



October, 2020 Vol:9 No:3

Bartın University

Journal of Faculty of Education

International Refereed Journal



e-ISSN: 1308-7177



BARTIN UNIVERSITY JOURNAL OF FACULTY OF EDUCATION

INTERNATIONAL REFEREED JOURNAL

Volume: 9, Issue: 3, October 2020

Owner

Prof. Dr. Çetin Semerci (Dean)

On behalf of Bartın University Faculty of Education

Editor-in-Chief

Asst. Prof. Dr. Burcu Şentürk

Assistant Editor

Asst. Prof. Dr. Emrullah Yılmaz

Editorial Board

Prof. Dr. Nuriye Semerci

Assoc. Prof. Dr. Ayla Çetin-Dindar

Assoc. Prof. Dr. Burçin Gökkurt-Özdemir

Assoc. Prof. Dr. Fatma Ünal

Assoc. Prof. Dr. Gülsün Şahan

Asst. Prof. Dr. Bahar Karaman-Güvenç

Asst. Prof. Dr. Barış Çukurbaşı

Asst. Prof. Dr. Burcu Şentürk

Asst. Prof. Dr. Emrullah Yılmaz

Asst. Prof. Dr. İhsan Çağatay Ulus

Asst. Prof. Dr. Mustafa Kocaarslan

Asst. Prof. Dr. Serpil Özdemir

Asst. Prof. Dr. Süreyya Genç

Secretariat

Res. Asst. Betül Çimenli *Foreign Language Specialist*

Res. Asst. Dilek Aydın *Preliminary Review Specialist and Layout Editor*

Res. Asst. Ersin Çilek *Preliminary Review Specialist and Layout Editor*

Res. Asst. Kenan Çetin *Foreign Language Specialist and Technical Assistant*

Res. Asst. Mehmet Can Demir *Preliminary Review Specialist and Layout Editor*

Res. Asst. Ömer Yılmaz *Publishing Preparation Specialist and Technical Assistant*

Contact

Bartın University Faculty of Education

74100 BARTIN – TURKEY

e-mail: buefad@bartin.edu.tr

Tel: +90 378 223 54 59

Bartın University Journal of Faculty of Education (ISSN 1308-7177) is an online, open-access, free of charge, international and refereed journal which is published by Bartın University Faculty of Education.

Index List

The Scientific and Technological Research Council of Turkey (TÜBİTAK) Turkish Academic Network and Information Center (ULAKBİM) Social Sciences Database, Index Copernicus, ProQuest, EBSCOHost, CiteFactor, Modern Language Association, Open Academic Journal Index (OAJI Indexing), Ulrich's Periodicals Directory, Turkey Based Social Sciences Citation Index (SOBIAD), Turkish Education Index.

SCIENTIFIC BOARD

- Prof. Dr. Apisak Bobby Pupipat, *Thammasat University, Thailand*
Prof. Dr. Aslı Yazıcı, *Bartın University, Turkey*
Prof. Dr. Celal Bayrak, *Hacettepe University, Turkey*
Prof. Dr. Cindy Walker, *Duquesne University, United States of America*
Prof. Dr. Çetin Semerci, *Bartın University, Turkey*
Prof. Dr. Gary N. Mclean, *University of Minnesota, Minnesota, United States of America*
Prof. Dr. Hafize Keser, *Ankara University, Turkey*
Prof. Dr. Halil İbrahim Yalin, *Gazi University, Turkey*
Prof. Dr. Halil Yurdugül, *Hacettepe University, Turkey*
Prof. Dr. Huda Ayyash-Abdo, *Lebanese American University, Lebanon*
Prof. Dr. Hüseyin Uzunboylu, *Near East University, Turkish Republic of Northern Cyprus*
Prof. Dr. Jesús García Laborda, *University of Alcalá, Spain*
Prof. Dr. Lotte Rahbek Schou, *Aarhus University, Denmark*
Prof. Dr. Mehmet Engin Deniz, *Yıldız Teknik University, Turkey*
Prof. Dr. Mehmet Taşpınar, *Gazi University, Turkey*
Prof. Dr. Mehmet Arslan, *Girne American University, Turkish Republic of Northern Cyprus*
Prof. Dr. Michael K. Thomas, *University of Illinois, Chicago, United States of America*
Prof. Dr. Michele Biasutti, *University of Padova, Italy*
Prof. Dr. Nuriye Semerci, *Bartın University, Turkey*
Prof. Dr. Piet Kommers, *University of Twente, Netherlands*
Prof. Dr. Rita Alexandra Cainço Dias Cadima, *Polytechnic of Leiria, Portugal*
Prof. Dr. Rolf Gollob, *University of Zurich, Switzerland*
Prof. Dr. Rosalina Abdul Salam, *University of Science, Malaysia*
Prof. Dr. Saouma Boujaoude, *American University of Beirut, Lebanon*
Prof. Dr. Süleyman Çelenk, *Girne American University, Turkish Republic of Northern Cyprus*
Prof. Dr. Süleyman Sadi Seferoğlu, *Hacettepe University, Turkey*
Prof. Dr. Todd Alan Price, *National Louis University, Illinois, United States of America*
Prof. Dr. Tuğba Yelken, *Mersin University, Turkey*
Prof. Dr. Vinayagum Chinapah, *Stockholm University, Sweden*
Prof. Dr. Vladimir A. Fomichov, *National Research University, Russia*
Prof. Dr. Yezdan Boz, *Middle East Technical University, Turkey*
Assoc. Prof. Dr. Ctibor Határ, *University of Constantine The Philosopher, Slovakia*
Assoc. Prof. Dr. Çiğdem Hürsen, *Near East University, Turkish Republic of Northern*
Assoc. Prof. Dr. Ebru Kiliç Çakmak, *Gazi University, Turkey*
Assoc. Prof. Dr. Fezile Özdamli, *Near East University, Turkish Republic of Northern*
Assoc. Prof. Dr. Hüseyin Biçen, *Near East University, Turkish Republic of Northern Cyprus*
Dr. Agnaldo Arroio, *University of São Paulo, Brazil*
Dr. Chryssa Themelis, *Lancaster University, England*
Dr. Nurbiha A. Shukor, *University of Technology, Malaysia*
Dr. Vina Adriany, *Indonesia University of Education, Indonesia*

REVIEWERS OF THE 9th VOLUME

- Prof. Dr. Alex DAVIES - Portland State University
- Prof. Dr. Arif SARIÇOBAN - Selçuk University
- Prof. Dr. Bülent ALTUNKAYNAK – Gazi University
- Prof. Dr. Ebru OĞUZ - Mimar Sinan Güzel Sanatlar University
- Prof. Dr. Ertuğrul USTA - Necmettin Erbakan University
- Prof. Dr. Güven Özdem - Giresun University
- Prof. Dr. Hüseyin YOLCU - Kastamonu University
- Prof. Dr. İsmail Hakkı MİRİCİ - Hacettepe University
- Prof. Dr. Özgen KORKMAZ - Amasya University
- Prof. Dr. Özgül KELEŞ - Aksaray University
- Prof. Dr. Riza GÖKLER - Ankara Yıldırım Beyazıt University
- Prof. Dr. Tahsin İLHAN - Tokat Gaziosmanpaşa University
- Assoc. Prof. Dr. Ağah Tuğrul KORUCU - Necmettin Erbakan University
- Assoc. Prof. Dr. Arzu Aydoğan YENMEZ - Niğde Ömer Halisdemir University
- Assoc. Prof. Dr. Fatih ÖZDEMİR - Nevşehir Hacı Bektaş Veli University
- Assoc. Prof. Dr. Aybüke PABUÇCU AKIÇ - Dokuz Eylül University
- Assoc. Prof. Dr. Ayşe YALÇIN ÇELİK - Gazi University
- Assoc. Prof. Dr. Cemalettin YILDIZ - Giresun University
- Assoc. Prof. Dr. Ebru BOZPOLAT - Sivas Cumhuriyet University
- Assoc. Prof. Dr. Ela Ayşe KÖKSAL - Niğde Ömer Halisdemir University
- Assoc. Prof. Dr. Ferhunde KÜÇÜKŞEN ÖNER - Bartın University
- Assoc. Prof. Dr. Gül Kaleli YILMAZ - Bursa Uludağ University
- Assoc. Prof. Dr. Gülcan ÇETİN - Balıkesir University
- Assoc. Prof. Dr. Güllüzar EYMUR - Giresun University
- Assoc. Prof. Dr. Gürsel GÜLER - Yozgat Bozok University
- Assoc. Prof. Dr. Hatice YILDIZ DURAK - Bartın University
- Assoc. Prof. Dr. Hatice Yıldız DURAK - Bartın University
- Assoc. Prof. Dr. İbrahim COŞKUN - Trakya University
- Assoc. Prof. Dr. Mehmet Cem ODACIOĞLU – Bartın University
- Assoc. Prof. Dr. Muammer YILMAZ - Bartın University
- Assoc. Prof. Dr. Mustafa Zeki ÇIRAKLI - Karadeniz Teknik University
- Assoc. Prof. Dr. Nalan Okan AKIN - Giresun University
- Assoc. Prof. Dr. Nuray MAMUR - Pamukkale University
- Assoc. Prof. Dr. Nurhan ÖZTÜRK - Sinop University
- Assoc. Prof. Dr. Sinem TARHAN - Bartın University
- Assoc. Prof. Dr. Tarik KIŞLA - Ege University
- Asst. Prof. Dr. Abdulkadir HAKTANIR - Necmettin Erbakan University
- Asst. Prof. Dr. Adem YILMAZ - Kastamonu University
- Asst. Prof. Dr. Ahmet Berk ÜSTÜN - Bartın University
- Asst. Prof. Dr. Ali BOSTANCIOĞLU - İskenderun Teknik University
- Asst. Prof. Dr. Armağan ATEŞKAN - İhsan Doğramacı Bilkent University
- Asst. Prof. Dr. Aslihan OSMANOĞLU – Trakya University
- Asst. Prof. Dr. Bahar KARAMAN GÜVENÇ - Bartın University
- Asst. Prof. Dr. Barış SEZER - Hacettepe University
- Asst. Prof. Dr. Belkıs TEKMEK - Başkent University
- Asst. Prof. Dr. Beyza AKSU DÜNYA - Bartın University
- Asst. Prof. Dr. Demet Deniz YILMAZ - Muş Alparslan University
- Asst. Prof. Dr. Emel Güvey AKTAY - Muğla Sıtkı Koçman University
- Asst. Prof. Dr. Emrullah YILMAZ - Bartın University
- Asst. Prof. Dr. Ferhat ÖZTÜRK - Kırıkkale University
- Asst. Prof. Dr. Gülşah SEZEN VEKLİ - Yozgat Bozok University
- Asst. Prof. Dr. Güneş YAVUZ - İstanbul University-Cerrahpaşa
- Asst. Prof. Dr. Hüseyin KAYGIN - Bartın University
- Asst. Prof. Dr. Mustafa KOCAARSLAN - Bartın University
- Asst. Prof. Dr. Mustafa SARITEPECİ - Necmettin Erbakan University
- Asst. Prof. Dr. Mustafa TÜYSÜZ - Van Yüzüncü Yıl University
- Asst. Prof. Dr. Rüveyda KARAMAN DÜNDAR - Bartın University
- Asst. Prof. Dr. Salih GÜLEN - Muş Alparslan University
- Asst. Prof. Dr. Sema SULAK - Bartın University
- Asst. Prof. Dr. Serkan İZMİRLİ - Çanakkale Onsekiz Mart University
- Asst. Prof. Dr. Sezen ARSLAN - Van Yüzüncü Yıl University
- Asst. Prof. Dr. Sezen CAMCI ERDOĞAN - İstanbul University-Cerrahpaşa
- Asst. Prof. Dr. Tuğba ECEVİT - Düzce University
- Asst. Prof. Dr. Ümit DİLEKÇİ - Batman University
- Asst. Prof. Dr. William DELEEUW - Valdosta State University
- Asst. Prof. Dr. Yasemin BÜYÜKŞAHİN - Bartın University
- Asst. Prof. Dr. Zekiye Müge TAVİL - Gazi University
- Lecturer. Dr. Erkan YÜCE - Nevşehir Hacı Bektaş Veli University
- Lecturer Dr. Nesime CAN - Ankara University
- Res. Asst. Dr. Aslı SAYLAN KIRMIZIGÜL - Erciyes University
- Res. Asst. Dr. Dilara SOMUNCU - Gaziantep University
- Res. Asst. Dr. Muhittin ŞAHİN - Ege University
- Res. Asst. Dr. Sinan KESKİN - Hacettepe University
- Res. Asst. Dr. Hasan Yücel ERTEM - Zonguldak Bülent Ecevit University
- Res. Asst. Dr. Neslihan GÖK AYYILDIZ - Niğde Ömer Halisdemir University
- Res. Asst. Dr. Sinem ÜNER - Gazi University
- Dr. İbrahim LİMON
- Dr. İshak Ersin KIRAÇ
- Dr. Ümmüye Nur TÜZÜN

CONTENT

Factors Affecting Attitudes of Prospective Teachers Towards Plastic Arts: An Example of a Faculty of Education in Turkey

Mikail Gökçe & Ayşegül Oğuz-Namdar

Research Article, <http://dx.doi.org/10.14686/buefad.610313>

Gökçe, M. & Oğuz-Namdar, A. (2020). Factors affecting attitudes of prospective teachers towards plastic arts: An example of a faculty of education in Turkey. *Bartın University Journal of Faculty of Education*, 9(3), 464-491.

