An Evaluative Study of Social Learning Theory Based Scientific Attitudes on Academic Success, Gender and Socio-economical Level

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Abstract

In this study, the results of educational activities based on social learning theory in improving scientific attitudes among primary school students were investigated. An experimental and control group design was used with students who attended 7th grade classes at three different schools. By determining two control groups, the teacher effect was minimized. In the experimental group, social learning theory based activities were carried out; however, in the first and second control groups, activities in the curriculum of science lessons were given. The data were gathered by administering the scientific attitude inventory, academic success test, and socio-economic level inventory as pre-and-post tests along with a permanency test. The results showed that educational activities based on social learning theory were more effective in improving students' scientific attitudes. Moreover, academic success was an important variable in the process of evaluating scientfic attitudes; but gender and socio-economical levels were not.

Key Words

Social Learning Theory, Scientific Attitudes, Science Teaching.

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Science education must contribute not only to students' cognitive developments but also their affective developments. Therefore, activities concerning the programs must be prepared with the consideration of objectives related with cognitive, affective, and psychomotor domains. However, it can be seen that activities are usually done heavily based on cognitive objectives, wheras neglecting affective and psychomotor domains (Akbaş, 2004; Selvi, 1996). Moreover, curriculum prepared for students usually focus on the cognitive learning and mostly exclude affective domain and its effectiveness (Bacanlı 1999; Bilen 2001).

Science as a subject at schools makes positive contributions to the development of students and provides permanency of their interest and desire to learn. The first level that students face with science is thorough basic activities during their primary school years. During this period, students should be helped to love science as a field, notice the basic principles of scientific method, develop permanency of interest and desire to learn, acquire the scientific process skills, and be provided with facilities to decide an appropriate field of study related with science (Bıkmaz, 2001). The evaluation of success in scientific teaching and learning is made through positive changes in behaviors. Therefore, behaviors are defined during teaching plans and goals are formed accordingly.

The Use of Social Learning Theory in Science Teaching for Acquisition of Scientific Attitudes

When studies related with attitudes in science teaching examined, it can be seen that attitudes toward science and scientific attitude have been the focus (Byrne & Johnstone, 1998; Koballa, 1988). Başaran (1978) describes scientific attitude as the separation of individuals between the problems, events, situations, and feelings that they experience and comment on them based on logical data. In the primary school period, the teaching activities might increase the effectiveness of general education by taking the scientific ad affective aspects into consideration in order to develop scientific attitude and planning. Giving breif life histories about famous scientists, museum visits, and activities on natural life will help students appreciate scientific education (Ata, 1999).

According to the social learning theory, learning by modeling is achieved through transmission of the information. The observer acquires the symbolic images of the behavi

ors that they modeled which directs him to the appropriate behaviors during the observation process. Thus, learning through modeling has four prerequisites. These steps are as follows:

1. Attention
2. Retention
3. Motor reproduction
4. Motivation

Bandura (1986) states that individuals do not need to learn everything directly because they are able to learn lots of things by observing others' experiences. In this situation, a great deal of cognitive, affective, social and psychomotor behaviors can be taught by modeling the respected or adored adults. In educational environments, teachers can teach creativity, effective learning, study skills, problem-solving skills, or many other things more effectively by simply becoming good models for their students. By doing so, the importance of science lessons which are designed taking the affective objectives within the curriculum into consideration and are prepared and applied to change the affective qualities of students will become more visable.

Aim

What is the effect of social learning theory based teaching activities on students' attitudes in the science lessons of 7th grade classes?

Sub problems

1. Are there any significant differences between the students in the experimental and control groups in terms of scientific attitudes measured by pre scores in science lessons of 7th grade classes?
2. Are there any significant differences between the students in the experimental and control groups in terms of scientific attitudes measured by pre-and-post test and retention test scores in science lessons of 7th grade classes?

3. Are there any significant differences between the students in the experimental and control groups in terms of scientific attitudes measured by post-test scores in science lessons of 7th grade classes?
4. Do academic success, gender, and socio-economic level have any significant effect on scientific attitudes post-test scores of students in the experimental group in science lessons of 7th grade classes?

Method

Research Model and Experimental Design

An experimental and control group design was used with students who attended 7th grade classes at three different schools. Pre-test post-test experimental design model with control group which can be described as mixed design is defined as an experimental design with two factors one of which is in the category of repeated measures the other is in a different category.

