The Effects of the Levels of Scientific Processing Skills of the Students of Classroom Teachers Department on Laboratory Attitudes and Science Achievement

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Abstract

The purpose of the present study is to investigate the relation between the scientific processing skill levels of the teacher candidates of Classroom Teachers Department and their laboratory attitudes and science achievements. For this reason, "Scientific Processing Skill Test" and "Laboratory Attitude Test" were applied to the second grade students of InonuUniversity, Education Faculty, Class room Teachers Department.The data were evaluated by using the SPSS 16.0 Program. The results showed that there is a significant relation between the laboratory attitudes, scientific processing skills, and science achievements of the students.

Keywords: LaboratoryAttitude, Scientific Processing Skills, Science Education, Science Achievement

1. Introduction

In today's information and technology age where scientific knowledge has increased by doubling, technological innovations have advanced rapidly, and where the influences of science and technology have become evident in all aspects of our lives, science and technology education plays a key role in the information and technology age in terms of the future of societies (Kandemir, 2012).

In the primary education process, science lessons are at the forefront among the lessons in which the child learns the environment, natural events and scientific developments with basic concepts, principles and generalizations. Depending on this, the child acquires the problem-solving skills through scientific method process.

For this reason, when science lessons are planned, developing the scientific process skills must be cared for as well as developing the phenomenal knowledge (Serin, 2005).

Scientific process skills are among the basic skills, which facilitate the learning in science, enable students to be active, develop taking responsibility feeling in their own learning activities, increase the permanence of learning, and make them acquire research methods (Aktaş, 2016).

In our present day, new methods and processes are focused on to enable students to be active in the learning environment and to construct scientific concepts as meaningful elements in the mind instead of traditional learning methods.

The Laboratory Method is undoubtedly one of the most effective among these methods used in science education. As a teaching method, the Laboratory Method is extremely important in that it enables users to learn permanently, and allows students to work individually or in groups (Akpullukçu, 2010).

For this reason, it is also important to establish new teaching media in the developed training programs that are developed in a constant manner, to select proper materials and methods for effective learning, and to determine of the attitudes of students towards science and technology lessons and science experiments. It was reported in previous studies that attitudes are the best predictors that might be used in predicting the achievements of students.

To enable students to develop positive attitudes, it has been reported in previous studies that planning, organizing and implementation of activities are necessary (Kaya, 2011).

2. Method

2.1. The Study Desing

The screening model, which is one of the quantitative research methods, was employed in the present study. The study was conducted with 104 (71 female, 33 male) students.

2.2. The Sampling of the Study

In the present study, the "Scientific Processing Skill Test", which was adopted into Turkish by Özkan et al. (1994) consisting of 36 questions, was applied to measure the scientific process skills of the students of Inonu University, Faculty of Education, Classroom Teachers Department, Second Year students and the "Laboratory Attitude Test", which was developed by Polat et al. (2015), was used to measure the laboratory attitudes of the students.
The "Scientific Processing Skill Test", which was employed as the data collection tool, consisted of 36 questions with 6 sub-groups (Table 1).

Table 1. Scientific Processing Skill Test Sub-groups

Sub-groups	Item Count
Establishing Hypothesis	7
Interpretation of the Data	5
Using the Data and Establishing Models	4
Doing Experiments	3
Making Operational Definitions	5
Defining and Checking the Variables	11

The laboratory attitudes were measured with the Attitude Scale, which was in the form of 5-Point Likert Scale and which consisted of 19 items. The science achievements of the teacher candidates were measured with the average grades of them at end-of-the-year science and technology laboratory classes.

3. Findings

The following results were obtained in the analyses that were made by examining the responses of the classroom teacher candidates to the measurement scale (Table 2)

Table 2. Relationship Between Science Achiment, Scientific Process Skills and Laboratory Attitudes

	Science Achievement	Scientific Process Skills	Laboratory Attitudes
FB-Pearson	1	,245	,225
Correlation C.	85	,024	,38
Significance Level		85	,85
BIB-Pearson	,245	1	,140
Correlation C.	,024	85	,201
Significance Level	85		85
LT- Pearson	,225	,140	1
Correlation C.	,038	,201	85
Significance Level	86	85	

4. Result

The most important target of education must be teaching students how to acquire and process information. Teaching scientific process skills was emphasized in previous studies in achieving this target. To increase the quality of life and standard, every individual must be able to use these skills in every stage of daily life (Çelik, 2013). To be able to raise individuals who are able to establish cause-effect relations and who can make right decisions on their own, which is one of the basic targets of the science education, learning must be changed from simple knowledge transfer to producing. This is only possible by ensuring that students are given information on scientific methods and are taught how to think on these (Steffe and Gale, 1995).

