



## Scientific Research Competencies of Prospective Teachers and their Attitudes toward Scientific Research

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### ABSTRACT

Present study has been constructed to determine scientific research competencies of prospective teachers and identify the extent of effect of prospective teachers' attitudes toward scientific research and scientific research methods course on their research skills and attitudes towards research. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers' research skills and attitudes toward research, also an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers' skills and their attitudes toward research. In order to obtain the data related to identified sub-problems "Scale for Identifying Scientific Research Competencies" and "Scale for Identifying the Attitude toward Research" have been utilized. Data collection tools were applied to 445 prospective teachers. It has thus been concluded in this study that scientific research methods course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect on the attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

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#### Keywords:

Prospective teachers, scientific research competencies, attitudes toward scientific research.

### 1. Introduction

Dating back to as early as the birth of mankind, there has been an unceasing attempt of construe and comprehend the environment and surrounding events, which in effect introduced a demand for producing scientific knowledge and developing research (Demirtaş, 2014). In modern age witnessing an increased demand and significance of scientific knowledge, there emerges a need for individuals generating and construing knowledge via employing the methods applied to reach scientific knowledge. Türkmen and Kandemir (2011) argue that this is only feasible by raising the kind of individuals who investigate, question, and construe knowledge and generate science via employing scientific research steps and principles. Sönmez (2008) defines science as, "the process of establishing a process on the basis of providing evidence with certain portions of fact and the compilation of dynamic knowledge attained at the end of this process". Reaching scientific knowledge deemed to be the main determinant of personal and social life quality which can only be secured via implementing the kind of research methods compatible with the key principles of

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research (Ural & Kılıç, 2005). Scientific research itself embodies the systematic and planned set of activities manipulated to obtain scientific knowledge (Karasar, 1994; Demirtaş, 2014; Can, 2013).

A closer inspection to the aforementioned definitions reveals that the focal point of science is mental processes, desire to know and presence of knowledge whilst the key objective of scientific research is to search, identify and construe the origins, causes and formation of the phenomenon observed in the universe and our surrounding (Sharp, Peacock, Johnsey, Simon, Smith, Cross et al., 2009).

As agreed, one of the key objectives of modern educational systems is to raise individuals who not merely consume knowledge but can also generate advanced knowledge reflecting their critical, questioning, creative and respectful attitude toward nature and humanity and the kind of individuals endowed with researcher, and scientific attitudes, behaviors and possessing the desire to share their knowledge with the rest of people. These are the kind of qualities that can be listed under scientific attitudes and behaviors (Karasar, 2007). As relevant literature is probed into, it is detected that such attitudes and behaviors are categorized as the most distinct qualities of modern man (Cafoğlu, 1998; Erdoğan, 1998; Genç, 2010). In order to generate scientific knowledge the foremost requirement is acquisition of scientific attitudes and behaviors (Erdem, 2012). Karasar (2007) claims that scientific attitudes and behaviors are investigating the kind of thoughts and behaviors facilitating problem solving, science generating or in a more comprehensive term, practicing of research techniques competencies.

Bökeoğlu and Yılmaz (2005) state that possessing scientific research skills and a positive attitude toward scientific research are inseparable constituents of rising as citizens that exhibit the necessities of modern age. As widely acknowledged, scientific research competencies and positive attitude toward scientific research should not be regarded as qualities of scientists alone and science is not to be generated by scientists only. This competency and attitude must be valued as among the essential features of modern individuals (Köseoğlu, Tümay and Budak, 2008). In that sense one of the most vital tasks of educational institutions is to render contribution in developing scientific perspective, attitude and behaviors of citizens.

