

EXAMINING PRESCHOOL TEACHER CANDIDATES' ATTITUDES TOWARDS SCIENCE IN TERMS OF SOME VARIABLES

Damla ALİGÜLLÜ AVCI

Teacher, TRNC Ministry of National Education, Department of Secondary Education, TRNC

ORCID: <https://orcid.org/0009-0004-1338-7360>

damla_aligullu@yahoo.com

Uğur SERİN

Dr., Teacher, Ministry of National Education, Necip Fazıl Kısakürek Primary School, Buca, İzmir

ORCID: <https://orcid.org/0000-0002-4667-9472>

ugurserin@gmail.com

Received: December 02, 2023

Accepted: January 18, 2024

Published: January 31, 2024

Suggested Citation:

Aligüllü Avcı, D., & Serin, U. (2024). Examining preschool teacher candidates' attitudes towards science in terms of some variables. *International Journal of New Trends in Arts, Sports & Science Education (IJTASE)*, 13(1), 53-59.



Copyright © 2024 by author(s). This is an open access article under the [CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/).

Abstract

This research aims to explore the teacher candidates' "attitudes towards science" who are studying in the preschool education department of a state university in Izmir; considering gender, socio-economic level, and the perspectives of the academic staff. The study's sample is composed of preschool students from a state university situated within the metropolitan area of Izmir province, located in Turkey. The research involved, a total of 278 teacher candidates, with 55.8% (n=155) being female and 44.2% (n=123) being male. For data collection the research used the "Science Attitude Scale" and the "Personal Information Form" conducted by Baykul (1992). The the instruments were confirmed to be valid and reliable, with the scale achieving an alpha reliability coefficient of .92. For multiple comparisons, one-way analysis of variance (ANOVA) and for pairwise comparisons t-tests were used to analyse the data. No significant difference was observed on the attitudes of preschool teacher candidates towards science based on independent variables which include gender, family socioeconomic level, and their perception of their teacher's attitude towards themselves.

Keywords: Attitude towards science, preschool, teacher candidate.

INTRODUCTION

Today, the field of natural sciences incorporates systematic knowledge about oneself and his natural environment, with continuous ways of improving and updating the acquired information. Science education provides children to acquire habitual objective thinking and making accurate evaluations against the situations they encounter. This practice leads them to be useful to themselves, their families, and their surroundings (Akgün, 1995).

When science is taught using scientific processes, students gain process skills and apply these skills in their everyday lives. Not only students develop more positive attitudes towards science but also enhance their creative skills (Kaptan & Korkmaz, 2001; Serin, 2001).

Attitudes are typically achieved in early childhood and strengthened through growing experiences. Particularly, adolescents' attitudes are consistent but not firmly established, and are clarified in the following years. Thus, attitude can be described as a significance of a person's comprehension and emotions towards a particular subject, motivating them to display positive or negative behavior. (Kağıtçıbaşı, 1999).

Studies have proven that emotional entry traits in shaping learning outcomes, career decisions, and leisure activities are as important as cognitive behaviors, (McComas, 1989; Saracaloğlu, 1992). The significant correlations between attitudes and achievements indicate that attitudes are least as influential as cognitive behaviors and should be blended into school programs (Berberoğlu, 1990, p.16; Saracaloğlu, 1992; 1996; Saracaloğlu, Serin, & Bozkurt, 2000; Saracaloğlu, Bozkurt, Serin, & Serin, 2004; Serin & Mohammadzadeh, 2008).

Research has shown that positive attitudes towards science has an impact on learning (Simpson et al., 1994; Weiss, 1987; Koballa, Crawley, and Shringley, 1990; IAEP, 1992; Linn, 1992; Saracaloğlu, Serin, & Bozkurt, 2001). Related to this, it is considered necessary to investigate the attitudes of preschool teacher candidates, who will contribute in shaping our future, towards science. As a result of the identified need, the objective of this study, conducted in Izmir at a state university, is to examine the attitudes of prospective preschool teachers towards science in terms of various variables. The research problem is reported below.