Population and Sample

This study was carried out on 7th grade students at primary schools. The population of the study is students at primary schools in the center of Kırşehir. In order to define the sample of the study, the authorities from the Kırşehir Directorate of National Education were interviewed and students from Zernişan, Vakkas Yaşar, Gazi and Prof. Dr. Erol Güngör primary schools which are similar in term of of socio-economic environment were taken as the sample. Defining three different schools as the sample, it was aimed to minimize the interaction between the students. Scientific Attitude Inventory was applied to all of the 7^{th} grade students at the sample schools and one of the classes which did not have any differences was selected. As a result, students from 7A were assigned as the experiment group; students from 7B were assigned as the control group; and students from 7D were assigned as the second control group.

Procedures

In the study, the Scientific Attitude Inventory (SAI II; Moore & Foy, 1997) was used to measure students' attitude towards science. There are 40 statements in the scale which is adapted to Turkish.

The 40 statements were structured to explain the nature of science, the way in which scientists work, and students' attitudes toward science. Concerning the reliability of scale, Cronbach Alpha reliability coefficient is found to be 0.76. Spearman Brown Split-half test correlation is 0.84. Moore and Foy (1997) reported that the original scale had a Cronbach Alpha reliability coefficient of 0.78 and Spearman Brown Split-half reliabiliy coefficient of 0.80. Factor analysis was done to investigate the structural validity of the scale. As a result of the statistical analysis, the factor loading of the statements is on a single factor and the factor loading of the scale consisting of 40 statements is above 0.53. This finding showed that the scale had one factor to identify scientific attitudes (Demirbaş, 2005).

With the aim of determining the students' academic success levels, 40 questions were prepared on "the Structure of Atom and Periodical Table" and "a Travel to Inner Structure of The Matter" which are in the 7th grade science education curriculum. After the item analysis, the number of the questions was determined to be 30. Furthermore, 45 questions were prepared on the unit "Meeting of Force and Movement, Energy" and after the item analysis, the number the questions was determined to be 35. Thus, the total number of questions in the academic success test was 65 (30+35). This academic success test was used in the research.

A socio-economic scale (Bacanlı, 2004) was used in order to determine the socioeconomic levels of 7th grade students in the sample group and explain its relation with the dependent variable.

Results and Discussion

There are not any significant differences between scientific attitude pre-and-post test scores of 7th grade students who are in the experimental and control groups (Chart 2 and Chart 3). Scientific attitude post test and retention test scores of the experimental group students whose activities were based on social learning theory were analyzed and found to be higher than their pre-test scores. The retention test scores of the students decreased a bit when compared with post test scores. But non-significant differences between the scores of pre-and-post tests and retention test explain that students continued the scientific attitudes that they acquired (Table 4-5).

According to the results of the study, academic success explained the 49% of total variance in scientific attitudes. When t-test results related with the significance of regression coefficients were examined, the academic success scores were found to be significant in estimating scientific attitude scores (Table 10).

After analyzing the application results of teaching activities based on social learning th

eory, the following recommendations are made:

- Teachers who are the operators of the curriculum must be informed about affective learning. The affective objectives of Science and Technology curriculum are included intensively in the curriculum which has started to be used with 4th and 5th grade classes since the 2005-2006 academic year. In-service training courses should be organized for teachers to show them how they define, observe, and assess affective gains.
- In Science and Technology curriculum which has started to be used with 4th and 5th grade classes since the 2005-2006 academic year, activities done by scientists, their life stories related to the topics should be combined with the topic itself.
- The number of the visual materials showing the scientific studies is limited. So, projects in order to develop visual materials such as films and presentations should be developed.

Kaynakça/ References

Abak, A., Eryılmaz, A. & Fakıoğlu, T. (2003). *Üniversite öğrencilerinin fizikle ilgili seçilmiş duyuşsal karakteristikleri ile fizik başarılarının ilişkisi.* V. Fen Bilimleri ve Matematik Eğitimi Kongresi, Ankara.

Akbaş, O. (2004). *Türk milli eğitim sisteminin duyuşsal amaçlarının ilköğretim II. kademedeki gerçekleşme derecesinin değerlendirilmesi.* Yayımlanmamış doktora tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Ata, E. (1999). *İlköğretim öğrencilerinde bilimsel ve sosyal tutum. Adapazarı örneği.* Yayımlanmamış yüksek lisans tezi, Sakarya Üniversitesi Sosyal Bilimler Enstitüsü, Sakarya.