There is an urgent need to apply the kind of curricula applicable to developing scientific research skills and positive attitude toward scientific research, but the number of such programs is far below expectations since these programs can be applicable in class only to the extent of perceptions and application skills of teachers, who are the actual implementers of curriculum. Accordingly it is a must to train the kind of prospective teachers, the actual implementers of curriculums aimed at developing scientific research skills of learners and positive attitude toward scientific research, who are personally endowed with scientific attitudes and behaviors (Türkmen and Kandemir, 2011). Irrespective of this agreement a number of relevant literature studies manifested that teacher's lack adequate knowledge on scientific process skills, which in effect culminated the emergence of students possessing low levels of scientific process skills (Karlı, Şahin and Ayas, 2009; Türkmen and Kandemir, 2011). Türkmen and Kandemir (2011) in their work attested that teachers lack adequate knowledge on scientific process skills hence students are raised as individuals with low levels of scientific process skills. Echoing results can be traced to the studies conducted by Karlı, Şahin and Ayas (2009), Hazır and Türkmen (2008).

As the relevant literature on the requirements of teaching profession and qualities of teachers is explored, there is a certain emphasis on the quality of possessing research knowledge and skills (Kılıç and Acat, 2007; Kincal, 2004; Şahin, 2011; YOK, 1999). Based on the results obtained from an abundance of studies revealing the determinant effects of teachers' attitudes, behaviors and skill levels on students' performance (Kılıç and Acat, 2007; Oruç and Ulusoy, 2008; Şahin and Altınay, 2009) it is safe to argue that teachers of modern education are undoubtedly required to possess adequate levels of knowledge on scientific researches, skills and positive attitudes. In addition, it is of vital importance to train the teachers, who are the key players in gaining research culture and scientific perspective to society, endowed with a positive attitude toward researches. In an experimental study conducted by Demirbaş and Yağbasan (2005) it is stated that teachers' role-modeling is a practical method in gaining scientific attitudes and skills to students.

In line with this framework, the necessity to integrate into teacher-training curricula the kind of courses that develop a research culture has risen as a requirement, since teachers can only transfer effectively the type of knowledge, skills and attitudes they themselves already hold. Accordingly in teacher-training programs, a set of alterations have been made to gain research competencies and positive attitude toward research. To

address this general objective, courses titled as “Research Techniques”, “Research Methods in Education” and “Research Methods” were integrated into teacher-training programs between years 1982-1997, but in 1997 these courses were crossed. During the 2006-2007 academic term however, they were reintegrated into the curriculums to develop research skills of prospective teachers (YOK, 2007a). It is envisaged that prospective teachers having taken this course shall develop an awareness on the structure of scientific research and scientific methods; generate new perspectives on these methods; identify the problem; make a decision on research model; designate the universe and sampling; develop data collection, analysis, and interpretation skills (YOK, 2007b). In terms of raising teachers possessing scientific research competencies and positive attitudes toward scientific research, it is of grave importance to make the most of scientific research methods course.

Studies in relevant literature can be grouped under two categories: studies to identify scientific research competencies of teachers and prospective teachers and analysis of such competencies with respect to several variables (Demircioğlu, 2006; Şahin and Altınay, 2009; Tekbıyık and İpek, 2007; Büyüköztürk, 1999; Yakar, 2014; Akar, 2007; Nartgün, Uluman, Akın, Çelik and Çevik, 2008; Türkmen and Kandemir, 2011) and studies on the quality of scientific research methods (Nartgün, et al., 2008; Kurt et al. 2011; Tay, Demirci-Güler and Taşdemir, 2009). However in relevant literature there are limited numbers of studies aimed at identifying teachers’ or prospective teachers’ attitude toward scientific researches (Korkmaz, Şahin and Yeşil, 2011).

For the prospective teachers, possessing scientific research skills and positive attitude toward scientific research bears critical importance in utilizing and transferring such skills during their teaching career (Taşdemir, 2013). In relevant literature no studies have been found which analyze prospective teachers’ scientific research skills and attitudes collectively with the effects of scientific research methods on the particular skills and attitudes. Identifying prospective teachers’ scientific research competencies and attitudes toward scientific research and detecting the effectiveness of scientific research methods can also provide vital contributions to raising researcher-teachers of the future.