The Research Problem

The study's problem is mentioned as the following: "Is there a significant difference in the attitudes of preschool teacher candidates towards science?"

Sub-Problems

In order to state solutions to the referred problem, investigations were carried out to find answers to the following sub-problems: Do the attitudes of preschool teacher candidates towards science differ based on gender, socioeconomic level of their family, and their perception of their teachers' attitudes towards them?

METHOD

Population and Sample

The study focuses on teacher candidates studying in education faculties. Education faculties in the province of Izmir were selected for the study population. 278 teacher candidates from the preschool education department of a state university situated within Izmir during the spring semester of the 2003-2004 academic year were selected using a non-random sampling method. The research sample involved volunteer teacher candidates attending classes on the specific day and time of the study. In the study, 278 teacher candidates participated; 55.8% (n=155) females and 44.2% (n=123) males.

Data Collection Instruments

For this research, the "Attitude Towards Science Scale," whose validity and reliability were established by Baykul (1992), was conducted. The scale's Cronbach's Alpha reliability is coefficient of .92. The scale which consisted of 30 statements that had both positive and negative expressions, was scored; the overall score was obtained by reversing the negative statements. Scores on the scale range from a minimum of 30 to a maximum of 150, with higher scores meaning a more positive attitude. In addition, Personal Information Form composed of six questions were administered to the participants.

Analysis and Interpretation of Data

In accordance with the objectives of the research, percentages were taken. One-way analysis of variance (ANOVA) was applied for multiple comparisons, whereas t-tests were carried out for pairwise comparisons. The significance level for the study was established at .05.

FINDINGS, DISCUSSION and CONCLUSIONS

This section presents, findings and comments related to the research problem and its sub-problems.

Findings Related to the First Sub-Problem

The first sub-problem of the study is expressed as "Do the average attitudes towards science of pre-service preschool teachers vary significantly based on the independent variable of gender?" The outcomes of the t-test results indicate that the mean scores of science attitudes of pre-service preschool teachers do not have any significant difference based on the gender variable.

Table 1. Distribution of students' average score on science attitude by gender and the result of the t-test.

Gender	n	%	Mean	Std.Dev.	t	p	Significance Level
Female	155	55.8	133.174	.770	1.405	.161	p>.05
Male	123	44.2	131.390	1.043			

As per Table 1, male pre-service teacher candidates exhibit a more "positive" level of attitude towards science in comparison to female teacher candidates. Nevertheless, this differentiation was not found statistically significant. This suggests that the attitudes of pre-service preschool teachers towards science are not affected by the gender independent variable, indicating that the attitudes of pre-service preschool teachers towards science are interpreted as independent of gender.

The outcomes of the current research are coherent with previous research (Berrington & Hendricks, 1988; Shepardson & Pizzini, 1990; Stables, 1990; Germann, 1995; Houtz, 1995; Boone, 1997; Neathery, 1997). Various inquiries (Baker, 1983; Hofstein, Maoz, & Rishpon, 1990; AAUW, 1991; Greenfield, 1996; Kanai & Norman, 1997; Francis & Greer, 1999) introduce research findings that support and are similar to each other. In addition, there are research outcomes highlighting notable variations based on the gender variable (Simpson & Oliver, 1985; Schibeci & Riley, 1986; Kurth, 1987; Mullis & Jenkins, 1988; Breakwell & Beardsell, 1992; Simpson et al., 1994; Weinburgh, 1995; Kanai & Norman, 1997; Francis & Greer, 1999).

Findings Related to the Second Problem

The second sub-problem of the study is stated as "Do the science attitude scores of pre-service preschool teachers show a significant difference based on the socio-economic level of their family?"

As seen in Table 3, there is no statistically significant difference in the science attitudes of students related to the socio-economic status of their families.

