WESTERN ANATOLIA
JOURNAL OF EDUCATIONAL SCIENCE
http://web.deu.edu.tr/baed
Dokuz Eylul University Institute of Educational Sciences

ISSN 1308 – 8971

Special Issue: Selected papers presented at WCNTSE

DETERMINATION OF THE TEACHER CANDIDATES' ATTITUDES TOWARDS ASTRONOMY

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Abstract

Astronomy has the characteristics of a key which endears science to primary students and develops their science literacy. In addition to that, the most important factor is qualified trained teachers, who have positive attitudes toward astronomy, for effective earth science education. Accordingly, the purpose of this study was to determinate teacher candidates' attitudes towards astronomy from different teacher training programs. For this surveying method study, first grade pre-service science teachers, classroom teachers and social studies teachers who study in a university on west part of Turkey were chosen as sample (N=193). "Survey of Attitudes toward Astronomy" test was applied as data collection tool. Descriptive and inferential statistics (frequency, mean, standard deviation, one-way ANOVA and Tukey HSD test) were used for the data analysis. The results showed that pre-service teachers' attitudes toward astronomy are undecided level. There is a significant differences between pre-service science teachers' and classroom teachers' attitudes scores. It can be concluded that attitudes towards astronomy might changes in terms of the different teacher training program.

Keywords: Astronomy education, attitude toward astronomy, pre-service teachers.

INTRODUCTION

Astronomy is one of the oldest sciences. It has been keeping on its development since ancient times. Many communities, such as Babylonians and Greeks, and many scientists, such as Galileo and Newton, were interested in astronomy. As a result of this exertion, new branches of science have emerged and basic sciences such as mathematics get on with great development (Arny, 1994). At the same time unknown truths that related with universe and life were emerged and thousands new inventions were came into our daily lives thanks to astronomical researches. The times that light contamination did not affect sky observations, astronomers observed night sky with naked eyes and telescopes and they saw thousands stars, planets, moons and comets with admiration (Aslan, Aydın, Demircan, Kırbıyık & Derman, 1996). They recorded movement of celestial bodies periodically and established time measurement system that we use today (Kırbıyık, 2001). All of this events played very important role for cumulating of our knowledge as we call it "science". In

fact that astronomy occurred as a result of curiosity of unknown which placed in human nature and depend on observation that is inseparable part of science. Astronomers who observed sky tried to understand where they fit the astronomical universe and diversity of infinite cosmos (Bixby, 2002). Concordantly, it will be easier that understand to science and how science works for people who have basic astronomy knowledge. As an example of this, when United State of America get behind space run, they set up an education curriculum integrated with astronomy for science education. In Turkey, the formerly astronomy was a compulsory course in secondary education. After the 1974, it removed among compulsory courses and became an elective course (Tunca, 2002). Nowadays, astronomy topics take place in the scope of life and social science, science and technology and social science curriculums in Turkish primary syllabus.

Therefore, pre-service science and technology, classroom and social science teachers should have proficiency of both knowledge and attitudes toward astronomy. Not only the teacher candidates who have positive attitude toward astronomy learn better astronomy topics but also teach better astronomy to students. And an addition to that, they can use astronomy as a key for science education. In this context the purpose of this study is to determine the level of pre-service teachers' attitude towards astronomy.

METHOD

The surveying method research was carried out with the participation of first grade pre-service science and technology, classroom and social science teachers (N=193, 114 female and 79 male) who study in a university on west part of Turkey. "Survey of Attitudes toward Astronomy" test which was developed by Zeilik, Schau and Mattern (1999) was used for identify the pre-service teachers attitudes towards astronomy (see Appendix A). It has 34 questions and was translated into Turkish with taking expert opinions. Each item is on a five-point Likert scale (Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, and Strongly disagree = 1). In addition, negatively phrased questions were reverse-coded during data analysis. Reliability coefficient (Cronbach's Alpha) of original survey was 0.86 for the pre-test and 0.92 for the post-test (Zeilik, Mattern, Hall, Teague & Bisard, 1997). For the current study, the Cronbach's alpha was calculated 0.79. Descriptive and inferential statistics (frequency, mean, standard deviation, one-way ANOVA and Tukey HSD test) were used for the data analysis. The means which calculated with obtained datas were organized (5-1=4, 4/5=0.80) as "1.00-1.80; strongly disagree", "1.81 - 2.59; disagree", "2,60 – 3,39; neither agree nor disagree-undecided", "3,40 – 4,19; agree" and "4,20 – 5,00; strongly agree". A $p < 0.05$ result was considered significant.