The Effect of The Manipulative Materials on The Early Mathematical Skills

Menekşe Boz, Gonca Uludağ, & Serap Erdoğan

Research Article, <http://dx.doi.org/10.14686/620085>

Boz, M., Uludağ, G. & Erdoğan, S. (2020). The effect of the manipulative materials on the early mathematical skills. *Bartın University Journal of Faculty of Education*, 9(3), 492-500.

Adaptation of the Scales of Justice in the Classroom into Turkish

Sinem Tarhan

Review Article, <http://dx.doi.org/10.14686/buefad.637422>

Tarhan, S. (2020). Adaptation of the scales of justice in the classroom into Turkish. *Bartın University Journal of Faculty of Education*, 9(3), 501-514.

Analysis of Scientific Epistemological Beliefs and STEM Attitudes of The Gifted Students

İsmail Dönmez & Semra Yalmancı-Yücel

Research Article, <http://dx.doi.org/10.14686/buefad.644698>

Dönmez, İ. & Yalmancı-Yücel, S. (2020). Analysis of scientific epistemological beliefs and STEM attitudes of the gifted students. *Bartın University Journal of Faculty of Education*, 9(3), 515-526.

Flipped Classroom Experiences of Preservice Teachers: Implications from a Mathematics Course

Taner Arabacıoğlu, Ersen Yazıcı, & Deniz Özen-Ünal

Research Article, <http://dx.doi.org/10.14686/buefad.659164>

Arabacıoğlu, T., Yazıcı, E. & Özen-Ünal, D. (2020). Flipped classroom experiences of preservice teachers: Implications from a mathematics course. *Bartın University Journal of Faculty of Education*, 9(3), 527-544.

Investigating Middle School Students' Metacognition and Mathematical Reasoning of Problem-Solving Skills

Sevim Sevgi, Yavuz Macun, & Cemalettin Işık

Research Article, <http://dx.doi.org/10.14686/buefad.675770>

Sevgi, S., Macun, Y. & Işık, C. (2020). Investigating middle school students' metacognition and mathematical reasoning of problem-solving skills. *Bartın University Journal of Faculty of Education*, 9(3), 545-563

A Scale Development Study on Middle School Students' Resistance Behaviors

Ece Yolcu & Mediha Sari

Research Article, <http://dx.doi.org/10.14686/buefad.685056>

Yolcu, E. & Sari, M. (2020). A scale development study on middle school students' resistance behaviors. *Bartın University Journal of Faculty of Education*, 9(3), 564-576.

Student Responses to Written Corrective Feedback on Multiple Draft Essays in an EFL Context

Vasfiye Geçkin

Review Article, <http://dx.doi.org/10.14686/buefad.685527>

Geçkin, V. (2020). Student responses to written corrective feedback on multiple draft essays in an EFL context. *Bartın University Journal of Faculty of Education*, 9(3), 577-597.

An Investigation on Instructional Emotions of English Language Teaching Students

Ayfer Su Bergil

Review Article, <http://dx.doi.org/10.14686/buefad.691395>

Su-Bergil, A. (2020). An investigation on instructional emotions of English language teaching students. *Bartın University Journal of Faculty of Education*, 9(3), 598-611.

The Effect of 5E Learning Cycle and Multiple Intelligence Approach on 9th Grade Students' Achievement, Attitude, and Motivation toward Chemistry on Unit of Chemical Properties

Mustafa Tüysüz & Ömer Geban

Research Article, <http://dx.doi.org/10.14686/buefad.724352>

Tüysüz, M. & Geban, Ö. (2020). The effect of 5E learning cycle and multiple intelligence approach on 9th grade students' achievement, attitude, and motivation toward chemistry on unit of chemical properties. *Bartın University Journal of Faculty of Education*, 9(3), 612-644.

The Use of Flipped Classroom Model in Teaching Profession Knowledge Course: Its Effects on Attitudes and Self-Efficacy Beliefs

Murat Debbag & Sevilay Yıldız

Review Article, <http://dx.doi.org/10.14686/buefad.725291>

Debbag, M. & Yıldız, S. (2020). The use of flipped classroom model in teaching profession knowledge course: Its effects on attitudes and self-efficacy beliefs. *Bartın University Journal of Faculty of Education*, 9(3), 645-665.

Lesson Study in Action: A Multiple Case Study of EFL Teachers

Ilknur Bayram & Özlem Canaran

Research Article, <http://dx.doi.org/10.14686/buefad.730780>

Bayram, I. & Canaran, Ö. (2020). Lesson study in action: A multiple case study of EFL teachers. *Bartın University Journal of Faculty of Education*, 9(3), 666-679.

TEOG (TEPSE) English Test: Content Validity and Teachers' Views

Ayşenur Uzun & Ferit Kılıçkaya

Research Article, <http://dx.doi.org/10.14686/buefad.732132>

Uzun, A. & Kılıçkaya, F. (2020). TEOG (TEPSE) English test: Content validity and teachers' views. *Bartın University Journal of Faculty of Education*, 9(3), 680-708.

Investigation Of the Relationship Between the Interpersonal Problem-Solving Skills and Self-Determination Levels of Pre-Service Teachers who Received and did not Receive Art Training

Aşkın Ceren Erez & Orhan Taşkesen

Research Article, <http://dx.doi.org/10.14686/buefad.757271>

Erez, A. C. & Taşkesen, O. (2020). Investigation of the relationship between the interpersonal problem-solving skills and self-determination levels of pre-service teachers who received and did not receive art training. *Bartın University Journal of Faculty of Education*, 9(3), 709-720.

Language Awareness and Second Language Acquisition: Is there a link?

Eda Başak Hancı-Azizoğlu

Research Article, <http://dx.doi.org/10.14686/buefad.764394>

Hancı-Azizoğlu, E. B. (2020). Language awareness and second language acquisition: is there a link? *Bartın University Journal of Faculty of Education*, 9(3), 721-732.



Factors Affecting Attitudes of Prospective Teachers Towards Plastic Arts: An Example of a Faculty of Education in Turkey

Mikail Gökçe^{*a}, Ayşegül Oğuz-Namdar^b

Article Info

DOI: 10.14686/buefad.610313

Article History:

Received: 24.08.2019

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Art,
Plastic arts,
Prospective teachers,
Attitude.

Article Type:

Research Article

Abstract

This research aims to determine the factors affecting the prospective teachers' attitudes towards plastic arts. The population of the research consists of prospective teachers who study in the 3rd and 4th grades of a Faculty of Education in Turkey. A total of 646 prospective teachers participated in the study. Personal information form and attitude scale were used to collect data. SPSS Package Programme was used for quantitative analyses. T-test and one-way analysis of variance (ANOVA) were used for analyzing the data obtained from personal information form and attitude scale. Results indicated that attitudes of prospective teachers towards plastic arts were affected by the following factors: reading newspapers, liking a field of art, reading books related to art, and their genders. It was also found out that prospective teachers were interested in plastic arts. In line with these results, it is suggested that plastic arts education and related activities should be more frequently included in university education.

Öğretmen Adaylarının Plastik Sanatlara Yönelik Tutumlarını Etkileyen Faktörler: Türkiye'deki Bir Eğitim Fakültesi Örneği

Makale Bilgisi

DOI: 10.14686/buefad.610313

Makale Geçmişi:

Geliş: 24.08.2019

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Sanat,
Plastik sanatlar,
Öğretmen adayları,
Tutum.

Makale Türü:

Araştırma Makalesi

Öz

Bu araştırma öğretmen adaylarının plastik sanatlara yönelik tutumlarını etkileyen faktörlerini belirlemek amacıyla yapılmıştır. Araştırmanın evrenini Türkiye'deki bir Eğitim Fakültesinde 3. ve 4. sınıfta öğrenim gören öğretmen adayları oluşturmaktadır. Toplam 646 öğretmen adayı araştırmanın örneklemini oluşturmaktadır. Verilerin toplanması amacıyla kişisel bilgi formu ve tutum ölçeği uygulanmıştır. Nicel analizler için SPSS Paket Programı kullanılmıştır. Kişisel bilgi formu ve tutum ölçeğinden elde edilen verilerin çözümlenmesinde t-testi ve tek yönlü varyans analiz testi (ANOVA) kullanılmıştır. Araştırmanın sonucuna göre öğretmen adaylarının plastik sanatlara yönelik tutumlarını belirleyen faktörler şu şekilde belirlenmiştir: gazete okuma durumu, bir sanat dalını sevimeleri, sanatla ilgili kitap okuyup okumama durumları ve cinsiyetleri. Ayrıca öğretmen adaylarının plastik sanatlara yönelik ilgilerinin olduğu sonucu ortaya çıkmıştır. Bu sonuçlar doğrultusunda üniversitelerde plastik sanatlar eğitimine ve etkinliklerine daha çok yer verilmesi önerilmektedir.

*Corresponding Author: mikail.gokce@gmail.com

^a Researcher, Youth and Sports Provincial Directorate, Bayburt, Turkey, <https://orcid.org/0000-0003-1074-8867>

^b Assoc. Prof. Dr, Recep Tayyip Erdogan University, Rize, Turkey, <https://orcid.org/0000-0002-6853-8507>

Introduction

People have expressed their emotions and ideas differently since their existence. It may be stated that such emotional expression had a great impact on the occurrence and development of art. It is known that art has many functions in human life. Some of these functions may include the emergence of creativity, expressing emotions, aesthetic taste and pleasure, spiritual relaxation, respect to cultural heritage. Art education and education by means of art are necessary for developing art, protecting its existence, securing its continuity and ensuring artistic awareness. "As a cultural and social being, human is in need of being nourished from different sources. One of these sources is art. It may be stated that art is necessary for ensuring that people think independently and distinctively, meet their psychological needs and express themselves comfortably and for creating a contemporary and progressive society (Oğuz, 2013). Based on the literature review, it was found out that there are quite different definitions of art. According to Read (1984), art is simply associated with the concepts of "plastic" or "visual" but it also includes the concepts of literature and music. According to Pasin (2004), art is an aesthetical relationship between human and objective facts in nature, and it is to learn how to see. Tolstoy defines art as "evoking in oneself a feeling one has once experienced and expressing that feeling by means of movement, sound, lines, colors and word to transmit the same feeling to others." Art is the whole process of creating which continuously evolves and brings innovation. French art scientist Charles Lalo highlighted the indispensability of art in life by saying that "art is not far from or close to life, it must be within the life" (as cited in Erbay, 2000).

In general, art is a spiritual activity that arises from people's efforts of beautifully and effectively expressing their emotions and ideas about nature by means of such tools like line, color, form, sound, word, and rhythm through adopting a personal style (Aytaç, 1981). Individually, art is a tool for a person's emotions, ideas, dreams, creative endeavors, realizing oneself, exploring one's own secret potential, and is a significant cultural dynamic of a society with a holistic nature in terms of promoting and binding societies (Ministry of National Education, 2007). Boydaş (2007) states that art and culture constitute the system of values that unites the citizens of a nation and the seal of sovereignty. He expresses that opinion, technology, etc. may be imported but emotion and art can never be imported. Art is a multifunctional social phenomenon. Art has to discuss and criticize a work of art and history, to reflect the one which is up-to-date and to design the future (Tezcan, 2011). Factors that ensure the acceptance of art by other individuals and societies include the fact that art satisfies, amuses, and entertains people, which allows them to take lessons from life as a result (Alakuş, et. al. 2009). Today, art is generally referred to the plastic arts or visual arts. Achieving originality and creating pleasing connections are the common traits of all arts including plastic and visual arts. Art is the expression of the aesthetical relationship between human and objective facts in the nature (Artut, 2007). Art education is not only an academic branch but a practice, mentality and behavior which fully covers and updates education and training. As a holistic component of basic education and the basis of spiritual education, art education aims to protect and develop creative and reproductive powers of a person during the development of personality harmoniously and holistically (San, 1979). The purpose of art education is not to train artists but to train an individual by means of art, namely aesthetic training of an individual. Art is an activity that creates the conditions which help individuals to reveal their creative powers and allows them to have a personality (Buyurgan & Buyurgan, 2001). Thanks to art education, a person learns the culture of society they live in. People who respect and protect their cultural values, tradition, art and history shall convey the culture to their next generations. Moral and material values have important effects on the formation of a nation, continuation of its existence and its progression on solid basis. Art education makes children and youth familiar with their culture, teaches and endears it, and allows them to grow into individuals who protect and sustain such values (Buyurgan and Buyurgan, 2007).