In line with this framework the main objective of present study is not only to identify prospective teachers’ scientific research competencies and attitudes toward scientific research, but also the effect of scientific research methods course on the research skills of prospective teachers and their attitudes toward research. To address this objective the study aims to seek answers for below-listed questions:

- 1) What is the level of prospective teachers’ scientific research competencies and their attitudes toward research?
- 2) Do prospective teachers’ scientific research competencies change significantly with respect to department variables?
- 3) Does prospective teachers’ attitude toward research change significantly with respect to department variables?
- 4) What is the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers?
- 5) What is the effect of Scientific Research Methods course on prospective teachers’ attitude toward research?
- 6) Does the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers vary significantly with respect to department variables?
- 7) Does the effect of Scientific Research Methods course on the attitudes of prospective teachers toward research vary significantly with respect to department variables?

## **2. Method**

### **2.1. Research model**

In present study descriptive and experimental research models have been employed in tandem. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers’ research skills and attitudes toward research and it is an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers’ skills and their attitudes toward research. As regards experimental dimension of the study, pre-test final-test pattern with no control group has been adopted.

## 2.2. Universe of the study and sampling

With respect to descriptive dimension of the study, students in Balıkesir University, Necatibey Faculty of Education and taking “Scientific Research Methods” course have been selected as the universe of this study. Data collection tools have been applied to 445 prospective teachers randomly selected on the principle of reflecting the universe by the sampling. However, the scales completed by 7 prospective teachers were excluded from the analysis due to some missing personal information. Information on the sampling is listed as below:

Table 1. Universe-sampling Table

Department	Universe	Sampling	Representation rate (%)
Dept. of Teaching Physical Sciences	120	64	53,3
Dept. of Teaching Turkish	130	53	40,8
Dept. of Teaching Computer Education and Instructional Technologies	123	56	45,5
Primary Educatio Mathematics Teaching	169	51	30,2
Classroom Teaching	122	61	50
Teaching Social Sciences	130	63	48,5
Teaching English	95	50	52,6
Preschool Teaching	53	47	88,7
<b>Total</b>	<b>942</b>	<b>445</b>	<b>47.2</b>

Experimental dimension structured to identify the effect of “Scientific Research Methods” course on prospective teachers’ research competency and their attitudes toward research has been conducted during 2013-2014 Academic Year Fall Term among students in Dept. of Teaching Physical Sciences, Primary Education Mathematics Teaching, Dept. of Teaching Turkish, Teaching Social Sciences and Dept. of Teaching Computer Education and Instructional Technologies (CEIT) having taken “Scientific Research Methods” course.

## 2.3. Data collection

In order to obtain the data relevant of identified sub-problems, “Scale for Identifying Scientific Research Competencies” and “Scale for Identifying the Attitude toward Research” have been utilized.

Developed by Doğan, Albayrak and Acar (2007), “Scale for Identifying Scientific Research Competencies” consists of 54 items. Scale items are graded in five-point Likert scale as “Always, Mostly, Occasionally, Rarely, Never”. Grading of scale is; Always= 5, Mostly= 4, Occasionally= 3, Rarely= 2, Never= 1. This data collection tool of Cronbach Alpha internal consistency coefficient was measured as .90 (Doğan, Albayrak and Acar, 2007) and revealed .89 Cronbach Alpha internal consistency coefficient in present study. Since this is a value between “ $0.80 < \alpha < 1.00$ ” it is identified that the scale is “highly reliable” (Kalaycı, 2006).

In order to designate prospective teachers’ attitudes toward research, “Scale for Identifying the Attitude toward Research” adapted into Turkish by Çetin, İlhan and Kinay (2012) has been employed. In the process of adapting into Turkish the scale originally developed by Papanastaiou (2005), the first step has been to analyze linguistic equivalence of the scale. Between the Turkish and English forms of the scale a positive-way, strong and significant relation was detected. Construct validity of the Turkish form of the scale was examined by Exploratory Factor Analysis (EFA). EFA showed that unlike the original form with 5 factors, the scale had a four-factor structure. Cronbach Alpha internal consistency coefficient of the scale was found as .88. Based on these findings it was concluded that the scale was a valid and reliable tool of measurement to designate Turkish college students’ attitudes toward research (Çetin, İlhan and Kinay, 2012). In present

study, Cronbach Alpha internal consistency coefficient of data collection tool was measured as .93. Since this was also a value between “ $0.80 < \alpha < 1.00$ ” the scale was identified as a “highly reliable” scale (Kalaycı, 2006).

