

Effects of Inquiry Based Learning Approach on Creative Thinking and Scientific Process Skills

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Summary

A constructive framework leads teachers to create an environment, which allows them and their students to question themselves, ask questions, make research and facilitate comprehension. How can teachers influence students while they are creating new information and are changing existing concepts? Teachers can have this influence by encouraging the students to observe the nature, interact with the nature and question the nature (Smith et al., 1993). Scientific research refers to scientists' way of learning the natural world and children's best way of learning the science (Brunner, 1960). In other words, if students carry out scientific practices according to the inquiry-based teaching and learning philosophy, they reach better meanings about the structure of science and become more interested in science (Roth, 1992). Making inquiries help students pose suitable questions, seek answers for them and solve the problems they encounter in daily life (Germann, 1994). Two individuals may not comprehend the same concept in the same way. They can confirm the phenomena they perceive through inquiries to this end. Inquiry-based learning provides the teachers and students with the opportunity of making inquiries about the natural world and using the evidence, they obtained in order to test these perceptions (Alouf&Bentley, 2003).

This study was carried out in order to examine the effects of inquiry-based learning approach on creative thinking and scientific process skills of preservice science teachers. It was conducted in the 3rd grade teaching technologies and material development course of the Department of Science Education in the education faculty of a state university in Turkey in the fall term of 2013-2014 academic year. Semi-experimental pattern with experimental and control groups was used in the research. The number of students included in the study group is 92 in total. While 45 of them are included in the experimental group, 47 of them are included in the control group. Average scores of previous terms were compared and it was indicated that the groups are equal. The study was carried out by the researcher in both groups for 12 weeks and whether there were significant differences among the creative thinking levels and scientific process skills of the student group receiving education on the basis of the program prepared by using inquiry-based learning approach and of the student group receiving education via traditional teaching method was examined.

In the research, Torrance Creative Thinking Test (TYDT) and Scientific Process Skill (BSB) Test were used as data collection tool. TYDT can be applied on age groups ranging from kindergarten to university. The test which merely consists of a paper-pencil test with no additional study has a verbal form and a figure form. These forms are separate and measure different dimensions of creativity. TYDT has 10 activities in total, seven of them in the verbal form and 3 of them in the figure form. In this study, TYDT figure form A was used (Korkmaz, 2002). According to Gerald Halpen et al., this tool is adequately reliable and valid. The test was translated into Turkish by Aksu and reliability and validity tests were performed. Reliability was calculated with test-retest method (Cited by Korkmaz, 2002). 30 minutes were given for the application of the test and it was carried out as pretest and posttest by the researcher. Data were evaluated by the researchers. Reliability coefficient of the test for this study is 0.92.

The scientific process skill test used as data collection tool in the study was originally developed by Enger and Yager (1998). Test was translated into Turkish by Koray, Özdemir,

Presley and Köksal (2007) and reliability test was performed. The test originally consists of thirty six items. Following the exclusion of five items with low reliability levels in the analyses carried out via Itefan program, the test consisted of thirty one items. Scope validity of the test was maintained through expert opinions and KR 21 reliability coefficient was determined to be 0.81. Pilot study of the test was applied by the researcher and KR 21 reliability coefficient was found to be 0.83 in the reliability study.

t-test analysis for independent groups was used in order to examine whether there were differences in the creative thinking levels and scientific process skills between of the students of the experimental group where inquiry-based learning approach was applied and of the control group where teaching methods and techniques of the curriculum were applied. t test for dependent groups was used in order to reveal whether there were differences in the creative thinking levels and scientific process skills within the students of experimental and control groups prior to and after the experiment. SPSS package program was used in the analysis of the data.

At the end of the analyses, it was concluded that inquiry-based learning approach had no significant impact on creative thinking levels but had positive impact on the scientific process skills of the students.

This study and other similar studies make us think that the use of methods and techniques which have recently been popular and are known as student-centered teaching methods in science education will enable the preservice teachers to be already informed about these methods when they enter the profession and to use them.