Thanks to quality art education, students learn both verbal and non-verbal methods that they can use to express their abstract ideas and emotions. Students also learn to trust in their creative intelligences and find out many different solutions to some problems. This attribute teaches students not to be afraid of deciding when there are multiple correct answers, and instills notions and techniques for the effective control of visual images they produce. Students enhance their perceptual, interpretational, and analytical skills (Boydaş, 2007). Art education aims to allow students to think creatively and express themselves. As part of this aim, art education ensures that students can interact within a society and make cultural exchange. Gazi Mustafa Kemal Atatürk, who attaches great importance to art and art education as a requirement for a country, emphasizes this by stating that "a nation devoid of art has lost part of its lifeblood" and "nations without art and artists are condemned to suffer under the governance of other nations." It is a necessity for every individual to take part in artistic activities and to show

interest in art. Thus, art education within formal education is provided under a specific program. Notion of art has been subject to the endeavors of classifying or grouping in under different titles up until today. As a result, art was divided into various branches. One of these branches is the Plastic Arts.

Plastic arts is the name used for referring to all works of arts including painting, sculpture, drawing, etc. which are created by applying materials (plastic in nature) like paint, clay that can be molded or shaped (İşcanoğlu, 2010). Plastic Arts consist of painting, sculpture and architectural arts. It is the name of arts that are expressed in three dimensions (Turani, 1975). In the art of shaping soft bodies, all the arts in the fields of painting, sculpture, engraving, and the art of sculpture, which are suitable for shaping plastic, hard bodies, are called plastic arts. In short, relief works of art are called plastic arts (Arseven, 1983). Plastic arts education aims to improve an individual's skills and creativity and enhance their aesthetical emotions as a self-confident, productive person. In line with this purpose, it entails to equip an individual with material know-how and provide the necessary education (Ateş, 2006). Some departments of faculty of education include art education in their curriculum as either a compulsory or an elective course. All teachers across different disciplines should receive art education. It is considered that if prospective teachers studying at a faculty of education are interested in plastic arts and adopt positive attitudes towards plastic arts, such interest and attitude shall positively affect their professional performances either directly or indirectly. In addition to its general functions, art is also used as a tool by teachers in training and education from time to time. Considering that teachers provide education to individuals who shall train the society, and may possibly guide them, it is important that prospective teachers who shall be the teachers of future adopt positive attitudes towards art, plastic arts (visual arts). Plastic arts education puts excitement, image and any emotion into practice by equipping the students with material know-how, improving their skills for seeing and shaping and training them. It allows students to improve their imagination, protect, care and love nature and works of art, gain insight for recognizing works of art and express what they learn. By changing the behaviors of a person, one should be given the chance to put what they learn into practice in the best possible manner (Erbay, 2000). This study which aims to determine the factors affecting attitudes of prospective teachers towards plastic arts was carried out along with prospective teachers who study at the faculty of education of a public university in northern Turkey. In the literature, attitudes have been defined in many ways. Attitude may be described as a reaction tendency that is adopted by an individual towards a phenomenon or object in their environment (İnceoğlu, 2000). Attitude is the way of choosing a position between positive and negative towards an entity, an object, a person or an incident (Fidan, 1996). In short, attitude is a tendency to give a reaction (Tezbaşaran, 1997). Adopting a functional perspective, Gardner defines attitude as a reaction of an individual towards a specific object or notion based on their belief and ideas (Gardner, 1985). Attitudes consist of mental, emotional and behavioral elements. It is assumed that there is a correlated consistency between these elements in general. According to this assumption, if the things that an individual knows require them to have a positive perspective mentally and if the individual is positive towards that object emotionally, we refer to it behaviorally (İnceoğlu, 2000). In the literature, there are many studies conducted in relation to attitude (Francis & Greer, 1999; Morrel & Lederman, 1998; Weinburg, 1995; Howard, 2003; Gazotti, 2000; House & Prison, 1998; Geban et. al., 1992; Lewin et. al. 1991; Coşkun, 2001; Serin, 2001; Ünlü, 2000; Yalvaç & Sungur, 2000; Selçuk, 1997; Yalçın, 1997; Hotaman, 1995).

Considering the papers related to painting education in the literature, the study, conducted by Sever (2005) to analyze the opinions of six grade students of the elementary school regarding painting course by means of mastery learning model indicated meaningful differences between their opinions based on the students' genders, schools, their parents' education status, levels of income, cognitive, psychomotor and affective skills and learning strategies. In Ökten's (2005) study conducted to investigate the creativity levels of 1st level elementary school students in a painting course and creative activities that may be engaged in with these students, Torrence Test of Creative Thinking was implemented and it was found out the gender differences of students did not lead to significant differences in terms of fluency, flexibility, and originality. The study conducted by Kurtuluş (2002) in relation with the place of painting courses in a weekly class schedule of elementary schools and the effects of these courses on students, ensured to determine the changes in the duration of painting course which is a significant component of art education at elementary school and respective attitudes of the students. In her study named creativity in children's paintings and improving them through painting education, Özcan (2002) emphasized that children's paintings were creative, children's creativity could be improved by means of art education, however a sophisticated method should be adopted to improve creativity of children. In a study conducted by Özden (2003) in relation to the fundamental problems experienced in painting education of the second level elementary school teachers, a meaningful difference was found in all factor groups in terms of painting teachers' opinions related to

the problems of painting course based on the institution and district of the institution they work at, and there was not a significant difference in terms of their opinions related to the problems of the painting course based on their genders, seniorities and cities where their faculty of graduation was located. Ayhan (1992) investigated the effect of painting course on other courses in secondary education and stated that children who painted were physically and mentally active, and their mental and physical status kept being active during other courses, too. In a study related to painting education at primary schools and problems encountered, Arısoy (1994) emphasized that many problems were experienced in painting education. It was highlighted that such problems arose from general education understanding, our methods of training teachers, school principals and inspectors, school structures and curriculums. Genç (2002) conducted a study to determine the problems experienced by elementary school painting teachers in practice and to develop solution suggestions. It was emphasized that there were many problems which constituted obstacles for elementary school painting teachers to achieve the projected objectives and behaviors (problems arising from the curriculum, tool-equipment use and availability, socio-cultural structure of the environment as well as physical problems). In her study which aims to investigate various factors determining the perspectives of secondary school-age students in terms of painting course, Bayram (1993) emphasized that attitudes of subjects towards painting course were adversely affected by the problems arising from general education understanding, curriculum, tight schedule, physical structures of schools, underestimation of painting course, parents who are lack of artistic culture. Burçak (2003) emphasized that problems were experienced during the applied parts of the painting course and the course deviated from its aim due to such reasons as a high number of students, lack of painting studio, lack of tools-equipment. In the study conducted by Coşkun (2001) with the aim of investigating the relationship between the attitudes of high school students with different socio-economic levels towards painting course and their school success, it was found out that income levels of families were not meaningfully connected with the school and that there was a meaningful relationship between the attitude towards painting course and school success.

Plastic arts education aims to train people so that they become individuals who are creative, care for aesthetic values, and improve themselves by seeing and exploring. It is important for a society to have people with sophisticated creativity who appreciate works of art, distinguish, evaluate, and interpret their environment (Şenlitürk, 2013). It was intended to determine the factors affecting the attitudes of prospective teachers towards plastic arts by means of practices of the study.

Problem Status

Taking prospective teachers as the basis, the study aims to determine the factors affecting attitudes of prospective teachers in different departments towards plastic arts. Moreover, in line with the information obtained, the problem status was put forward by looking at whether there is a significant difference between variables arising from the analysis of attitudes of prospective teachers towards plastic arts.

Sub-problems of the Study

1. What are the factors affecting attitudes of prospective teachers towards plastic arts?

Method

Descriptive research method was used in this study to determine the factors affecting the attitudes of prospective teachers, who were in their 3rd and 4th years of study at a faculty of education of a university in Turkey, towards plastic arts. The descriptive research model defines a given situation as completely and carefully as possible (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2010). This section covers the research model, population and sample group of the research, role, and characteristics of the researcher, data collection tools, analysis of collected data and process.

Research Model

Survey model was used for conducting this study. Survey models are applied to a population consisting of a large number of -on the whole population or a group, sample or sample group taken from it- in order to reach a general conclusion on the population (Karasar, 1999). The convenience sampling method allows the researcher to take samples from the world around them (Balcı, 2007). The researcher begins to create their sample group, starting from the most accessible responders until they reach the required group size or works on the most accessible situation or sample that will save time and money (Büyüköztürk et al., 2010).

Population and Sample of the Research

The population of the research consists of 716 prospective teachers in total, who were in their 3rd and 4th years of study at the Faculty of Education of a public university in northern Turkey in the 2017-2018 academic year. All students in their 3rd and 4th years at undergraduate programs at the faculty of education were included in the research. The sample group of the research consisted of 646 prospective teachers in total, including 71 prospective teachers from Elementary School Mathematics Teaching, 107 prospective teachers from Science Teaching, 238 prospective teachers from Psychological Counseling and Guidance undergraduate program, 154 prospective teachers from Primary School Teaching and 76 prospective teachers from Turkish Teaching. Moreover, forms and scales of 8 participating prospective teachers were not included in the sample group due to missing answers. Information on other study groups is given in Table 1.

Table 1. Numbers of Prospective Teachers According to Study Groups

Numbers of Prospective Teachers According to Genders	Male	Female		
	262	384		
Numbers of Prospective Teachers According to GPAs	0.00-2.49	2.50-2.99	3.00 and Above	
	114	260	272	
Numbers of Prospective Teachers According to Newspaper Reading Frequency	I read every day	I read a few times a week	I read a few times a month	I never read
	35	114	230	266
Numbers of Prospective Teachers According to Favorite Art Branches	Painting	Photography	Music	Ballet
	Theater	Cinema	None	Other
	60	84	212	4
	42	110	29	3
Numbers of Prospective Teachers According to Their Status of Reading Books Related to Art	I read all the time	I sometimes read	I rarely read	I never read
	45	194	189	215

Data Collection Tools

The conceptual framework of this study was created through a literature review. The data collection tools used in the survey were Scale of Attitude Towards Plastic Arts (Şenlitürk, 2013) and Personal Information Form.

Scale of Attitude Towards Plastic Arts

Scale of Attitude Towards Plastic Arts (Şenlitürk, 2013) and Personal Information Form were used in the study to determine the attitudes of prospective teachers towards plastic arts. Scale of Attitude Towards Plastic Arts consists of 14 items. The scale is in the form of 5 point likert scale. The items that reveal the attitudes towards plastic arts were scaled as 1- I totally agree, 2- I agree, 3- I'm neutral, 4- I don't agree, 5- I strongly disagree. Some expressions in the attitude scale were asked with a negative question pattern (I don't have any skills for plastic arts. I don't like to visit exhibitions on plastic arts.), and were corrected with reverse coding during analysis of data. Variables for Attitudes Towards Plastic Arts and Variables in the Personal Information Form were used to ensure the validity and reliability of the study. Necessary written approval was obtained from Şenlitürk (2013) to use Scale of Attitude Towards Plastic Arts developed thereby. In order to determine the items of the scale, Şenlitürk (2013) asked 20 prospective teachers who were in their 4th year at a Social Sciences Teaching, Primary School Teaching and Turkish Teaching departments at the Faculty of Education of Burdur Mehmet Akif Ersoy University to write compositions. The attitude scale consisting of 29 items were applied to prospective teachers who were in their 4th year. As a consequence of the pilot application, the questions of the attitude scale were analyzed with the help of expert opinions, and the attitude scale used in the actual study was created. Şenlitürk (2013) conducted principal components factor analysis to reveal the structural validity of the scale. As a result, it was found out that the scale had a 4-factor structure. These factors explain 66% of the total variance. Accordingly, it can be said that the scale can make considerably correct measurements that are fit for the purpose. After obtaining necessary legal

permissions, the attitude scale and personal information form were applied to prospective teachers after talking to the academicians to determine a day and hour. The number of female-male prospective teachers participating in the study according to their undergraduate programs are shown in Table 2.

Table 2. Numbers of Female-Male Prospective Teachers According to Undergraduate Programs

	Primary School Mathematics	Science	PCG	Primary School	Turkish
Female	45	64	131	98	46
Male	26	43	107	56	30
Total	71	107	238	154	76

Personal Information Form

The personal information form developed by the researcher constituted the preliminary section of the attitude scale. The questions are related to the prospective teachers' ages, genders, grade point average (GPAs), undergraduate programs they are studying, whether they read newspapers, their favorite art branches, and whether they read books related to art.

Analysis of Data

For the collection of data, the researcher applied the attitude scale and personal information form on prospective teachers, who were in their 3rd and 4th years, of all undergraduate programs at the faculty of education of a public university in northern Turkey. For the analysis of data obtained from the attitude scale and personal information form, answers of prospective teachers were evaluated one by one, and Frequency (f) and percentage (%) values were analyzed by using SPSS package program. The items of attitude scale were scored for evaluation. T-test and one-way analysis of variance (ANOVA) were conducted for comparable independent groups after meeting parametric conditions. For general reliability and sub-dimension reliability, Cronbach Alpha internal consistency reliability coefficient was calculated. The findings were interpreted in the significance level of .05.

T- test: It is used to test whether the difference between two unrelated sampling averages is significant. Assumptions, measurements for dependent variable and scores are in interval or ratio scale, and the average of two comparable groups belongs to the same variable. The distribution of measurements for the dependent variable are normal in both groups. Samples, the average scores of which will be compared, are unrelated (Büyüköztürk, 2017). As the independent variable consists of two dimensions in this research, t-test was used for independent groups.