As regards descriptive dimension data collection tools were applied to identified sampling. As regards experimental dimension on the other hand, it was conducted at the beginning and final of the course-teaching-process. During the application stage, 306 students took the pre-test and 278 students took the final test. However, since 43 students having taken the pretest did not take the final test, and 10 students having taken the final test but not the pretest, they were excluded from the analysis. Additionally 2 scales from the pretest and 7 scales from the final test were excluded from the analysis due to some missing personal information. Numeric data on the study group regarding the experimental dimension of research are as given below.

Table 2. Numeric Data on Study Group

Department	Pre-test	Final-test
Teaching Social Sciences	44	44
Primary Education Maths Teaching	72	72
Teaching CEIT	45	45
Dept. of Teaching Turkish	34	34
Dept. of Teaching Physical Sciences	66	66

#### 2.4. Data analysis

“Scale for Identifying Scientific Research Competencies” consists of 54 items. Scale items are graded in five-point Likert scale as “Always, Mostly, Occasionally, Rarely, Never”. Grading of scale is; Always = 5, Mostly = 4, Occasionally = 3, Rarely = 2, Never = 1. The scores reflecting prospective teachers’ research competencies have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 5 grades and 4 intervals ( $4:5=0.8$ ) limit intervals were scored within 0.8 interval from 1 to 5 (1.00-1.80 “Never”, 1.81-2.60 “Rarely”, 2.61-3.40 “Occasionally” 3.41-4.20 “Mostly” and 4.21-5.00 “Always”). In the scale, inverse scoring was conducted in the 25, 29, 30-39 intervals and item 46.

“Scale for Identifying the Attitude toward Research” was constructed in 7-point Likert type and responses of participants were scored as; 1 “I absolutely disagree”, 2 “I disagree”, 3 “I partially disagree”, 4 “I am undecided”, 5 “I partially agree”, 6 “I agree” and 7 “I absolutely agree”. The scores reflecting prospective teachers’ attitudes toward research have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 7 grades and 6 intervals ( $6:7=0.85$ ) limit scores were scored within 0.85 interval from 1 to 7 (1.00-1.85 “I absolutely disagree”, 1.86-2.71 “I disagree”, 2.72-3.57 “I partially disagree”, 3.58-4.43 “I am undecided”, 4.44-5.29 “I partially agree”, 5.30-6.15 “I agree” and 6.16-7.00 “I absolutely agree”). In the scale inverse scoring was conducted in the 1, 6, 7, 9-12 intervals and items 16, 18, 23, 25, 26, 28, and 32.

As a result of Kolmogorov-Smirnov test applied to detect if data obtained for descriptive dimension exhibited a normal distribution, it was deemed appropriate to use parametric tests in the analysis of data revealing prospective teachers’ scientific research competencies ( $z=1.096$ ;  $p=.181$ ;  $p>.05$ ). As regards the attitude toward research, Kolmogorov-Smirnov test indicated that in the analysis of data it is more appropriate to apply nonparametric tests ( $z=1.594$ ;  $p=.012$ ;  $p<.05$ ). In the identification of prospective teachers’ scientific research competencies and attitudes toward research, arithmetic mean and standard deviation scores were employed. In order to designate if research competencies varied significantly with respect to department variable “One-Way ANOVA”; and in order to detect within which groups significant differentiation occurred, “Scheffe” test was employed. To see whether attitudes significantly differentiated, “Kruskall Wallis-H analysis” was conducted. To identify the originating source of groups explaining the different attitudes among prospective teachers, Mann-Whitney U test was performed.