Table 2. Distribution of pre-service preschool teachers' average science attitude scores by socio-economic level and the result of the t-test.

SEL	n	%	Mean	Std.Dev.	t	p	Significance Level
Low	61	21.9	132.049	10.302	.079	.779	p>.05
Middle	217	78.1	132.473	10.617			

SEL: Socio-Economic Level

Table 2 demonstrates that the attitudes of teacher candidates who perceive their socio-economic level as insufficient and moderate show similar characteristics. The nonexistence of statistically significant differentiation in averages related to the attitudes towards science claims that the attitudes of pre-service preschool teachers are not impacted by the socio-economic independent variable; therefore, it illustrates to signify independence. The results of the current research are in align with the findings of Miller-Whitehead (1999) and Serin et al. (2000), but are supportive in nature of the research outcomes by Hammrich (1998), and Saracaloğlu, Serin, and Bozkurt (2001).

Findings Related to the Third Sub-Problem

The third sub-issue of the research is mentioned as "Is there a significant difference in the science attitude scores of pre-service preschool teachers based on their perception of their teachers' attitudes towards them?"

After examining the science attitude scores of pre-service preschool teachers based on Table 3, it is clear that the average science attitude is lower among teacher candidates who perceive their teacher as authoritarian; on the other hand, it is higher among pre-service preschool teachers who perceive their teacher as democratic.

Table 3. Distribution of the pre-service preschool teachers' science attitude scores on the perception of the teacher's attitude.

Teacher's Attitude	n	Mean	Std.Dev.	Std.Er.
Authoritarian	57	130.368	13.806	1.828
Indifferent	124	132.822	9.784	.878
Democratic	97	133.010	9.119	.925
Total	278	132.384	10.532	.631

Table 4 presents the analysis results that are conducted to determine whether there is a significant difference in attitude scores based on their perception of the teachers' attitude as an independent variable.

As stated by Table 4, based on their perceptions of their teachers' attitudes towards them the attitude scores of pre-service preschool teachers were examined through one-way analysis of variance (ANOVA). The findings outline that the science attitude scores of pre-service preschool teachers did not exhibit a significant difference based on their perceptions of their teachers' attitudes towards them.

Table 4. ANOVA Results for the science attitude scores of pre-service preschool teachers based on perception of teacher's attitude.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	293.467	2	146.733	1.326	.267
Within Groups	30434.350	275	110.670		
Total	30727.817	277			

The results of the current study are consistent with the findings reported by Serin (2001). However, the results may be at odds with the research outcomes of Hasan (1985), Young and Kellogg (1993), and Talsma (1996).

This study which aimed to determine the science attitudes of pre-service preschool teachers concerning different variables, it was found that the participants' attitudes toward science didn't show any significant variations based on gender, family socio-economic level, and their perceptions of their teachers' attitudes towards them.

Overall, the research has indicated that pre-service preschool teachers exhibit a positive level of attitude towards science.

According to the results of the study, the following recommendations have been formulated:

- ✓ Within classroom activities, learning-teaching situations that facilitate students' understanding should be prioritised. Moreover, individual activities should be emphasised in greater terms to encourage the development of positive attitudes in young individuals.
- ✓ Pre-service preschool teachers should be encouraged to visit Science and Nature Museums. This can enhance the interest levels of young individuals and contribute to the development of positive attitudes.
- ✓ In order to foster positive attitudes towards science, programs should integrate cognitive objectives and translate them into behavioural outcomes.
- ✓ Studies exploring the relationship between students' attitudes towards science and their academic achievements can be conducted across different ages, grades, and departments.
- ✓ It is recommended to carry out research that identifies teachers' attitudes towards their students.

Ethics and Conflict of Interest

It is pointed out by the authors that no conflict of interest among them occurred and that they have maintained the ethical principles throughout the entire research process.