One-Way Analysis of Variance (ANOVA): It is used to test whether the difference between two or more unrelated sample averages is significantly different from zero (Büyüköztürk, 2017). One-way ANOVA was applied where there are three and more independent variables in this research.

Research Ethics

This research was evaluated at the meeting (no:2/2020) by the Ethics Committee of Social Sciences and Humanities of Recep Tayyip Erdogan University in 21.02.2020 and found ethically acceptable

Findings

This section covers findings and their interpretations.

Normality Values

Table 3. Normality Values

Variable	\bar{X}	Sd	Cronbach Alpha	Skewness Value	Kurtosis Value
Sub-dimension of skill	6.26	1.23	.71	.698	1.50
Sub-dimension of attitude	9.59	1.86	.74	.244	-.038
Sub-dimension of following recent developments	14.58	3.39	.83	-.403	-.048
Sub-dimension of exhibition	12.90	3.75	.75	-.023	.603

Based on Table 3, skewness and kurtosis values of the scale of attitude of prospective teachers towards plastic arts were found as (.698, 1.50) for the sub-dimension of skill, as (.244, -.038) for the sub-dimension of attitude, as (-.403, -.048) for the sub-dimension of following recent developments, and as (-.23, .603) for the sub-dimension of the exhibition, respectively. It is expressed that these values analyzed meet the normality assumption. The skewness and kurtosis values between +2 and -2 show that the normality assumption is met (George & Mallery, 2003). Upon analyzing the table, considering that the Cronbach Alpha internal consistency reliability coefficient is above .70, and the reliability level stipulated for measurement tools that may be used in research is .70 (Sipahi, Yurtkoru & Çinko, 2008), it may be stated that internal consistency reliability is appropriate.

Findings on the Dimension of Skill

Frequencies and percentages were taken into consideration while obtaining the findings for this dimension. The findings obtained are shown in Table 4 below.

Table 4. Opinions of Prospective Teachers on the Dimension of Skill

	I totally agree		I agree		I'm neutral		I don't agree		I strongly disagree	
	f	%	f	%	f	%	f	%	f	%
I have skills for plastic arts.	35	5.4	119	18.4	186	28.7	173	26.7	133	20.5
I don't have any skills for plastic arts.	88	13.6	123	19	172	26.6	148	22.9	115	17.8

Based on Table 4, item "I have skills for plastic arts;" was answered as "I totally agree," by 35 of the prospective teachers (5.4%), as "I agree," by 119 (18.4%), as "I'm neutral," by 186 (28.7%) as "I don't agree," by 173 (26.7%) and as "I strongly disagree." 133 (20.5%) prospective teachers. For this item, it can be concluded that the prospective teachers are neutral on the opinion of having skills for plastic arts.

For the item "I don't have any skills for plastic arts," frequency and percentage were found with reverse coding. 115 of the prospective teachers (17.8%) answered "I totally agree," 148 (22.9%) answered "I agree," 172 (26.6%) answered "I'm neutral," 123 (19%) answered "I don't agree," and 88 (13.6%) answered "I strongly disagree." For this item, it can be concluded that the students are neutral on the opinion of not having any skills for plastic arts.

Findings on the Dimension of Attitude

Frequencies and percentages were taken into consideration while obtaining the findings for this dimension. The findings obtained are shown in Table 5 below.

Table 5. Opinions of Prospective Teachers on the Dimension of Attitude

	I totally agree		I agree		I'm neutral		I don't agree		I strongly disagree	
	f	%	f	%	f	%	f	%	f	%
I think necessary interest is not shown in plastic arts in our country.	146	22.6	231	35.7	201	31.1	44	6.8	24	3.7
Plastic arts should be made widespread in our city.	173	26.7	281	43.4	118	18.2	46	7.1	28	4.3
I'm interested in plastic arts.	56	8.6	195	30.1	158	24.4	141	21.8	96	14.8
I think our country is not interested in plastic arts.	144	22.2	252	39	181	28	51	7.8	18	2.7
I like having an interest in plastic arts.	45	6.9	176	27.2	203	31.4	152	23.5	70	10.8

Based on Table 5, to the item "I think necessary interest is not shown in plastic arts in our country;" 146 of the prospective teachers (22.6%) answered "I totally agree," 231 (35.7%) answered "I agree," 201 (31.1%) answered "I'm neutral," 44 (6.8%) answered "I don't agree," and 24 (3.7%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers think the necessary interest is not shown in plastic arts in our country.

To the item "Plastic arts should be made widespread in our city;" 173 of the prospective teachers (26.7%) answered "I totally agree," 281 (43.4%) answered "I agree," 118 (18.2%) answered "I'm neutral," 46 (7.1%) answered "I don't agree," and 28 (4.3%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers agree plastic arts should be made widespread in their city.

To the item "I'm interested in plastic arts;" 56 of the prospective teachers (8.6%) answered "I totally agree," 195 (30.1%) answered "I agree," 158 (24.4%) answered "I'm neutral," 141 (21.8%) answered "I don't agree," and 96 (14.8%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers are interested in plastic arts.

To the item "I think our country is not interested in plastic arts;" 144 of the prospective teachers (22.2%) answered "I totally agree," 252 (39%) answered "I agree," 181 (28%) answered "I'm neutral," 51 (7.8%) answered "I don't agree," and 18 (2.7%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers think our country is not interested in plastic arts.

To the item "I like having an interest in plastic arts;" 45 of the prospective teachers (6.9%) answered "I totally agree," 176 (27.2%) answered "I agree," 203 (31.4%) answered "I'm neutral," 152 (23.5%) answered "I don't agree," and 70 (10.8%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers are neutral on whether they like having an interest in plastic arts.

Findings on the Dimension of Current Developments

Frequencies and percentages were taken into consideration while obtaining the findings for this dimension. The findings obtained are shown in Table 6 below.

Table 6. Opinions of Prospective Teachers on the Dimension of Current Developments

	I totally agree		I agree		I'm neutral		I don't agree		I strongly disagree	
	f	%	f	%	f	%	f	%	f	%
I like reading articles on plastic arts.	19	2.9	96	14.8	123	19	264	40.8	144	22.2
I like following news on plastic arts from TV, internet, radio, newspaper and magazines.	31	4.7	147	22.7	135	20.8	226	34.9	107	16.5
I follow developments on plastic arts.	16	2.4	84	13	156	24.1	259	40	130	20.1
I follow courses on plastic arts in the city I live.	10	1.5	48	7.4	97	15	301	46.5	190	29.4

Based on Table 6, to the item "I like reading articles on plastic arts;" 19 of the prospective teachers (2.9%) answered "I totally agree," 96 (14.8%) answered "I agree," 123 (19%) answered "I'm neutral," 264 (40.8%) answered "I don't agree," and 144 (22.2%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers do not like reading articles on plastic arts.

To the item "I like following news on plastic arts from TV, internet, radio, newspaper and magazines;" 31 of the prospective teachers (4.7%) answered "I totally agree," 147 (22.7%) answered "I agree," 135 (20.8%) answered "I'm neutral," 226 (34.9%) answered "I don't agree," and 107 (16.5%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers do not like following news on plastic arts from TV, internet, radio, newspapers and magazines.

To the item "I follow developments on plastic arts;" 16 of the prospective teachers (2.4%) answered "I totally agree," 84 (13%) answered "I agree," 156 (24.1%) answered "I'm neutral," 259 (40%) answered "I don't agree," and 130 (20.1%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers do not follow developments in plastic arts.

To the item "I follow courses on plastic arts in the city I live;" 10 of the prospective teachers (1.5%) answered "I totally agree," 68 (7.4%) answered "I agree," 97 (15%) answered "I'm neutral," 301 (46.5%) answered "I don't agree," and 190 (29.4%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers do not follow courses on plastic arts in the city they live.

Findings on the Dimension of Exhibition

Frequencies and percentages were taken into consideration while obtaining the findings for this dimension. The findings obtained are shown in Table 7 below.

Table 7. Opinions of Prospective Teachers on the Dimension of Exhibition

	I totally agree		I agree		I'm neutral		I don't agree		I strongly disagree	
	f	%	f	%	f	%	f	%	f	%
I like visiting exhibitions on plastic arts.	78	12	223	34.5	143	22.1	123	19	79	12.2
I don't like visiting exhibitions on plastic arts.	105	16.2	229	35.4	155	23.9	95	14.7	62	9.5
I visit exhibitions on plastic arts.	26	4	139	21.5	154	23.8	201	31.1	126	19.5

Based on Table 7, to the item "I like visiting exhibitions on plastic arts;" 78 of the prospective teachers (12%) answered "I totally agree," 223 (34.5%) answered "I agree," 143 (22.1%) answered "I'm neutral," 123 (19%) answered "I don't agree," and 79 (12.2%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers like visiting exhibitions on plastic arts.

For the item "I don't like to visit exhibitions on plastic arts," frequency and percentage were found with reverse coding. 62 of the prospective teachers (9.5%) answered "I totally agree," 95 (14.7%) answered "I agree," 155 (23.9%) answered "I'm neutral," 229 (35.4%) answered "I don't agree," and 105 (16.2%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers like visiting exhibitions on plastic arts.

To the item "I visit exhibitions on plastic arts;" 26 of the prospective teachers (4%) answered "I totally agree," 139 (21.5%) answered "I agree," 154 (23.8%) answered "I'm neutral," 201 (31.1%) answered "I don't agree," and 126 (19.5%) answered "I strongly disagree." For this item, it can be concluded that the prospective teachers do not visit exhibitions on plastic arts.

Findings on Genders

Four factors -skill, attitude, current developments, exhibition- were used for obtaining the findings on the attitude of prospective teachers towards plastic arts. T-test was conducted for independent groups in order to determine whether the attitude scores of prospective teachers towards plastic arts vary according to gender. The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to Gender

Table 8. Comparison of the Dimension of Skill According to Gender

	Gender	N	\bar{X}	ss	sd	t	p
Dimension of skill	Male	262	6.21	1.31	644	-.85	.38
	Female	384	6.30	1.18			

Based on Table 8, no significant difference was found between the scores for the sub-dimension of skill in the attitude scale of prospective teachers towards plastic arts according to their gender ($t_{644} = -.85$, $p = .380$). Accordingly, it can be said that gender had no effect on opinions on skills for plastic arts, and male and female prospective teachers have similar opinions on skills for plastic arts.

Comparison of the Dimension of Attitude According to Gender

Table 9. Comparison of the Dimension of Attitude According to Gender

	Gender	N	\bar{X}	ss	sd	t	p
Dimension of attitude	Male	262	13.36	3.90	644	2.59	.01*
	Female	384	12.59	3.60			

* $p < .05$

Based on Table 9, a significant difference was found between the scores for the sub-dimension of skill in the attitude scale of prospective teachers towards plastic arts according to their gender ($t_{644} = -2.59$, $p = .01$). Looking at this difference, it is seen that males' average scores for the dimension of attitude ($\bar{X} = 13.36$, $S_s = 3.90$) is significantly higher than females' average scores for the dimension of attitude ($\bar{X} = 12.59$, $S_s = 3.60$). Based on this finding, it can be said that the attitude of male prospective teachers towards plastic arts is more positive than female prospective teachers.

Comparison of the Dimension of Current Developments According to Gender

Table 10. Comparison of the Dimension of Current Developments According to Gender

	Gender	N	\bar{X}	ss	sd	t	p
Dimension of Current Developments	Male	262	14.63	3.27	644	.35	.73
	Female	384	14.54	3.49			

Based on Table 10, no significant difference was found between the scores for the sub-dimension of current developments in the attitude scale of prospective teachers towards plastic arts according to their gender ($t_{644} = -.35$, $p = .73$). Accordingly, it can be said that gender had no effect on following current developments on plastic arts, and male and female prospective teachers have similar opinions on following current developments on plastic arts.

Comparison of the Dimension of Exhibition According to Gender

Table 11. Comparison of the Dimension of Exhibition According to Gender

	Gender	N	\bar{X}	ss	sd	t	p
Dimension of Exhibition	Male	262	9.58	1.91	644	-.08	.93
	Female	384	9.60	1.83			

Based on Table 11, no significant difference was found between the scores for the sub-dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts according to their gender ($t_{644} = -.08$, $p = .93$). Accordingly, it can be said that gender had no effect on following exhibitions on plastic arts, and male and female prospective teachers have similar opinions on the following exhibitions on plastic arts.

Findings on GPA

Data were reviewed in four factors -skill, attitude, current developments and exhibition- while obtaining the findings towards plastic arts in the research. One-way ANOVA was conducted to determine whether attitude scores of prospective teachers towards plastic arts indicate a significant difference according to their GPAs. GPAs were analyzed in three different values (0.00-2.49, 2.50-2.99, and 3.00 and above). The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to GPA**Table 12.** Comparison of the Dimension of Skill According to GPA

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of skill	Between Groups	3.12	2	1.56	1.02	.36
	Within groups	979.67	643	1.53		
	Total	982.79	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way analysis of variance- was met ($F(2,643)=1.75$ $p=.17$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of skill in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their GPA ($F(2, 643) = 1.02, p = .36$). Accordingly, it can be said that GPA had no effect on the opinions of prospective teachers on skills for plastic arts.