FINDINGS

The findings are presented below. According to Table 1, the means of pre-service science teachers' (N=90), pre-service classroom teachers' (N=52) and pre-service social studies teachers' (N=51) attitudes scores are respectively *3,3104, 3,1222,* and *3,1701.* It indicated that they were undecided level (2,60 – 3,39; neither agree nor disagree-undecided) attitudes toward astronomy.

Table 1. Descriptive statistics of total attitudes scores for different teacher training programs.

Program	N	M	SD
Pre-service Science Teachers	90	3,3104	0,41565
Pre-service Classroom Teachers	52	3,1222	0,46995
Pre-service Social Studies Teachers	51	3,1701	0,47291
Total	193	3,2226	0,45402

Besides, the figure 1 shows that mean of pre-service science teachers' attitudes scores (M=3,3104) is the most highest score between all of three programs. One-way ANOVA used for the purpose of investigating significant differences between teacher candidates' programs and mean of attitudes scores. Before this analysis, test of homogeneity of variances was used and it was found that data groups were homogeneous (p>,05).

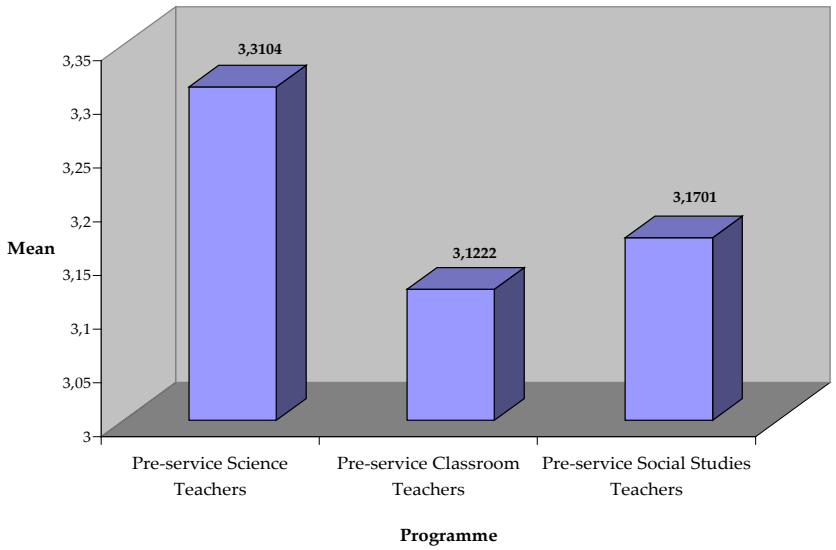

Figure 1. The means of attitude scores according to different teacher training programs.

One-way ANOVA (see Table 2) identified significant differences ($F_{(2,190)}$= 3,380, p<.05). Post-hoc analysis was conducted to see where the specific differences. Tukey HSD was used as a post-hoc test. Tukey HSD results indicated that there were significant differences between pre-service science teachers' (N=90, M=3,3104, SD=0,41565) and pre service classroom teachers' (N= 52, M= 3,1222, SD= 0,46995) total attitude scores.

Table 2. One-way ANOVA comparison between programs and total attitude scores

	Sum of Squares	df	Mean Square	F	p
Between Groups	1571,687	2	785,843		
Within Groups	44179,619	190	232,524	3,380	,036
Total	45751,306	192			

DISCUSSION

As a result of this research, pre-service teachers have mid-level (undecided) attitudes toward astronomy. Within these scores, pre-service science teachers have the highest mean of attitudes scores and pre-service classroom teachers have relatively the lowest mean of attitudes scores. Consequentially, there were significant differences between pre-service science teachers' and pre-service classroom teachers' total attitude scores. It can be concluded that attitudes towards astronomy might changes in terms of the different teacher training program. This finding is consistent with Ucar and Demircioğlu (2011), who concluded that most science courses are taken by preservice teachers in the last two years as part of the program requirements, so by that time there are not many factors affect students' attitudes towards science and astronomy.