As a result of Kolmogorov-Smirnov test applied to detect if data obtained for experimental descriptive dimension exhibited a normal distribution, in the analysis of pre-test ( $z=4.789$ ;  $p=.000$ ;  $p<.05$ ) and final-test ( $z=6.109$ ;  $p=.000$ ;  $p<.05$ ) scores of prospective teachers' scientific research competencies non-parametric tests shall be employed. In the analysis of pre-test ( $z=1.250$ ;  $p=.088$ ;  $p>.05$ ) and final-test ( $z=6.109$ ;  $p=.971$ ;  $p>.05$ ) scores obtained from Kolmogorov-Smirnov test to detect their attitudes toward research, parametric tests were applied. To detect the effect of scientific research methods course on the scientific research competency of prospective teachers and to see if a significant differentiation existed between pre-test and final-test scores of each group, "Wilcoxon signed ranks" analysis for dependent groups was performed. To detect their effect on the attitude toward research and see if a significant differentiation existed between pretest and final test scores of each group, "t-test" for dependent groups was conducted. To see if final test scores related to prospective teachers' scientific research competencies varied significantly with respect to department variable "Kruskall Wallis-H analysis" was applied. To identify if final test scores related to prospective teachers' attitudes varied significantly with respect to department variable "One-Way ANOVA" analysis was put into practice. In the interpretation of collected data, a comparison was made between the experimental and descriptive results to reach indirect suggestions on the permanency of skills and attitudes.

### 3. Results

Results related to Prospective teachers' scientific research competencies and their attitudes toward scientific research are as manifested in Table 3.

Table 3. Prospective Teachers' Scientific Research Competencies and Their Attitudes toward Scientific Research

	N	Min.	Max.	$\bar{X}$	S
Scientific research competency	438	2.23	5.00	3.48	.36
Attitudes toward scientific research	438	2.00	7.00	5.33	.87

As demonstrated in Table3, with a .36 standard deviation the arithmetic mean of prospective teachers' views on their scientific research competencies was detected as  $\bar{X}=3.48$ . According to the obtained value prospective teachers "Mostly" exhibit the kind of behaviors indicating scientific research competency. With a .87 standard deviation the arithmetic mean of prospective teachers' views on their attitude toward research was detected as  $\bar{X}=5.33$ . Based on this score it can be argued that prospective teachers' perception on their attitude toward research is in "I agree" level.

Table 4. Prospective Teachers' Scientific Research Competencies With Respect to Department Variable

	Sum of squares	Sd	Mean square	p	Significant difference
Intergroup	3.52	7	.50	.00	e>d; e>h
Intra-group	54.33	430	.13		
Total	57.84	437			

Obtained findings show that prospective teachers' scientific research competencies with respect to department variable can be ordered from the highest to the lowest as: CEIT (e;  $\bar{X}=3.68$ ), physical sciences (a;  $\bar{X}=3.52$ ) and social sciences (g;  $\bar{X}=3.52$ ), preschool (f;  $\bar{X}=3.48$ ), primary education mathematics (b;  $\bar{X}=3.45$ ), Turkish (c;  $\bar{X}=3.42$ ), English (h;  $\bar{X}=3.41$ ) and classroom teaching (d;  $\bar{X}=3.37$ ). In a different saying it is safe to claim that behaviors indicative of scientific research competencies are occasionally exhibited by

classroom teaching prospective teachers ( $\bar{x}=3.37$ ) while mostly exhibited by prospective teachers from the remaining departments. Table 4 points that there is significant differentiation among departments ( $p=.000$ ,  $p<.05$ ). This difference is in favor of prospective teachers from CEIT department ( $e$ ;  $\bar{x}=3.68$ ), English ( $h$ ;  $\bar{x}=3.41$ ) and classroom teaching ( $d$ ;  $\bar{x}=3.37$ ) department students.

Table 5. Prospective Teachers' Attitude toward Scientific Research With Respect To Department Variable

Department	N	Mean rank	sd	KWH	p	Significant difference
a. Teaching Physical Sciences	64	274,96	7	37.003	.00	a>b; a>c; a>d; a>f; a>h;
b. Primary Education Mathematics Teaching	50	192,56				e>b; e>c; e>d; e>f; e>h;
c. Teaching Turkish	52	175,34				g>c; g>d
d. Classroom Teaching	61	184,51				
e. Teaching Computer Education and Instructional Technologies CEIT	55	268,25				
f. Preschool teaching	47	214,23				
g. Teaching social sciences	59	237,58				
h. Teaching English	50	194,07				