Comparison of the Dimension of Attitude According to GPA**Table 13.** Comparison of the Dimension of Attitude According to GPA

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of attitude	Between Groups	44.05	2	22.03	1.57	.21
	Within groups	9002.41	643	14.00		
	Total	9046.46	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(2,643)=.65$ $p=.53$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of attitude in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their GPA ($F(2, 643) = 1.57, p = .21$). Accordingly, it can be said that GPA had no effect on the attitudes of prospective teachers towards plastic arts.

Comparison of the Dimension of Current Developments According to GPA**Table 14.** Comparison of the Dimension of Current Developments According to GPA

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of Current Developments	Between Groups	25.79	2	12.90	1.12	.33
	Within groups	7401.84	643	11.51		
	Total	7427.63	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(2,643)=39$ $p=.68$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of current developments in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their GPA ($F(2, 643) = 1.12, p = .33$). Accordingly, it can be said that the GPA had no effect on whether prospective teachers follow current developments on plastic arts.

Comparison of the Dimension of Exhibition According to GPA

Table 15. Comparison of the Dimension of Exhibition According to GPA

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of Exhibition	Between Groups	12.08	2	6.04	1.74	.18
	Within groups	2228.03	643	3.47		
	Total	2240.11	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(2,643)=.43$ $p=.65$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their GPA ($F(2, 643) = 1.74$, $p = .18$). Accordingly, it can be said that GPA had no effect on whether prospective teachers follow exhibitions on plastic arts.

Findings on Undergraduate Programs

Data were reviewed in four factors -skill, attitude, current developments, and exhibition- while obtaining the findings towards plastic arts in the research. The research was carried out with five undergraduate programs including Turkish Teaching, Science Teaching, Primary School Teaching, Mathematics Teaching and Psychological Counseling and Guidance. One-way analysis of variance was conducted to determine whether attitude scores of prospective teachers towards plastic arts indicated a significant difference according to the undergraduate programs they study. The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to Undergraduate Programs

Table 16. Comparison of the Dimension of Skill According to Undergraduate Programs

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of skill	Between Groups	11.89	4	2.97	1.96	.10
	Within groups	970.90	641	1.52		
	Total	982.79	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(4,641)=2.67$ $p=.06$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of skill in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to the undergraduate programs they study ($F(4,641) = 1.96$, $p = .10$). According to these findings, it can be said that license programs had no effect on opinions of prospective teachers on skills for plastic arts.

Comparison of the Dimension of Attitude According to Undergraduate Programs

Table 17. Comparison of the Dimension of Attitude According to Undergraduate Programs

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of attitude	Between Groups	99.08	4	24.77	1.78	.13
	Within groups	8947.38	641	13.96		
	Total	9046.66	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(4,641)=.38$ $p=.82$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of attitude in the attitude scale of prospective

teachers towards plastic arts did not indicate a statistically significant difference according to the undergraduate programs they study ($F(4,641) = 1.78, p = .13$). According to these findings, it can be said that license programs had no effect on the attitudes of prospective teachers towards plastic arts.

Comparison of the Dimension of Current Developments According to Undergraduate Programs

Table 18. Comparison of the Dimension of Current Developments According to Undergraduate Programs

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of Current Developments	Between Groups	53.80	4	13.45	1.17	.32
	Within groups	7373.83	641	11.50		
	Total	7427.63	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(4,641)=.47, p=.76$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of current developments in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to the undergraduate programs they study ($F(4,641) = 1.17, p = .32$). According to these findings, it can be said that license programs had no effect on whether prospective teachers follow current developments on plastic arts.

Comparison of the Dimension of Exhibition According to Undergraduate Programs

Table 19. Comparison of the Dimension of Exhibition According to Undergraduate Programs

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of Exhibition	Between Groups	.87	4	.22	.06	.99
	Within groups	2239.24	641	3.49		
	Total	2240.11	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(4,641)=1.59, p=.18$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of exhibition in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to the undergraduate programs they study ($F(4,641) = .06, p = .99$). According to these findings, it can be said that license programs had no effect on whether prospective teachers follow exhibitions on plastic arts.

Findings on Newspaper Reading Frequency

Data were reviewed in four factors -skill, attitude, current developments and exhibition- while obtaining the findings towards plastic arts in the research. Data on newspaper reading frequency were obtained with four options including "I read every day," "I read a few times a week," "I read a few times a month" and "I never read." One-way analysis of variance was conducted to determine whether the sub-dimensions of skill, attitude, exhibition and current developments in the attitudes of prospective teachers towards plastic arts indicate a significant difference according to their newspaper reading frequency. The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to Newspaper Reading Frequency**Table 20.** Comparison of the Dimension of Skill According to Newspaper Reading Frequency

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of skill	Between Groups	12.19	3	4.06	2.69	.04*
	Within groups	970.60	642	1.51		
	Total	982.79	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=1.50$ $p=.480$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of skill in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to their newspaper reading frequency ($F(3,642) = 2.69$, $p = .04$). According to the results of Scheffe test conducted to determine the range of the levels of difference between them, no difference was identified. This may have resulted from the fact that Scheffe test is more conservative. Accordingly, it can be said that the newspaper reading frequency had no effect on the sub-dimension of skill in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Attitude According to Newspaper Reading Frequency**Table 21.** Comparison of the Dimension of Attitude According to Newspaper Reading Frequency

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of attitude	Between Groups	61.25	3	20.41	1.46	.23
	Within groups	8985.21	642	14.00		
	Total	9046.46	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=.58$ $p=.71$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of attitude in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their newspaper reading frequency ($F(3, 642) = 1.46$, $p = .23$). Accordingly, it can be said that the newspaper reading frequency had no effect on the dimension of attitude in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Current Developments According to Newspaper Reading Frequency**Table 22.** Comparison of the Dimension of Current Developments According to Newspaper Reading Frequency

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of Current Developments	Between Groups	109.94	3	36.65	3.22	.02*
	Within groups	7317.70	642	11.40		
	Total	7427.63	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=.66$ $p=.58$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for following current developments in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to their newspaper reading frequency ($F(3, 642) = 3.22$, $p = .02$). According to the results of Scheffe test conducted to

determine the range of the levels of difference between them, no difference was identified. This may have resulted from the fact that Scheffe test is more conservative. Accordingly, it can be said that the newspaper reading frequency had no effect on the prospective teachers' attitude of following current developments on plastic arts.

Comparison of the Dimension of Exhibition According to Newspaper Reading Frequency

Table 23. Comparison of the Dimension of Exhibition According to Newspaper Reading Frequency

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of Exhibition	Between Groups	61.09	3	20.36	6.00	.000*
	Within groups	2179.02	642	3.39		
	Total	2240.11	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=1.110$ $p=.41$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to their newspaper reading frequency ($F(3,642) = 6.00$, $p = .000$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, scores for the sub-dimension of the exhibition of prospective teachers, who chose the option of "I never read," towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the option of "I read a few times a month" ($Md = .64$, $SD = .17$). Accordingly, it can be said that the newspaper reading frequency had no effect on the prospective teachers' attitude of following exhibitions on plastic arts.

Findings on Favorite Art Branch

Data were reviewed in four factors -skill, attitude, current developments, and exhibition- while obtaining the findings towards plastic arts in the research. Data on the favorite art branch were obtained with ten options including sculpture, painting, photography, music, ballet, literature, theater, cinema, none and other. One-way analysis of variance was conducted to determine whether the sub-dimensions of skill, attitude, exhibition, and current developments in the attitudes of prospective teachers towards plastic arts indicate a significant difference according to their favorite art branch. The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to Favorite Art Branch

Table 24. Comparison of the Dimension of Skill According to Favorite Art Branch

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of skill	Between Groups	7.93	6	1.32	.87	.52
	Within groups	974.86	639	1.57		
	Total	982.79	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(6,639)=1.01$ $p=.420$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of skill in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their favorite art branch ($F(6, 639) = .87$, $p = .52$). According to these results, it can be said that favorite art branches had no effect on the opinions of prospective teachers on skills for plastic arts.

Comparison of the Dimension of Attitude According to Favorite Art Branch

Table 25. Comparison of the Dimension of Attitude According to Favorite Art Branch

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of attitude	Between Groups	312.96	6	52.16	3.82	.00*
	Within groups	8733.50	639	13.67		
	Total	9046.46	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(6,639)=.58$ $p=.74$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of attitude in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to their favorite art branch ($F(6,639) = 3.82$, $p = .00$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, scores for the sub-dimension of the attitude of prospective teachers, who chose the art branch of cinema, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of painting ($Md = 2.56$, $SD = .59$). According to the results of another Scheffe test conducted scores for the sub-dimension of attitude of prospective teachers, who chose the favorite art branch of music, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of painting ($Md = 2.08$, $SD = .54$). Accordingly, it can be said that the newspaper reading frequency affected the sub-dimension of attitude in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Current Developments According to Favorite Art Branch

Table 26. Comparison of the Dimension of Current Developments According to Favorite Art Branch

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of Current Developments	Between Groups	349.24	6	58.21	5.26	.00*
	Within groups	7078.39	639	11.08		
	Total	7427.63	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(6, 639)=.50$ $p=.85$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for following current developments in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to their favorite art branch ($F(6,639) = 5.26$, $p = .00$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, scores for the sub-dimension of following current developments of prospective teachers, who chose the art branch of cinema, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of painting ($Md = 2.22$, $SD = .54$). According to the results of another Scheffe test conducted, scores for the sub-dimension of following current developments of prospective teachers, who chose the favorite art branch of cinema, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of photography ($Md = 1.75$, $SD = .48$). In the analyses conducted, scores for the sub-dimension of following current developments of prospective teachers, who did not choose any art branches, towards plastic arts were found to be significantly higher than the scores of prospective teachers who chose the art branch of painting ($Md = 2.94$, $SD = .73$). Moreover, scores for the sub-dimension of following current developments of prospective teachers, who did not choose any art branches, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of photography ($Md = 2.47$, $SD = .69$). Accordingly, it can be said

that the newspaper reading frequency had no effect on the sub-dimension of following current developments in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Exhibition According to Favorite Art Branch

Table 27. Comparison of the Dimension of Exhibition According to Favorite Art Branch

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of Exhibition	Between Groups	37.55	6	6.26	1.82	.09
	Within groups	2202.56	639	3.45		
	Total	2240.11	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(6,639)=1.104$ $p=.36$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to their favorite art branch ($F(6, 639) = 1.82$, $p = .09$). Accordingly, it can be said that the favorite art branch before the university had no effect on the sub-dimension of exhibitions in the attitude scale of prospective teachers towards plastic arts.

Findings on Whether They Read Books Related to Art

Data were reviewed in four factors -skill, attitude, current developments and exhibition- while obtaining the findings towards plastic arts in the research. Data on whether they read books related to arts were obtained with four options including "I read all the time," "I sometimes read," "I rarely read" and "I never read." One-way analysis of variance was conducted to determine whether the sub-dimensions of skill, attitude, exhibition and current developments in the attitudes of prospective teachers towards plastic arts indicate a significant difference according to whether they read books related to art. The findings obtained were shown in the tables below.

Comparison of the Dimension of Skill According to Whether They Read Books Related to Art

Table 28. Comparison of the Dimension of Skill According to Whether They Read Books Related to Art

	Source of variance	Sum of squares	sd	Mean Squares	<i>F</i>	<i>p</i>
Dimension of skill	Between Groups	13.91	5	2.78	1.84	.10
	Within groups	968.87	640	1.51		
	Total	982.79	645			

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=2.16$ $p=.093$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of skill in the attitude scale of prospective teachers towards plastic arts did not indicate a statistically significant difference according to whether they read books related to arts ($F(5, 645) = 1.84$, $p = .10$). According to these results, it can be said that whether they read books related to arts had no effect on the sub-dimension of skill in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Attitude According to Whether They Read Books Related to Art

Table 29. Comparison of the Dimension of Attitude According to Whether They Read Books Related to Art

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of attitude	Between Groups	277.99	3	92.66	6.78	.00*
	Within groups	8768.48	642	13.66		
	Total	9046.46	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=.85$ $p=.47$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of attitude in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to whether they read books ($F(3, 642) = 6.78, p = .00$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, attitude scores of prospective teachers, who do not read any books related to arts, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who regularly read books ($M_d = 1.78, SD = .60$). According to the results of the Scheffe test again, attitude scores of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the attitude scores of prospective teachers who sometimes read books ($M_d = 1.50, SD = .37$). After the analyses conducted, no differences were found between other fields. Accordingly, it can be said that the whether they read books related to arts had no effect on the scores for the sub-dimension of attitude in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Current Developments According to Whether They Read Books Related to Art

Table 30. Comparison of the Dimension of Current Developments According to Whether They Read Books Related to Art

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of Current Developments	Between Groups	722.50	3	240.83	23.06	.00*
	Within groups	6705.132	642	10.44		
	Total	7427.63	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=.39$ $p=.40$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for following current developments in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to whether they read books ($F(3, 642) = 20.06, p = .00$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, scores for following current developments of prospective teachers who do not read any books related to arts, were found to be significantly higher than the scores of those who regularly read books ($M_d = 2.62, SD = .53$). According to the results of the Scheffe test again, scores for following current developments of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the scores for following current developments of prospective teachers who sometimes read books ($M_d = 2.40, SD = .32$). According to the results of Scheffe test again, scores for following current developments of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the scores for following current developments of prospective teachers who rarely read books ($M_d = 1.84, SD = .32$). Accordingly, it can be said that whether they read books related to arts had no effect on the scores

for the sub-dimension of following current developments in the attitude scale of prospective teachers towards plastic arts.