In another similar reported by Zeilik et. al.'s (1997) which took place in U.S.A showed that undergraduate students' attitudes toward astronomy were slightly positive. Accordingly, Zeilik and Morris (2003) conducted another research with undergraduate students in U.S.A. and reported strong positive attitude toward astronomy and science. These results are different than the current study. Hence it can be concluded that the attitude towards astronomy may changes in terms of the different cultures and gave an idea how close the society to the science is.

CONCLUSION

As a consequence of this study, pre-service teachers do not have proficiency of attitudes toward astronomy. Adequate level of attitude toward astronomy is a precondition for effective astronomy education. Therefore, the education activities must begin especially with observational activities like sky observation with naked eye. Curiosity and interest of pre-service teachers should be increased. For future studies, activities which improve attitudes toward astronomy can develop and research for their efficiency.

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APPENDIX A

Survey of Attitudes Toward Astronomy

The questions below are designed to identify your attitudes about astronomy and science. The item scale has 5 possible responses; the responses range from 1 (strongly disagree) through 3 (neither agree nor disagree) to 5 (strongly agree). Please read each question. From the 5-point scale mark the response that most clearly represents your agreement with the statement. Use the entire 5-point scale. Try not to think too deeply about each response; there are no correct or incorrect answers.

1. Astronomy is a subject learned quickly by most people.	1	2	3	4	5
2. I will have trouble understanding astronomy because of how I think.	1	2	3	4	5
3. Astronomy concepts are easy to understand.	1	2	3	4	5
4. Astronomy is irrelevant to my life.	1	2	3	4	5
I will get frustrated going over astronomy tests in class.	1	2	3	4	5
6. I will be under stress during astronomy class.	1	2	3	4	5
7. I will understand how to apply analytical reasoning to astronomy.	1	2	3	4	5
8. Learning astronomy requires a great deal of discipline.	1	2	3	4	5
9. I will have no idea of what's going on in astronomy.	1	2	3	4	5
10. I will like astronomy.	1	2	3	4	5
11. What I learn in astronomy will not be useful in my career.	1	2	3	4	5
12. Most people have to learn a new way of thinking to do astronomy.	1	2	3	4	5
13. Astronomy is highly technical.	1	2	3	4	5
14. I will feel insecure when I have to do astronomy homework.	1	2	3	4	5
15. I will find it difficult to understand astronomy concepts.	1	2	3	4	5
16. I will enjoy taking this astronomy course.	1	2	3	4	5
17. I will make a lot of errors applying concepts in astronomy.	1	2	3	4	5
18. Astronomy involves memorizing a massive collection of facts.	1	2	3	4	5
19. Astronomy is a complicated subject.	1	2	3	4	5
20. I can learn astronomy.	1	2	3	4	5
21. Astronomy is worthless.	1	2	3	4	5
22. I am scared of astronomy.	1	2	3	4	5
23. Scientific conclusions are rarely presented in everyday life.	1	2	3	4	5
24. Scientific concepts are easy to understand.	1	2	3	4	5
25. Science is not useful to the typical professional.	1	2	3	4	5
26. The thought of taking a science course scares me.	1	2	3	4	5
27. I like science.	1	2	3	4	5
28. I find it difficult to understand scientific concepts.	1	2	3	4	5
29. I can learn science.	1	2	3	4	5
30. Scientific skills will make me more employable.	1	2	3	4	5
31. Science is a complicated subject.	1	2	3	4	5
32. I use science in my everyday life.	1	2	3	4	5
33. Scientific thinking is not applicable to my life outside my job.	1	2	3	4	5
34. Science should be a required part of my professional training.	1	2	3	4	5