Findings of Table 5 reveal that as prospective teachers' attitude toward scientific research with respect to department variables analyzed the highest mean rank belongs to Teaching Physical Sciences students ( $a$ ;  $\bar{x}=274,6$ ), whilst the lowest mean rank belongs to students in Teaching Turkish department ( $c$ ;  $\bar{x}=175,34$ ). As manifested prospective teachers' attitude toward scientific research with respect to "department" variable differs significantly ( $KWH=37.003$ ;  $p=.000$ ;  $p<.05$ ). A significant difference was detected among the attitudes of prospective teachers studying in the Dept. of Teaching Physical Sciences, Primary Education Mathematics Teaching, Dept. of Teaching Turkish, Classroom Teaching, Preschool Teaching and Teaching English ( $p<.05$ ). A statistically significant differentiation was measured between prospective teachers in CEIT, Primary Education Mathematics Teaching, Classroom Teaching, Preschool Teaching, Dept. of Teaching Turkish and Teaching English; prospective teachers in Department of Social Sciences and Dept. of Teaching Turkish and Classroom Teaching ( $p<.05$ ). This finding can be interpreted as evidencing the deduction that prospective teachers' attitude toward scientific research varies with respect to their department.

Table 6. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers' Scientific Research Competencies

Final-test Pre-test	N	Mean rank	Rank sum	z	p
Negative rank	136	110.59	150040.0	1.684*	.09
Positive rank	125	102.02	19151.0		
Equal	0				

\*Based on negative ranks

As can be witnessed in Table 6, between the scores prospective teachers had before scientific research methods course and the score they receive at the end of course there is a difference in favor of final-test scores but this difference is not significant ( $z=1.684$ ;  $p=.092$ ;  $p>.05$ ). According to these results it can be argued that scientific research methods course has no significant effect in gaining scientific research competencies to prospective teachers.

Table 7. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers' Attitude toward Research

Attitudes toward scientific research	N	$\bar{X}$	S	sd	t	p
Pre-test	261	5.41	.38	260	-38.09	.00
Final-test	261	3.42	.77			

Table 7 displays that scientific research methods course has a negative effect on prospective teachers' attitudes toward research ( $t= -38.094$ ,  $p=.000$ ,  $p <.05$ ). Before the application prospective teachers' previous mean score ( $\bar{X}=5.41$ ) of their attitude toward research significantly regressed ( $\bar{X}=3.42$ ) after taking the course. Correlation between pre-test and final-test scores is .039. However this finding is not indicative that prospective teachers with higher pre-test score does not necessarily receive a high final-test score or prospective teachers' with low pre-test score does not necessarily receive a low final-test score. Nonetheless it indicates that their attitude toward research is somehow affected.

Table 8. With Respect to Department Variable the Effect of Scientific Research Methods Course on Prospective Teachers' Scientific Research Competencies

Department	N	Mean rank	$\chi^2$	p
a. Dept. of Teaching Physical Sciences	66	133.50	1.314	.86
b. Primary Education Mathematics Teaching	72	126.40		
c. Dept. of Teaching Turkish	34	123.15		
d. CEIT	45	132.01		
e. Teaching Social Sciences	44	139.81		

As the mean ranks of groups in Table 8 are examined; the highest mean rank belongs to the final test scores of prospective teachers in department of Teaching Social Sciences ( $\bar{X}=139.81$ ), while the lowest mean rank belongs to the final test scores of prospective teachers in Dept. of Teaching Turkish ( $\bar{X}=123.15$ ). According to these findings no significant differentiation exists among final-test scores related to the effect of scientific research methods course on prospective teachers' scientific research competencies with respect to department variable ( $\chi^2=1.314$ ;  $p=.859$ ;  $p>.05$ ).