Comparison of the Dimension of Exhibition According to Whether They Read Books Related to Art

Table 31. Comparison of the Dimension of Exhibition According to Whether They Read Books Related to Art

	Source of variance	Sum of squares	sd	Mean Squares	F	p
Dimension of Exhibition	Between Groups	44.81	3	14.94	4.37	.00*
	Within groups	2195.03	642	3.42		
	Total	2240.11	645			

* $p < .05$

Based on Levene's test, it was found out that assumption of homogeneity of variance -an assumption of one-way ANOVA- was met ($F(3,642)=1.74$ $p=.16$). As a result of analyses carried out after meeting the assumption of homogeneity of variance, it was found that scores for the dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts indicated a statistically significant difference according to whether they read books ($F(3, 642) = 4.037$, $p = .00$). According to the results of the Scheffe test conducted to determine the range of the levels of difference between them, scores for the dimension of the exhibition of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the scores of prospective teachers who sometimes read books ($M_d = .54$, $SD = .18$). Accordingly, it can be said that whether they read books related to arts had no effect on the scores for the sub-dimension of the exhibition in the attitude scale of prospective teachers towards plastic arts.

Conclusion and Suggestions

This section of the study covers research results and suggestions offered accordingly.

Conclusion

The factors affecting attitudes of prospective teachers, who were studying at the faculty of education of a state university in northern Turkey, towards plastic arts were determined in the research. The population of the research consists of prospective teachers who were in their 3rd and 4th years at the Faculty of Education of a state university in the north of Turkey in 2017-2018 academic year. Personal information form and attitude scale were applied to prospective teachers. The questions in the attitude scale were analyzed in the dimensions of skill, attitude, current developments, and exhibition. In the attitude scale, two questions were asked regarding the level of prospective teachers' attitudes towards skills for plastic arts. The prospective teachers indicated moderately that they have skills for plastic arts. In the attitude scale, five questions were asked regarding the level of prospective teachers' attitudes towards plastic arts. It can be concluded that the prospective teachers generally agree to the opinions that the necessary interest is not shown in plastic arts in our country, plastic arts should be made widespread in their city, they are interested in plastic arts, and our country is not interested in plastic arts. Moreover, it was concluded that prospective teachers generally agree moderately to the opinion that they like having an interest in plastic arts.

Öztürk's (2012) research titled "Review of Attitudes and Opinions of Special Education Teachers towards Visual Arts Course" aims to review and determine the attitudes and opinions of special education teachers towards the course of visual arts. The population of the research, which was conducted in accordance with the survey model, consists of all teachers working at public and private elementary schools, special education institutions, special education centers and rehabilitation centers in the provincial center and districts under Trabzon Provincial Directorate of National Education. "Semi-structured interview form," personal information form covering demographic characteristics of teachers and "questionnaire" with the scale of attitude towards the course of Visual Arts were used in this research, the sample group of which consisted of 170 special education teachers. SPSS Programme was used for quantitative analyses. As a result of analyses carried out, it was concluded that the special education teachers have positive attitudes towards the course of Visual Arts. However, some differences were found out according to variables and sub-dimensions of attitude which are effective on the attitudes of teachers towards this course. Hızal's (2017) research titled "Review of Attitudes of Pre-school Teachers towards Visual

Arts and Art Activity” covers the review of attitudes of pre-school teachers towards visual arts and art activity. The survey method, one of the descriptive research methods based on qualitative approach, was used as the pattern of the research. The study group of the research consists of 171 pre-school teachers working in schools under the Ministry of National Education in Trabzon and its districts in the 2014-2015 academic year. Attitude Scale of Pre-school Teachers Towards Arts and Art Activity developed for data collection was used in the research. SPSS program for interpretation of data, descriptive statistical processes for data analysis, exploratory factor analysis in psychometric processes of the scale, and comparative statistical techniques were used. In consequence of the research, the ones with the highest attitude values towards arts and art activity turned out to be the pre-school teachers working in pre-school classes. Considering their programs of graduation, it was seen that teachers that graduated from the child development department had the highest attitude values, while teachers that graduated from pre-school education department had the lowest attitude values. It was seen that the attitude of teachers that graduated from child development department towards art activity was significantly high. The score of teachers that studied visual arts to conduct art activities was found to be higher than those who did not. No significant difference could be found between teaching experience and attitude towards art activities. It was found that the number of female teachers is much higher than male teachers. In the analysis conducted, no significant difference was found between the attitude of female and male teachers towards art activities.

In the attitude scale, four questions were asked regarding the level of prospective teachers’ attitudes towards following current developments on plastic arts. It was concluded that prospective teachers generally do not agree to the opinions that “I like reading articles on plastic arts,” “I like following news on plastic arts from TV, internet, radio, newspapers and magazines,” “I follow developments on plastic arts,” and “I follow courses on plastic arts in the city I live.” In the attitude scale, three questions were asked regarding the level of prospective teachers’ attitudes towards visiting exhibitions on plastic arts. It was concluded that prospective teachers generally agree to the opinion that “I like visiting exhibitions on plastic arts,” while they generally they do not agree to the opinion that “I don’t like visiting exhibitions on plastic arts” and “I visit exhibitions on plastic arts.”

In the research titled “Review of Attitudes of Prospective Teachers towards Plastic Arts” conducted by Şenlitürk (2013), prospective teachers stated that they participated in exhibitions on plastic arts. Moreover, it was revealed that the students are not interested in plastic arts and do not follow current developments. According to genders, it was concluded that female prospective teachers visit exhibits more; and that elementary school mathematics teaching, pre-school education and science teaching departments had opinions on skills for plastic arts and followed exhibitions.

In the current research, no significant difference was found between the genders of prospective teachers and their attitude towards plastic arts in the dimensions of skill, current developments and exhibition, while there is a significant correlation in the dimension of attitude. It was concluded that the attitude of male prospective teachers towards plastic arts was higher than female prospective teachers. Çatıkkaş’s (2014) research titled “Review of Prospective Teachers’ Self-Efficacy in Art Education” aims to determine the self-efficacy perceptions of prospective teachers towards art education. A valid and reliable measurement tool was developed for this purpose. The research model of field screening, one of the descriptive research methods, was used in the research. The sample group of the research consists of 137 prospective teachers studying in a painting education department. The researcher developed the “Self-Efficacy Scale for Art Education” as a measurement tool to determine the efficacy perceptions of prospective teachers towards art education. In consequence of the research, it was revealed that there was no significant difference in the self-efficacy scores of prospective teachers according to gender, while there was a significant difference according to the high schools they graduated from and universities they were studying at.

We found no significant difference between the GPA of prospective teachers and their attitudes towards plastic arts in the dimensions of skill, current developments, and exhibition. Based on the analysis of data, it was concluded that the GPA had no effect on the determination of attitudes of prospective teachers towards plastic arts. No significant difference was found between the undergraduate programs of prospective teachers and their attitude towards plastic arts in the dimensions of skill, current developments and exhibition. Based on the analysis of data, it was concluded that the undergraduate programs had no effect on the determination of attitudes of prospective teachers towards plastic arts. In Gökhan’s (2007) research titled “Plastic Arts Education in Elementary Schools in Turkey and Related Suggestions,” it was concluded that the scope of the curriculum should be extended in terms of arts education by increasing course hours; and additionally, a course that takes its purpose only from art should

definitely be included in the education-training process, especially in pre-schools and elementary schools, with an understanding of education through art.

Our results indicated no significant difference between the newspaper reading frequency of prospective teachers and their attitude towards plastic arts in the dimensions of skill, attitude and current developments, while there is a significant correlation in the dimension of exhibition. Surprisingly, it was concluded that scores for the sub-dimension of the exhibition of prospective teachers, who chose the option of “I never read,” towards plastic arts were significantly higher than the attitude scores of prospective teachers who chose the option of “I read a few times a month,” and those who never read follow exhibitions on plastic arts. No significant difference was found between the favorite art branches of prospective teachers and their attitude towards plastic arts in the dimensions of skill and exhibition, while there is a significant correlation in the dimensions of attitude and current developments. Scores for the sub-dimension of the attitude of prospective teachers, who chose the favorite art branches of cinema and music, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branch of painting. Therefore, it was concluded that the newspaper reading frequency affected the sub-dimension of attitude in the attitude scale of prospective teachers towards plastic arts. Scores for the sub-dimension of following current developments of prospective teachers, who chose the art branch of cinema, towards plastic arts were found to be significantly higher than the attitude scores of prospective teachers who chose the art branches of painting and photography. Surprisingly, it was concluded that scores for the sub-dimension of following current developments of prospective teachers, who did not choose any art branches, towards plastic arts were significantly higher than the scores of prospective teachers who chose the art branches of painting and photography. In Cam’s (2015) research titled “Evaluation of Secondary School Students’ Opinions on Art Education and Necessity of Art (Example of Antalya Province),” it was concluded that students attach importance to the issues regarding art education and necessity of art, such as the fact that art supports creativity, develops imagination exercises the body in a more coordinated manner, and that art education should be given by the experts of the course.

The results showed no significant difference between whether prospective teachers read books related to art and their attitude towards plastic arts in the dimensions of skill, while there is a significant correlation in the dimensions of attitude, current developments and exhibition. Scores for attitude towards plastic arts of prospective teachers, who do not read any books related to arts were found to be significantly higher than the attitude scores of prospective teachers who regularly and sometimes read books. Scores for following current developments of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the scores for following current developments of prospective teachers who regularly or sometimes read books or do not read any books. Scores for the exhibition dimension of prospective teachers, who do not read any books related to arts, were found to be significantly higher than the scores of prospective teachers who sometimes read books. It was concluded that scores for the attitude, current developments and exhibition dimensions of those who do not read any books related to arts were surprisingly high.

Related research in literature found out significant differences in the correlation between attitude towards the course and success in terms of gender variable in their studies (Francis & Greer, 1999, Selçuk, 1997; Üstüner & Sancar, 1999; Weinburgh, 1995). Several researchers, however, found out that it did not vary significantly (Morrell & Ledeerman, 1998; Orhun, 1999; Serin, 2001; Saracaloğlu & Kaşlı, 2001; Yalvaç & Sungur, 2000; Yetim 2002). Significant correlations between attitude and academic success have also been found Aksakary, 1981; Boran & Oruç, 1994; Coşkun, 2001; Çapar, 2001; Geban et al., 1992; Hotaman, 1995; House & Prison, 1998; Lewin et al., 1991; Selçuk, 1997; Serin, 2001; Tepe, 1999; Ünlü, 2000; Üstüner & Sancar, 1999; Uzuntiryaki, 1998; Yalçın, 1997; Yalvaç & Sungur, 2000).

Suggestions

Taking quantitative results into consideration, the following suggestions were developed for this research, in which the attitude levels of prospective teachers towards plastic arts were reviewed in terms of variables.

- In order to increase the interest of prospective teachers towards plastic arts, works of plastic arts can be placed in the educational environment they study, and they can be directed to plastic arts through advertisement posters and designs to attract their attention to participating in activities at the university. Restricted elective courses on plastic arts may be added to the curriculum of all departments of faculty of education at universities, or

training classes on plastic arts can be opened. Prospective teachers can be encouraged to visit exhibitions on plastic arts. Moreover, conferences or seminars in this field can be organized at universities.

- In order to increase the interest towards plastic arts in our country and our cities, more projects on plastic arts can be organized, and training classes on plastic arts can be given by experts. Public and local administrations can support projects featuring works of plastic art in the landscape design of environmental and public buildings. Public and local administrations can support events of plastic arts, and open plastic art galleries for organizing such events.
- In order to ensure prospective teachers to follow current developments and events on plastic arts, universities can announce them with posters and handouts, or by issuing newspapers or magazines.
- Elective courses on plastic arts can be included in the curriculum of secondary schools where prospective teachers study before university, and they can be encouraged to take these courses. Moreover, workshops can be established for prospective teachers to perform applications.

In addition to the suggestions developed by the researcher considering quantitative findings, the following suggestions beneficial for the researchers are offered:

- Different research methods can be used to determine factors affecting the attitudes of prospective teachers towards plastic arts. Their opinions can be determined through interviews.
- A more detailed research covering all departments and the year of studies of this state university in northeastern Turkey can be conducted on this issue.
- Research can be conducted in different universities by using a wider population and setting a larger sample group.

Acknowledgments

This article is based on the first author's master's thesis.