Babadoğan, C. (1993). Bloom'un amaçlar sınıflaması ve okulda öğrenme kuramına yöneltilen çeşitli eleştiriler. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, *26* (1), 167-176.

Bacanlı, H. (1999). *Duyuşsal davranış eğitimi.* Ankara: Nobel Yayın Dağıtım.

Bacanlı, H. (2004). *Sosyal ilişkilerde benlik (kendini ayarlamanın psikolojisi).* İstanbul: Millî Eğitim Bakanlığı Yayınları.

Bandura, A. (1971). *Psychological modeling: Conflicting theories.* Chicago: Aldine-Atherton Inc.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (2001). A cognitive theory: an agentic perspective. *Annual Review of Psychology*, *52*, 1-26.

Barrington, B. L., & Hendricks, B. (1988). Attitudes toward science and science knowledge of intellectually gifted and avarage students in third, seventh and eleventh grades. *Journal of Research in Science Teaching*, *25*, 679-687.

Başaran, İ. E. (1978). *Eğitim psikolojisi.* Ankara: Bilim Matbaası.

Bıkmaz, F. H. (2001). *İlköğretim 4. ve 5. sınıf öğrencilerinin fen bilgisi dersindeki başarılarını etkileyen faktörler.* Yayımlanmamış doktora tezi, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Bilen, M. (2001). *Kurumlarda insan ilişkilerinin başarıya etkisi.* 2000 Yılında Türk Eğitim Örgütü ve Yönetimi Ulusal Sempozyumu, Ankara.

Bloom, B. S. (1998). *İnsan nitelikleri ve okulda öğrenme* (çev. D. A. Özçelik). İstanbul: Milli Eğitim Basımevi.

Büyüköztürk, Ş. (2001). *Deneysel desenler: ön test son test kontrol gruplu desen.* Ankara: Pegem Yayınları.

Büyüköztürk, Ş. (2002). *Sosyal bilimler için veri analizi el kitabı.* Ankara: Pegem Yayınları.

Büyüköztürk, Ş. (2003). *Eğitim istatistiği yüksek lisans ders notları.* Ankara: Ankara Üniversitesi Eğitim Bilimleri Enstitüsü.

Byrne, B. M. (1984). The general academic self concept nomological network: A review of construct validation research. *Review of Educational Research*, *54*, 427-456.

Byrne, M. S., & Johnstone, A. H. (1988). Critical thinking and science education. *Studies in Higher Education*, *25* (8), 325.

Cannon, R. K., & Simpson, D. R. (1985). Relationships among attitude, motivation and achievement of ability grouped, seventh grade, life science students. *Science Education*, *69* (2), 121-138.

Demirbaş, M. & Yağbasan, R. (2004). Fen bilgisi öğretiminde, duyuşsal giriş özelliklerinin değerlendirilmesinin işlevi ve öğretim süreci içinde, öğretmen uygulamalarının analizi üzerine bir araştırma. *Gazi Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *5* (2), 177-193.

Demirbaş, M. (2005). *Fen bilgisi öğretiminde sosyal öğrenme teorisinin öğrenme ürünlerine etkisinin incelenmesi.* Yayımlanmamış doktora tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

Dewey, J. (1996). *Demokrasi ve eğitim* (çev. M. Salih Otoran). İstanbul: Başarı Yayınları.

Efe, H. (1992). *Duyuşsal yoğunluklu amaçların gerçekleşme düzeyleri.* Yayımlanmamış yüksek lisans tezi, Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Elmesky, R., & Tobin, K. (2005). Expanding our understandings of urban science education by expanding the roles of students as researchers. *Journal of Research in Science Teaching*, *42*, 807-858.

Finson, D. K., & Enochs, G. L. (1987). Student attitudes toward science-technology-society resulting from visitation to a science technology museum. *Journal of Research in Science Teaching*, *24* (7), 593-609.

Flick, L. (1990). Scientist residence program improving children's image of science and scientist. *School Science and Mathematics*, *90* (3), 204-214.

Freedman, M. P. (1997). Relationship among laboratory instruction, attitude toward science and achievement in science knowledge. *Journal of Research in Science Teaching*, *34* (4), 343-357.

Gürdal, A. (1992). İlköğretim okullarında fen bilgisinin önemi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *8*, 185-188.

House, D. J. (1993). Cognitive-motivational predictors of science achievement. *International Journal of Instructioanal Media*, *20* (2), 155-162.