Table 9. With Respect to Department Variable the Effect of Scientific Research Methods Course on the Attitudes of Prospective Teachers toward Scientific Research

	Sum of squares	Sd	Mean square	F	p	Significant difference
Intergroup	4.59	4	1.15	8.68	.00	a<b, a<c, a<d, a<e
Intragroup	33.85	256	.13			

Total	38.44	260
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As obtained findings reveal the highest attitude level pertains to prospective teachers in the department of Teaching Social Sciences ( $\bar{x}=3.56$ ), while the lowest attitude level pertains to prospective teachers in Primary Education Mathematics Teaching department ( $\bar{x}=3.21$ ). Table 9 also shows that there is significant differentiation with respect to departments ( $p=.000$ ,  $p <.05$ ). This difference can be seen in favor of prospective teachers from department of Teaching Social Sciences (b;  $\bar{x} = 3.56$ ), Dept. of Teaching Turkish (c;  $\bar{x} = 3.53$ ), CEIT (d;  $\bar{x} = 3.47$ ) and Dept. of Teaching Physical Sciences (d;  $\bar{x} = 3.45$ ) and Primary Education Mathematics Teaching (a;  $\bar{x} = 3.21$ ).

#### 4. Discussion

In present study structured to identify prospective teachers' scientific research competencies and attitudes toward scientific research and the effect of scientific research methods course on their research skills and research attitudes. It has been detected that prospective teachers' "Mostly" exhibited the kind of behaviors indicative of scientific research competency and their attitude toward research was in "I agree" level. On the other hand a study conducted by Büyüköztürk (1999) revealed that participant teachers lacked adequate level of research competencies and similarly a study by Türkmen and Kandemir (2011) posited that teachers lacked adequate level of theoretical knowledge on scientific process skills. The incongruity between the results obtained from studies with similar motives may be attributed to the sampling and timing incompatibility between studies.

Another finding of current study is that the kind of behaviors indicative of scientific research competencies were, compared to prospective teachers in Teaching English and Classroom Teaching, significantly more widely adopted by CEIT prospective teachers. In terms of attitudes toward scientific research, prospective teachers studying in Dept. of Teaching Physical Sciences possessed significantly higher levels of positive attitude compared to prospective teachers from other departments. Akar (2007) in his study manifested that prospective teachers in Classroom Teaching department lacked high levels of scientific process skills. Similar findings on the attitude toward scientific research were also detected in Yakar's (2014) study and it was concluded that pre-service training that prospective teachers in Dept. of Teaching Physical Sciences receive had a positive effect in developing their scientific process skills.

It has been concluded in present study that scientific research methods course posits no significant effect in gaining scientific research competencies to prospective teachers and that this effect showed no difference with respect to departments and on the contrary the course negatively affected prospective teachers' attitudes toward research and that there occurred a difference to the disadvantage of prospective teachers in Primary Education Mathematics Teaching. On the other hand as regards self-competency, Nartgün et al. (2008) identified a difference in favor of prospective teachers having taken the course. In the study of Büyüköztürk (1999) it was manifested that prospective teachers having taken competency-relevant courses, in comparison to the ones not taken the course, proved to be more efficient in research practices. The discrepancy in the results of studies conducted for similar motives might be explained with the differences of research competency related courses in the process dimension.

#### 5. Conclusion and Recommendations

It has been concluded at the end of study that prospective teachers' level of exhibiting the kind of behaviors indicative of scientific research competency was in "Mostly" and their attitudes toward research was in "I agree" level. It has also been detected that behaviors indicative of scientific research competency were significantly more widespread among CEIT (Computer Education and Instructional Technologies) prospective teachers compared to prospective teachers from departments of English and Classroom Teaching and as regards their attitudes toward scientific research, prospective teachers studying in Department of Teaching Physical Sciences held further positive attitudes than the prospective teachers studying in different departments. It has thus been concluded in this study that scientific research methods

course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect on the attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

Based on the deduction that attracting the teacher to research process and allowing personal integration to research activities is the pivotal factor in perpetuating learning activity, it is safe to argue that instead of transferring theoretical knowledge alone more emphasis should be rendered to practice stage in gaining research skills to prospective teachers. Accordingly it becomes feasible to instill the essentials of scientific research methods course and the kind of settings favorable to put into practice their theoretical knowledge could be arranged for prospective teachers. By associating the context of scientific research methods course with real life, the kind of studies in which prospective teachers may utilize their course learning can be designed in the future. Present study could be repeated among wider samplings and varied groups and to obtain more elaborate data, it could be patterned on the basis of qualitative research methods.

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