References

- Alakuş, A. O., Mercin, L., Ayaydın, A., Vural, D. Ü., Yuna, S., & Yılmaz, M. G. (2009). *Sanat eğitimi ve görsel sanatlar öğretimi (1. bs.) [Art education and visual arts education (1th ed.)]*. Ankara: Pegem Academy Publishing.
- Arısoy, A. (1994). *İlkokullarda resim-iş eğitimi ve karşılaşılan sorunlar [Art education in primary schools and problems encountered]*. Unpublished Master's Thesis, Gazi University, Ankara, Turkey.
- Arseven, C. E. (1983). *Sanat ansiklopedisi (5. bs.) [Art encyclopedia (5th ed.)]*. İstanbul: Milli Eğitim Publisher.
- Artut, K. (2007). *Sanat Eğitimi (5. bs.) [Art encyclopedia (5th ed.)]*. Ankara: Anı Publishing.
- Ateş, G. (2006). *Plastik sanatlar eğitimi'nde materyal olarak bakır'ın yeri ve önemi [The place and importance of copper as a material in plastic arts education]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Ayhan, M. (1992). *Orta öğretimde resim dersinin diğer derslere etkisi [The effect of painting lesson on other courses in secondary education]*. Unpublished Master's Thesis, Marmara University, İstanbul, Turkey.
- Aytaç, Ç. (1981). *Sanat ve uygarlık [Art and civilization]*. Ankara: Bizim Büro Publisher.
- Balcı, A. (2007). *Sosyal bilimlerde araştırma yöntem, teknik ve ilkeler (6. bs.) [Research methods, techniques and principles in social sciences (6th ed.)]*. Ankara: Pegem A Publishing.
- Bayram, A. (1993). *Ortaokul çağı (12-15 yaş) çocuğunun resim-iş dersine bakış açısını belirleyen etkenler [The factors that determine the point of view of secondary school children (12-15 years)]*. Unpublished Master's Thesis, Gazi University, Ankara, Turkey.
- Boydaş, N. (2007). *Sanat eleştirisine giriş (2. bs.) [Introduction to art criticism (2th ed.)]*. Ankara: Gündüz Education and Publishing.
- Burçak, N. (2003). *Orta öğretim okullarında resim-iş dersinde fiziki ortam yetersizliğinin yarattığı sorunlar [problems caused by the lack of physical environment in painting-work class in secondary schools]*. Unpublished Master's Thesis, Gazi University, Ankara, Turkey.
- Buyurgan, S. & Buyurgan, U. (2001). *Sanat eğitimi ve öğretimi (1. bs.) [Art education and teaching (1th ed.)]*. Ankara: Dersal Publishing.
- Buyurgan, S. & Buyurgan, U. (2007). *Sanat eğitimi ve öğretimi (2. bs.) [Art education and teaching (2th ed.)]*. Ankara: Pegem A Publishing.
- Büyüköztürk, Ş., Çakmak, E., Akgün, Ö., Karadeniz, Ş., & Demirel, F. (2010). *Bilimsel araştırma yöntemleri (7. bs.) [Scientific research methods (7th ed.)]*. Ankara: Pegem Academy Publishing.
- Cam, F. (2015). *Ortaöğretim öğrencilerinin sanat eğitimi ve sanatın gerekliliği hakkındaki görüşlerini değerlendirilmesi (Antalya ili örneği) [Evaluation of secondary school students' views on art education and the necessity of art (The case of Antalya)]* Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Coşkun, N. (2001). *Farklı sosyoekonomik düzeydeki lise öğrencilerinin resim dersine yönelik tutumları ile okul başarıları arasındaki ilişkinin incelenmesi (Gaziantep ili örneği) [Investigation of the relationship between high school students at different socioeconomic levels and their school success (The case of Gaziantep)]*. Unpublished Master's Thesis, Gaziantep University, Gaziantep, Turkey.
- Çatıkkaş, D. (2014). *Öğretmen adaylarının sanat eğitimi öz-yeterliklerinin araştırılması [Research on teacher education self-efficacy of teacher candidates]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Erbay, M. (2000). *Plastik sanatlar eğitimi'nin gelişimi (2. bs.) [Development of plastic arts education (2th ed.)]*. İstanbul: Boğaziçi Universty Publications.
- Fidan, N. (1996). *Okulda öğrenme ve öğretme [Teaching and learning at school]*. Ankara: Alkım Bookselling Publishing.

- Francis, L. J. & Greer, J. E. (1999). *Attitude Toward Science Among Secondary Pupils In Northern Ireland: Relationship With Sex, Age And Religion*. Research in Science & Technological Education. Vol 17. No 1. (65-75).
- Gardner, R. C. (1985). *Social Psychology and Social Language Learning: The Role of Motivation and Attitudes*. Edward Arnold Inc., London.
- Gazotti, M. A. (2000). Affective Factors and Foreign Language Learning: How Can We Deal With Them In The Classroom? <http://askeric.org/plwebcgi/obtain.Pl>.
- Geban, Ö., Aşkar, P. & Özkan, İ. (1992). Effects Of Computer Simulated Experiments and Problem-Solving Approaches On High School Students. *Journal of Educational Research*. Vol 86. No 1. (5-10).
- Genç, H. (2002). *Resim-iş öğretmenlerinin uygulamada karşılaştıkları problemler ve çözüm önerileri [Problems faced by art teachers and their solutions]*. Unpublished Master's Thesis, Gazi University, Ankara, Turkey.
- Gökhan, M. A. (2007). *İlköğretimde plastik sanatlar eğitimi ve önermeler [Plastic arts education in primary education and propositions]* Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Hızal, A. Y.(2017). *Okul öncesi öğretmenlerinin görsel sanatlara ve sanat etkinliğine yönelik tutumlarının incelenmesi [Pre-school teachers' attitudes towards visual arts and art activity]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Hotaman, D. (1995). *Gülhane Askeri Tıp Akademisi Sağlık Meslek Yüksek Okulu Hemşirelik Bölümü öğrencilerinin tutumları ile akademik başarıları arasındaki ilişki [The relationship between attitudes and academic achievements of Gülhane Military Medical Academy Health Vocational School Nursing Department students]*. Unpublished Master's Thesis, Hacettepe University, Ankara, Turkey.
- House, J. D. ve Prison, S. K. (1998). Students Attitudes And Academic Background As Predictors Of Achivement In College English. *International Journal of Instructional Media*. Vol 25. No 1. (29-43).
- Howard, I. A. (2003). *The Role Of Attitudes About Language In The Learning Of Foreign Language*. University of Chicago. Copyright © 2003 Ebsco Publishing. www.ebscohost.com.
- İnceoğlu, M. (2000). *Tutum algı iletişim [Attitude perception communication]*. Ankara: İmaj Publishing.
- İşcanoğlu, K. (2010). *Türkiye'de 1919-1946 arasında yaratılmak istenen yüksek ve ulusal kültür içerisinde plastik sanatlar eğitiminin yeri [To create the desired place between 1919-1946 and plastic arts education in high national culture in Turkey]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Karasar, N. (1999). *Bilimsel araştırma yöntemi (9. bs.) [Scientific research method (9th ed.)]*. Ankara: Nobel Publishing.
- Kurtuluş, Y. (2002). İlköğretimde resim-iş derslerinin haftalık ders dağılımı içindeki yeri ve öğrenciler üzerindeki etkileri [The place of art-work courses in the weekly course distribution and the effects on students]. *Journal of National Education*, 153-154. (Kış-Bahar 2002).
- Lewin, T., Nama, S. & Ziapora, L. (1991). Achivements And Attitudional Patterns of Boys and Girls in Science. *Journal of Research in Science Teaching*. Vol 28. No 4. (315-328).
- MEB. (2007). *Görsel sanatlar dersi (1-8. sınıflar) öğretim programı ve kılavuzu [visual arts course (grades 1-8) curriculum and guide]*. Ankara: MEB Publications.
- Morrel, P. D. & Lederman, N. G. (1998). Students' Attitudes Toward School and Classroom Science: are they Independent Phenomea? *School Science & Mathematics*. Vol 98. No 2. (76-84).
- Oğuz, A. (2013). *Yaratıcı drama yönteminin sınıf öğretmeni adaylarının sanata yönelik ilgilerine ve sanat eğitimi dersi başarılarına etkisi [The effect of creative drama method on the interest of art teacher candidates and the success of art education course]*. Doctorate Dissertation, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Orhun, N. (1999). Anadolu Üniversitesi Fen Fakültesi Matematik Bölümü 1. ve 4. sınıf öğrencilerinin matematik benlik kavramları, matematiğe yönelik tutumları, matematik yeteneklerinin bazı değişkenler açısından

- karşılaştırılması [The comparison of mathematics self-concept, attitudes towards mathematics, mathematics skills of some 1st and 4th grade students of Anadolu University Faculty of Science Mathematics in terms of some variables]. *Dokuz Eylül University, Buca Journal of the Faculty of Education*, 11, (1999) (49-53).
- Ökten, İ. (2005). *İlköğretim 1. kademe öğrencilerinin resim-iş derslerindeki yaratıcılık düzeylerinin incelenmesi ve bu öğrencilere uygulanabilecek yaratıcı etkinlikler [Primary education 1. examining creativity levels of art students in art classes and creative activities that can be applied to these students]*. Unpublished Master's Thesis, Dokuz Eylül University, İzmir, Turkey.
- Özcan, H. (2002). *Çocuk resimlerinde yaratıcılık, resim-iş eğitimi ile geliştirilmesi yöntemleri [creativity in children's paintings, methods of development with painting education]*. Unpublished Master's Thesis, Dokuz Eylül University, İzmir, Turkey.
- Özden, Ö. (2003). *İlköğretim ikinci kademe resim-iş eğitiminde karşılaşılan temel sorunlar üzerine bir araştırma [A research on the basic problems encountered in primary and secondary education]*. Unpublished Master's Thesis, Dokuz Eylül University, İzmir, Turkey.
- Öztürk, F. B. (2012). *Özel eğitim öğretmenlerinin görsel sanatlar dersine yönelik tutum ve görüşlerinin incelenmesi [Attitudes and opinions of special education teachers towards visual arts course]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Pasin, G. (2004). *Lise sanat etkinliklerini izleme 11. sınıf [High School Art Activities 11th Grade]*. İstanbul: MEB Publications.
- Read, H. (1984). *The Meaning of Art*. London: Faber & Faber.
- San, İ. (1979). *Sanatsal yaratma ve çocukta yaratıcılık [Artistic creation and creativity in children]*. Ankara: Turkey Isbank Cultural Publications.
- Saracaloğlu, S. & Kaşlı, A. F. (2001). Öğretmen adaylarının bilgisayara yönelik tutumları ile başarıları arasındaki ilişki [The relationship between student teachers' attitudes towards computer and their success]. *Ege Journal of Education*, 1, (110-126).
- Selçuk, E. (1997). *İngilizce dersine karşı tutum ile bu dersteki akademik başarı arasındaki ilişki [The relationship between attitude towards English course and academic achievement in this course]*. Unpublished Master's Thesis, Abant İzzet Baysal University, Bolu, Turkey.
- Serin, O. (2001). *Lisans ve lisansüstü düzeydeki fen grubu öğrencilerinin problem çözme, fen ve bilgisayara yönelik tutumları ile başarıları arasındaki ilişki [The relationship between undergraduate and graduate students' attitudes towards science, computer and science achievement]*. Unpublished Doctorate Dissertation, Dokuz Eylül University, İzmir, Turkey.
- Sever, B. (2005). *İlköğretim altıncı sınıf öğrencilerinin resim-iş dersine ilişkin görüşlerinin tam öğrenme modeline göre incelenmesi [Investigation of sixth grade elementary school students' views about painting course according to full learning model]*. Unpublished Master's Thesis, Dokuz Eylül University, İzmir, Turkey.
- Şenlitürk, A. (2013). *Öğretmen adaylarının plastik sanatlara yönelik tutumlarının incelenmesi [Examination of pre-service teachers' attitudes towards plastic arts]*. Master's Thesis, It is obtained from <https://tez.yok.gov.tr/UlusalTezMerkezi>.
- Tezbaşaran, A. (1997). *Likert tipi ölçek geliştirme kılavuzu [Likert type scale development guide]*. Ankara: Turkish Psychological Association Publications.
- Tezcan, M. (2011). *Sanat sosyolojisi [Sociology of Art]*. Ankara: Anı Publishing.
- Turani, A. (1975). *Sanat terimleri sözlüğü (3. bs.) [Glossary of art terms (3th ed.)]*. Ankara: Toplum Publisher.
- Ünlü, S. (2000). *The Effect of Conceptual Change Text in Students' Achievement Atom Molecule. Matter Concepts*. Unpublished Master's Thesis, Ortadoğu Teknik University, Ankara, Turkey.
- Üstüner, I. Ş. & Sancar, M. (1999). Lise öğrencilerinin fizik kavramlarını anlama düzeylerini ve tutumlarını etkileyen faktörlerin değerlendirilmesi [Evaluation of high school students' understanding of physics concepts

- and factors affecting their attitudes]. *Dokuz Eylül University, Buca Journal of the Faculty of Education, Special Issue*, (339-347).
- Weinburg, M. (1995). Gender Differences in Students' Attitudes Toward Science: A Meta-Analysis of the Literature From 1970 to 1991. *Journal of Research in Science Teaching*. Vol 32. No 4. (387-398).
- Yalçın, P. (1997). *Ankara merkez ilköğretim okullarındaki 5. sınıf öğrencilerinin Matematik başarıları ile zeka, kaygı ve tutum puanları arasındaki ilişki [The relationship between mathematics achievement and intelligence, anxiety and attitude scores of 5th grade students in Ankara central primary schools]*. Unpublished Master's Thesis, Gazi University, Ankara, Turkey.
- Yalvaç, B. & Sungur, S. (2000). Fen bilgisi öğretmen adaylarının laboratuvar derslerine karşı tutumlarının incelenmesi [Examination of science teacher candidates' attitudes towards laboratory courses]. *Dokuz Eylül University, Buca Journal of the Faculty of Education*, 12, (2000) (56-64).
- Yetim, H. (2002). *İlköğretim öğrencilerinin Matematik ve Türkçe derslerindeki akademik başarıları üzerine bir araştırma [A research on the academic achievement of elementary school students in Mathematics and Turkish classes.]*. Unpublished Master's Thesis, Dokuz Eylül University, İzmir, Turkey.