REFERENCES

- AAUW - American Association of University Women. (1991). *Shortchanging girls, shortchanging America: A call to action* (Vol. 4792). American Association of University Women. Washington, D.C: AA of Un. W. Pub.
- Akgün, Ş. (1995). *Fen bilgisi öğretimi*. Giresun.
- Baykal, Y. (1990). *İlkokul beşinci sınıftan lise ve dengi okulların matematik ve fen derslerine karşı tutumda görülen değişmeler ve öğrenci seçme sınavındaki başarı ile ilişkili olduğu düşünülen bazı faktörler*. Ankara: ÖSYM Yayınları.

- Baker, D. R. (1983, April). The Relationship of attitude, cognitive abilities, and personality to science achievement in the junior high school. Paper presented at the annual meeting of the NARST, Dallas, TX.
- Barrington, B. L., & Hendricks, B. (1998). Attitudes toward science and science knowledge of intellectually gifted and average students in third, seventh, and eleventh grades. *Journal of Research in Science Teaching*, 25, 679-687.
- Berberoğlu, G. (1990). Kimyaya ilişkin tutumların ölçülmesi. *Eğitim ve Bilim*, 14, 76, 16-17, Nisan.
- Bloom, B. S. (1971). *Affective consequences of school achievement*. In J. H. Block (Ed.). *Mastery of Learning*, New York: Rinehard and Winston, 13-28.
- Bloom, B. S. (1979). *İnsan nitelikleri ve okulda öğrenme*. Çev: D. A. Özçelik. Ankara: Milli Eğitim Basımevi.
- Boone, W. J. (1997). Science attitudes of selected middle school students in China: A preliminary investigation of similarities and differences as a function of gender. *School Science and Mathematics*, 97, 2, February.
- Breakwell, G. M., & Beardsell, S. (1992). Gender, parental and peer influences upon science attitudes and activities. *Public Understanding of Science*, 1, 183-197.
- Campbell, R. L., & Martinez-Perez, L. A. (1976). A study of relationships of science attitudes, achievement and self-concept of pre-service teachers. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (49th, San Francisco, California, April 23-25, 1976.
- Catsambis, S. (1995). Gender, race, ethnicity, and science education in the middle grades. *Journal of Research in Science Teaching*, 32, 243-257.
- Germann, P. J. (1988). Development of the attitude toward science in school assessment and its use to investigate the relationship between science achievement and attitude toward science in school. *Journal of research in science teaching*, 25(8), 689-703.
- Germann, P. J. (1994). Testing a model of science process skills acquisition: An interaction with parents' education, preferred language, gender, science attitude, cognitive development, academic ability and biology knowledge. *Journal of Research in Science Teaching*, 31, 749-783.
- Greenfield, T. A. (1996). Gender, ethnicity, science achievement and attitudes. *Journal of Research in Science Teaching*, 33, 901-933.
- Francis, L. J., & Greer, J. E. (1999). Measuring Attitude toward science among secondary school students: The Affective Domain. *Science and Technological Education*, 17, 2, 219-226.
- Hall, D. A. (1990). The effects of an innovative activity-centered biology program on attitude toward elementary teachers. A paper presented at the Annual Meeting of the National Association for Research in Science Teaching. (63rd, Atlanta, GA, April 8-11, 1990. ED 319612.
- Hammrich, P. (1998). Promoting females' success in science. *Journal of Supervision and Curriculum Development*, 1, 4, 20-24, December/January.
- Henderson, D. G., Fisher, D. L., & Fraser, B. J. (1998). Learning environments in senior secondary environmental science classes. The Annual Meeting of the Australian Association for Research in Education. Adelaide, South Australia, November.
- Hasan, O. E. (1985). An Investigation into factors affecting attitudes toward science of secondary school students in Jordan. *Science Education*, 69, 3-18.
- Hofstein, A., Maoz, N., & Rishpon, M. (1990). Attitudes towards school science: a comparison of participants and non-participants in extracurricular science activities. *School Science and Mathematics*, 90, 13-22.
- Houtz, L. E. (1995). Instructional strategy change and the attitude and achievement of seventh eight-grade science students. *Journal of Research in Science Teaching*, 32, 629-648.
- International Assessment of Educational Progress. (IAEP). (1992). *Learning science*. Princeton, NJ: Educational Testing Service.
- Kağıtçıbaşı, Ç. (1988). *İnsan ve insanlar*. Gözden geçirilmiş 7. Basım. İstanbul: Evrim Basım-Yayımlar-Dağıtım.
- Kahle, J. B. (1983). The disadvantaged majority: Science education for women. ERIC ED 242561.
- Kanai, K., & Norman, J. (1997). Systemic Reform evaluation: gender differences in student attitudes toward science and mathematics. Proceedings of the 1997 Annual International Conference of the AETS. ERIC ED 405220
- Kaptan, F. (1999). *Fen bilgisi öğretimi*. İstanbul: Milli Eğitim Basımevi
- Kaptan, F., & Korkmaz, H. (2001). Mevcut fen bilgisi programı ile 2001-2002 öğretim yılında uygulanacak olan yeni fen bilgisi programlarının karşılaştırılması. *Çağdaş Eğitim Dergisi*, 273, 33-38.