İnceoğlu, M. (2000). *Tutum, algı, iletişim.* Ankara: İmaj Yayınevi.

Jarvis, T., & Pell, A. (2005). Factors influencing elementary school children's attitudes toward science before, during, and after a visit to the UK National Space Centre. *Journal of Research in Science Teaching*, *42* (1), 53-83.

Jones, M. G., Howe, A., & Rua, M. (2000). Gender differences in students' experiences, interests, and attitudes toward science and scientists. *Science Education*, *84*, 180-192.

Koballa, R. T., & Crawley, E. F. (1985). The influence of attitude on science teaching and learning. *School Science and Mathematics*, *85* (3), 222-232.

Koballa, R. T. Jr. (1988). Attitude and related concepts in science education. *Science Education*, *72* (2), 115-126.

Levin, T., Sabar, N., & Libman, Z. (1991). Achievement an attitudinal patterns of boys and girls' science. *Journal of Research in Science Teaching, 28* (4), 315-328.

Maoz, N., & Rishpon, M. (1990). Attitudes towards school science: A comparison of participants and nonparticipants in extracurricular science activities. *School Science and Mathematics*, *90* (1), 13-22.

Marsh, H. W., & Yeung, A. S. (1997). Causal effects of academic self concept on academic achievement structural equation models of longitudinal data. *Journal of Educational Psychology*, *89*, 41-54.

Mason, L. C., Kahle, B. J., & Gardner, L. A. (1991). Draw-a-scientist test-future implication. *School Science and Mathematics*, *91* (5), 193-198.

Meredith, E. J., Fortner, W. R., & Mullins, W. G. (1997). Model of affective learning for nonformal science education facilities. *Journal of Research in Science Teaching*, *34*, 805-818.

Moore, W. R. & Foy, R. L. H. (1997). The scientific attitude inventory: A revision (SAI II). *Journal of Research in Science Teaching*, *34* (4), 327-336.

O'Neill, K. D., & Polman, J. L. (2004). Why educate "little scientists?" Examining the potential of practice-based scientific literacy. *Journal of Research in Science Teaching*, *41* (3), 234-266.

Oruç, M. (1993). *İlköğretim okulu II. kademe öğrencilerinin fen tutumları ile fen başarıları arasındaki ilişki.* Yayımlanmamış yüksek lisans tezi, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Regis, A., Albertazzi, P. G., & Roletto, E. (1996). Concept maps in chemistry education. *Journal of Chemistry Education*, *73*, 1084-1088.

Sanchez, F., & Roda, M. (2003). Relationship between self-concept and academic achievement in primary students. *Electronic Journal of Research in Educational Psychology and Psychopedagogy*, *1* (1), 95-120.

Schibeci, R. A. (1983). Selecting appropriate attitudinal objectives for school science. *Science Education*, *67* (5), 595-603.

Selvi, K. (1996). Tutumların ölçülmesi ve program değerlendirme. *Anadolu Üniversitesi Eğitim Fakültesi Dergisi*, *6* (2), 39-53.

Smith, W. S., & Erb, T. O. (1986). Effect of women science career role models on early adolescents' attitudes toward scientists and women in science. *Journal of Research in Science Teaching*, *23*, 667-676.

Stephens, K. R. (1999). *Factors affecting science related attitudes in academically talented youth.* Unpublished doctoral dissertation, The University of Southern Mississippi.

Tekin, H. (1996). *Eğitimde ölçme ve değerlendirme.* Ankara: Yargı Yayınları.

Tepe, D. (1999). *Öğrencilerin fen derslerine karşı tutumları ile başarıları arasındaki ilişki.* Yayımlanmamış yüksek lisans tezi, Marmara Üniversitesi Fen Bilimleri Enstitüsü, İstanbul.

Tuckman, B. W. (1991). *Educational psychology, from theory to application.* Florida: Harcourt Brace Jovanovich, Inc.

Weinburgh, M. (1995). Gender differences in student attitudes toward science: A meta analysis of the literature from 1970 to 1991. *Journal of Research in Science Teaching*, *32* (4), 387-398.

Korkmaz, İ. (2002). *Sosyal öğrenme kuramı.* Yeşilyaprak, B. (Ed). *Gelişim ve öğrenme psikolojisi.* Ankara: Pegem A Yayıncılık.

Zacharia, Z., & Barton, A. C. (2004). Urban middle-school students' attitude toward a defined science. *Science Education*, *88*, 197-222.