Knowing laboratory attitudes of students is important in forming new teaching methods that might improve the scientific process skills of students. A total of 104 students who were studying at the second grade of Classroom Teaching Department, were included in our study to determine the relation between science process skills and laboratory attitudes of classroom teacher candidates. As a result of the Regression Analysis which was made between the laboratory attitudes and Scientific Processing Skills of the teacher candidates, a positive correlation was found. The relation between laboratory attitudes and science achievements was found to be positive at significant level. The relation between science achievements and Scientific Processing Skills was found to be also positive at a significant level. It is considered that the high scientific process skills of the teacher candidates, who show high attitude towards laboratory method, which is one of the important methods in science teaching, made us consider that the students that are going to be raised by these teacher candidates will be affected at a positive way.

5. Discussion

The results obtained in the context of the study findings showed that there is a significant and positive relation between the laboratory attitudes, Scientific Processing Skills and science achievements of teacher candidates.
This finding, which we faced at the end of our study overlap with the findings of the study that was conducted by Doğruöz (1998) in which he reported that the science achievement scores of the students, to whom traditional method was applied, were lower than the science achievements of the students who were taught with scientific process skills, and the interest of the students who were taught with scientific process skills in science lessons was statistically more, and showed more positive attitudes towards science.

Again, in line with the results of our study, Özdemir (2004) conducted a study and evaluated the success, scientific process skills, and attitudes towards scientific knowledge levels of the study and control groups. He reported that the study group to which the laboratory method, which was based on scientific process skills were applied showed positive added values compared to the control group.

Aydoğdu (2006) conducted a study and investigated the relation between the scientific process skills of primary school 7^{th} grade students at science and technology lessons, and examined the effects of teachers' using scientific process skills in classrooms on demographic characteristics of the students, and reported similar results which supported the results of our study. As a result of this study, Aydoğdu found that the scientific process skills of the students were low, there was a positive relation between the scientific process skills and their academic achievements, their attitudes towards science, and the interest of the families; and reported that the scientific process skill levels of the students differentiated at a statistically significant level according to variables like the frequency of students in using scientific process skills in classrooms, the educational level of parents, and whether or not they had a computer of their own.

Harlen (1999) stated in his study that scientific process skills were helpful in the understanding of Physical Sciences by students, scientific process skills might be criteria to determine the understanding of Physical Sciences, and claimed that the viewpoint that the knowledge was based on mere memorization in Physical Sciences could be eliminated by teaching scientific process skills. These results are consistent with the results of our study.
In line with the present study of ours, Downing and Filer (1999) conducted a study on teacher candidates who would be appointed as teachers in primary schools, and found a positive relation (r=.39) at a significant level between the scientific process skills and the science attitudes of the candidates.

The study that was conducted by Lee (1993) on scientific process skills supports the results obtained in our study. In this study, Lee analyzed the relation between scientific process skills and science attitudes of 1486 science teacher candidates, and found a positive relation at a significant level (r=.21).

In 2014, Meriç and Karatay conducted a study on $7^{th}$and 8^{th}grade students and reported that there was a linear relation between the academic achievement levels and the acquisition levels of scientific process skills. This result confirms the results of our study.

Şentürk and Dündar (2017) conducted a study on primary school 4^{th} and 5^{th} grade students, and determined positive and moderate-level significant relations between the belief of the students in science and their scientific process skills, which is consistent with the results of our study.

Ünaldı Özlem (2012) conducted a doctorate thesis study on primary school 7th grade students, and showed that the science education practice, which was based on scientific process skills, changed the attitudes and scientific process skills of students towards science and technology lessons in a positive way.

Temiz, Taşar and Tan (2006), conducted a study and defined the scientific process skills as the basic skills facilitating the learning in Physical Sciences, providing research methods, enabling students to be active, developing the taking responsibility sense on their own, increasing permanence of learning.

Böyük et al. (2011) conducted a study and stated that scientific process skills were an important tool for students to learn the ways to access information and to understand scientific studies; and was an important target for students to acquire in science education.

In our study, the fact that there was a positive and significant relation between the laboratory attitudes and Scientific Processing Skills and science achievement of the teacher candidates is consistent with the results of previous studies in the literature.

We believe that the students in the primary and secondary education should be provided with the medium in which they can use the Scientific Processing Skills in science lessons and in science laboratory practices.
We believe that positive contributions may be made to the science education by including lessons intended to develop scientific process skills in students, and by improving the scientific process skill levels, and based on this, the laboratory attitudes of teacher candidates by employing various education methods.

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