- Koballa, Jr., Crawley, F. E., & Shrigley, R. L. (1990). A summary of science education-1988. *Science Education*, 74, 3, 369-381.
- Kurth, K. (1987). Factors which influence a female's decision to remain in science. ERIC ED 288739.
- Linn, M. C. (1992). Science education reform: Building the research base. *Journal of Research in Science Teaching*, 29, 821-840.
- McGinnis, J. R., Kraker, S., Rota-McDuffie, A., & Watanabe, T. (1997). Charting, the attitude and belief journeys of teacher candidates in a reform-based mathematics and science. A paper presented at the Annual Meeting of the American Educational Research Association. San Diego, California. April 13-17.
- Mdletshe, K. D., Manale, J., Vorster, L., & Lynch, P. (1995). Student perceptions of and attitudes toward science. Paper presented at the Conference on Improving Science and Mathematics Teaching: Effectiveness of Interventions in Southern Africa. Namibia, December 11-15, 1995.
- Miller-Whitehead, M. (1999). Bridging the student achievement gap in science. A paper presented at the Annual Meeting of the Mid-South Educational Research Association. (Point Clear, AL, Nov. 1999. ED 435742.
- Mullis, I. S., & Jenkins, L. B. (1988). *The Science report card elements of risk and recovery*. Princeton, NJ: Educational Testing Service.
- Neathery, M. F. (1997). Elementary and secondary students' perceptions toward science: Correlations with gender, ethnicity, ability, grade, and science achievement. *The Electronic Journal for Research in Science & Mathematics Education*, 2(1), 3-11.
- NFER. (1996). Patterns of mathematics and science teaching in lower secondary in England and ten other countries. Third International Mathematics and Science Study. First National Report: Part 2. <<http://www.nfer.ac.uk/summary/1re2suww.htm>>.
- Önal, A., & Geban, Ö. (1994). Genel lise programında yer alan kimya konularıyla ilgili derslerin müfredatlarının incelenmesi ve ders geçme sisteminin değerlendirilmesi. I. Ulusal Fen Bilimleri Sempozyumu Bildirileri. Dokuz Eylül Üniversitesi Yayınları,
- Riesz, E., & Stephen, S. (1996). *Gender differences in attitudes toward science*. Newsletter of the Fine Foundation, Spring.
- Saracaloğlu, A. S., & Kaşlı, A. F. (2001). Öğretmen adaylarının bilgisayara yönelik tutumları ile başarıları arasındaki ilişki. *E.Ü. Eğitim Fakültesi Dergisi*, 1(1), 110-126.
- Saracaloğlu, A. S., Serin, O., & Bozkurt, N. (2001). Öğretmen adaylarının fen bilimlerine yönelik tutumları ile başarıları arasındaki ilişki. *Ege Üniversitesi Ege Eğitim Dergisi*, 1(2), 50-59
- Saracaloğlu, A. S., Başer, N., Yavuz, G., & Serin, O. (2002). Lise öğrencilerinin fene yönelik tutumları ile başarıları arasındaki ilişki. XI. Eğitim Bilimleri Kongresi, 23-26 Ekim 2002 Yakın Doğu Üniversitesi, Lefkoşa, KKTC
