a bright view of experiments and general laboratory applications in their career, and thus meaningful and various learning environments can be created with the increase in the number and quality of experiments.
- When the crucial effect of direct experiences on self-efficacy beliefs is considered, more applications can be included by increasing the number of laboratory class hours to develop prospective teachers' self-efficacy beliefs in laboratory use.
- More importance should be attached to pedagogical content knowledge and subject knowledge to enhance prospective teachers' general attitudes and self-efficacy beliefs.
- Development in the self-efficacy beliefs regarding laboratory use can be ensured by enriching the scientific content of the laboratory course with the activities that can be applied to primary education and associating the course content with the future job career.

- Prospective teachers' attitudes and self-efficacy beliefs can be improved with the support from the faculty and by learning various application samples which makes them not abstain from laboratory courses.
- Research findings can be compared by conducting the current research with different variables and in different laboratory courses.

Disclosure statement

No potential conflict of interest was reported by the authors.

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