- Saracaloğlu, A. S., Bozkurt, N., Serin, O., & Serin, U. (2004). Öğretmen adaylarının mesleğe yönelik tutumlarını etkileyen faktörler. *Çağdaş Eğitim Dergisi*, 29(311), 16-28.
- Serin, O., Kesercioğlu, T., Saracaloğlu, A. S., & Serin, U. (2000). İlköğretim bölümü sınıf öğretmenliği ve fen bilgisi öğrencilerinin fene yönelik tutumları. Erzurum: IX. Eğitim Bilimleri Kongresi.
- Serin, O. (2003). Sınıf öğretmenliği ve fen bilgisi öğrencilerinin fen (bilimlerin)'e yönelik tutumları. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi*, 17(17), 75-86.
- Serin, O., & Mohammadzadeh, B. (2008). The relationship between primary school students' attitudes towards science and their science achievement (sampling: Izmir). *Journal of Educational Sciences*, 2(6), 68-75.
- Serin, U. (2001). *DEÜ Buca eğitim fakültesi ve CBÜ Demirci eğitim fakültesi fen bilgisi öğretmen adaylarının fene yönelik tutumlarının karşılaştırılması*. (Yayınlanamış Yüksek Lisans Tezi). Dokuz Eylül Üniversitesi.
- Schibeci, R. A., & J. P. (1986) Influence of students' background and perception on science attitude and achievement. *Journal of Research in Science Teaching*, 23, 177-187.
- Shepardson, D. P., & Pizzini, E. L. (1994). Gender, achievements, and perception toward science activities. *School Science and Mathematics*, 94, 188-193.
- Shrigley, R. L. et al. (1988). Defining attitude for science educators. *Journal of Research in Science Teaching*, 25(8), 659-678.
- Simpson, R. D., Koballa, T. R. Jr., Oliver, J. S., & Crawley, F. E. (1994). *Research on the affective dimension of science learning*. D. White (Ed). Handbook of Research on Science Teaching and Learning. New York: MacMillan Publishing Company.: 211-235.
- Simpson, R. D., & Oliver, J. R. (1985). Attitudes toward Science and achievement motivation profiles of male and female science students in grades six through ten. *Science Education*, 69, 511-526.

- Soran, H., & Oruç, M. (1994). İlköğretim okulu ii. kademe öğrencilerinin fen tutumları ile fen başarıları arasındaki ilişki. I. Ulusal Fen Bilimleri Eğitimi Sempozyumu Bildirileri. 21-30.
- Stables, A. (1990). Differences between pupils from mixed and single-sex schools in their enjoyment of school subjects and in their attitudes to science and to school. *Educational Review*, 42, 221-230.
- Talsma, V. L. (1996). Science autobiographies: What do they tell us about preservice elementary teachers' attitudes towards science and science teaching?. A paper presented at NARST Annual Meeting. April 2, 1996.
- Young, B. J., & Kellogg, T. (1993). Science attitudes and preparation of preservice elementary teachers. *Science Education*, 77(3), 279-291.
- 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, 387-398.
- Weiss, I. R. (1987). *Report of the 1985-86 national survey of science and mathematics education*. Research Triangle Park, NC: Research Triangle Institute.