The Effect of The Manipulative Materials on The Early Mathematical Skills

Menekşe Boz^{*a}, Gonca Uludağ^b, Serap Erdoğan^c

Article Info

DOI: 10.14686/buefad.620085

Article History:

Received: 16.09.2019

Accepted: 21.09.2020

Published: 05.10.2020

Keywords:

Manipulative material

Early mathematical skills

Early childhood education

Article Type: Research Article

Abstract

The aim of this study is to examine the effect of the manipulative materials on the early mathematical skills of the preschool children. The research is a quantitative study in experimental design. The study group of the research was composed of 45 children, 22 experimental group and 23 control group, who are 60-72-month and attending the preschool education in the 2015-2016 educational year. The Demographic Information Form and The Test of Early Mathematics Ability-Third Edition (TEMA-3) were used as the data collection tool. For the children in the experimental group, a learning environment was established outside the classroom environment and the children interacted with the manipulative mathematical materials for six weeks. As a result of the analyses performed, a statistically significant difference was found between the pretest-posttest average scores of the children in the experimental group in favor of the posttest; a statistically significant difference was found between the posttest average scores of the children in the experimental and control group in favor of the experimental group. According to this result, it was determined that the manipulative mathematical materials had positive effects on the early mathematical skills of preschool children.

Manipülatif Materyallerin Erken Matematik Becerilerine Etkisi

Makale Bilgisi

DOI: 10.14686/buefad.620085

Makale Geçmişi:

Geliş: 16.09.2019

Kabul: 21.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Manipülatif materyal

Erken matematik becerileri

Erken çocukluk eğitimi

Makale Türü: Araştırma

Makalesi

Öz

Bu çalışmanın amacı, manipülatif materyallerin okul öncesi dönemdeki çocukların erken matematik becerilerine etkisinin incelenmesidir. Araştırma deneysel desende nicel bir çalışmadır. Araştırmanın çalışma grubunu 60-72 aylık olan ve 2015-2016 eğitim-öğretim yılında okul öncesi eğitime devam eden 22'si deney, 23'ü kontrol grubunda olmak üzere toplam 45 çocuk oluşturmaktadır. Veri toplama aracı olarak Demografik Bilgi Formu ve Erken Matematik Yeteneği Testi-3 (TEMA-3) kullanılmıştır. Deney grubundaki çocuklar için, sınıf ortamının dışında bir öğrenme ortamı oluşturulmuş ve bu ortamda çocukların altı hafta boyunca manipülatif matematik materyalleri ile etkileşim kurlmaları sağlanmıştır. Yapılan analizler sonucunda, deney grubunu oluşturan çocukların öntest-sontest puan ortalamaları arasında son test lehine; deney ve kontrol grubundaki çocukların sontest puan ortalamaları arasında da deney grubu lehine istatistiksel olarak anlamlı bir fark bulunmuştur. Bu sonuca göre, manipülatif matematik materyallerinin okul öncesi dönemdeki çocukların erken matematik becerileri üzerinde olumlu etkisinin olduğu belirlenmiştir.

*Corresponding Author: mboz@hacettepe.edu.tr

^a Asst. Prof. Dr., Hacettepe University, <https://orcid.org/0000-0002-6218-105X>

^b Asst. Prof. Dr., Giresun University, <https://orcid.org/0000-0001-5665-9363>

^c Prof. Dr., Anadolu University, <https://orcid.org/0000-0001-6149-4460>

Introduction

Change is effective also in education as it is in every field. In order to raise the individuals needed by the society and to bring them the knowledge and the skills of our age, the teachers' role also has become different and the teacher is not the only source of education together with this changing sense of education. Together with the change of the description of "learning", information is not conveyed only by teachers, the learning environments also play an important role in facilitating learning. The interaction of the individual with his/her environment, having rich experiences is provided by arranging the learning environments. These environments provide opportunities for individuals to test, correct and reproduce the information they have constructed (Yaşar, 1998). These learning environments, affecting the learning in the explanation of the information by the learner, differentiates based on the developmental level and needs. Akyol (2011) have emphasized that the learning environments are important for the learners, according to the constructivist approach. The studies have revealed that the learning environments have parallels with the cognitive, affective learning products of the students and the academic achievement of the students increase when they are in the learning environments they like (Fraser & Fisher, 1983; McRobbie & Fraser, 1993). And the educational materials have great importance in establishing the learning environments and presenting the information. The instructional materials are tools that help learners construct knowledge, establish new knowledge, and perform instruction more effectively in the teaching environments. The Instructional materials present multiple learning environments for learners' needs, which are remarkable, provide remembrance, materialize, save time, and facilitate understanding of content (Yalın, 2004). The inclusion of more than one sensory organ in the process allows learning permanent (Ergün & Özdaş, 1997). When learning environments are prepared, this principle should be taken into consideration and it should be allowed that the presentation of information is performed with the teaching materials addressing multiple senses for permanent and meaningful learning. Moreover, if the knowledge is abstract, more concrete materials need to be included in the learning environment (Kutluca & Akın, 2013). The preschool children, due to their ages, are in the preoperational stage, one of the cognitive developmental stages, and therefore, they have difficulty in perceiving and constructing the abstract concepts. For this reason, it is important to establish a learning environment based on concrete, that is, physical knowledge, and to include the concrete materials in the process. The concretization of the abstract concepts is only possible with the teaching materials (Toptaş, 2008). As it contains abstract concepts, mathematics is one of the branches of science in which the use of teaching materials becomes important.

Mathematics is an important part of our daily life. Many basic mathematical concepts develop in the preschool period, and some experimental researches reveal that there are differences in the mathematical competences of the children when they start the elementary school. The mathematical skills of the children are among the important factors for their success and it is seen that these skills form the basis of their professional careers in adulthood (Dağlıoğlu, Genç & Dağlı, 2017). However, as the preschool children are in the preoperational stage, it is seen that they do not have enough maturity to explain the abstract mathematical concepts and problems. Piaget (1952) has emphasized that the individual constructs the knowledge himself; he/she needs a cognitive maturity to understand the abstract mathematical concepts and the concrete materials and experience is important. The active interaction of the learners with the concrete materials is necessary for the construction of complex knowledge. The children in the preschool period also gain reasoning skills through concrete experiences. Skemp (1987) has stated that the interaction of the children with the concrete objects will form the basis for their abstract learning. In many studies, the concrete materials are recommended as a solution for explaining the mathematical concepts and relationships (Castro, 2006; Gürbüz, 2007; Kutluca & Akın, 2013; Remillard, 2000; Sowell, 1989). At this point, it is necessary to refer the manipulative materials in mathematics education.

Manipulative materials, which are concrete teaching materials, are the objects that encourage conscious or unconscious mathematical thinking and that the individual deals with the affective behavior (Swan & Marshall, 2010). Hynes (1986) has described the term "manipulative" as "the concrete models putting the mathematical concepts together, addressing various emotions and that can be touched and moved by the students". In NCTM (1989), the decisions on using the manipulative materials in mathematics have been made and it has been supported in 2000 that the manipulatives are sources to use in order to improve the mathematics education. The manipulatives, "the concrete materials" are considered to be very important for improving the mathematical

education and it will continue to play an important role as an important instrument in order to perform and motivate the change in learning and teaching (Ball, 1992).

For the preschool children, the physical knowledge is important in understanding the mathematical concepts. In explaining the two-dimensional representations and abstract concepts, the literature has revealed that the manipulative materials serve as a bridge from concrete to abstract and support learning (Boggan, Harper & Whitmire, 2010; Cope, 2015; Laski, Jor'dan, Daoust & Murray, 2015). The manipulative materials provide interaction and learning experience. Heddens (1986) has also described the pedagogical effects of using the manipulative materials as helping learning.

Today, the manipulative materials involve an important part of the educational material industry. For this reason, we may classify the manipulatives as the commercial-industrial products and the handmade products by the teachers, experts, educators. In this study, the manipulative materials produced by researchers were provided to the preschool children. Based on the fact that the use of the manipulatives supports the explanation of the abstract concepts and the symbols by the children, in this research, it was aimed to examine the effects of the manipulative mathematical materials on the early mathematical skills of the preschool children. The research questions are as follows:

1. Is there a statistically significant difference between the pretest scores and the posttest scores obtained by the children in the experimental group in the Test of Early Mathematical Skills?
2. Is there a statistically significant difference between the posttest scores obtained by the children in the experimental and the control groups in the Test of Early Mathematical Skills?

Method

Research Design

The research is a quantitative study in experimental design. The experimental designs are the studies, also known as "the scientific method", performed to determine the cause and effect relationships between the variables by examining all the phenomenon, event, object, subject, and factors, and measure them by comparing the results (Ersoy, 2013). In the research, the pretest-posttest model with a control group was used in order to determine the effect of the manipulative mathematical materials on the early mathematical skills of the preschool children. In this model, there are two groups, an experimental and a control group, formed with the random method. In both groups, a pretest is applied before the intervention and the posttest is applied after the intervention (Karasar, 2013). The required ethical permits were taken for the research.

Study Group

The study group of the research was composed of 60-72 month children attending an independent preschool and an institutional preschool affiliated to the Ministry of Education in the 2015-2016 educational year. An experimental and a control group was included in the study. Totally 45 children, 22 (12 girls, 10 boys) in the experimental group and 23 (9 girls, 14 boys) in the control group, were included in the research. The age average of the children included in the experimental and the control group is 63 months. When the ages and the educational levels of the parents of the children included in the experimental group were examined, it was observed that 36% of the mothers and 41% of the fathers were at the age of 31-35, 68% of the mothers and 73% of the fathers were university graduates. When the ages and the educational levels of the parents of the children included in the control group were examined, it was observed that 70% of the mothers and 74% of the fathers were at the age of 36-40, 74% of the mothers and the fathers were university graduates. The teacher of the children in the experimental group had 16, the teacher of the children in the control group had 11 years of professional experience and both teachers were pre-school education graduates.

According to the results of the Mann Whitney-U Test performed to reveal whether there was a significant difference between the pretest scores of the experimental and the control group, no statistically significant difference was observed between the scores of the experimental group (Median:24) and the scores of the control group (Median:21) ($U=225$, $p<.05$). According to this finding, it may be said that the early mathematical skills of the children in the experimental and the control groups were similar, before starting the application.

Data Collection Tools

The data of the research were obtained using the Demographic Information Form and Test of Early Mathematics Ability, TEMA-3, formed by the researchers to obtain information about the children.

The Early Mathematics Ability Test (TEMA). The test is a norm-based parallel form test, developed by Ginsburg and Baroody in 1983 and used to define the mathematical skills of the children between three years and eight years and eleven months (Bliss, 2006; Ginsburg & Baroody, 2003). The test was published as TEMA-2 by being reviewed in 1990 and as TEMA-3 in 1993 in its developed form and the adaptation studies of TEMA-3 for the children of 60-72 months were performed by Erdoğan and Baran (2006) in Turkey. TEMA-3, consisting of two forms, A and B forms, and 72 items, is applied to the children individually and after the calculation of the chronological ages of the children the application is started from the item corresponding to the age of the child (Ginsburg & Baroody, 2003). In TEMA-3, used to in determining the children, who are ahead of or fall behind their peers in the mathematical thinking, in determining the weaknesses and strengths of the children in mathematics, in determining the progression in learning mathematics and to direct the teaching practices; pictures, mathematical symbols, countable little objects are used as the materials (Bliss, 2006; Ginsburg & Baroody, 2003). As a result of the validity and the reliability studies performed by Ginsburg and Baroody (2003), the correlation among the forms has been found as .82 from Form A to Form A, as .93 from Form B to Form B, as .93 from Form A to Form B; as a result of the validity and the reliability studies performed by Erdoğan and Baran (2006), the correlation among the forms has been found as .90 from Form A to Form A, as .88 from Form B to Form B, as .88 from Form A to Form B. The value of the KR-20 test performed to test the reliability of the test was found as .94 for Form A, as .96 for Form B by Ginsburg and Baroody (2003); and it was found as .92 for Form A, as .93 for Form B by Erdoğan and Baran (2003). In this research, the required permissions for the use of this scale were received.

Data Collection

The application was performed in November-December 2015. Various manipulative mathematical materials were developed by the researchers in order to improve the number concepts and operations, geometry, matching, comparing, ordering, classification and pattern skills of the children depending on the learning outcomes and the indicators included in the Republic of Turkey Ministry of Education 2013 Preschool Education Program (Figure 1). The materials developed are the materials which are not included in the classrooms of the children in both the experimental and the control groups, sensuous, give a chance to trial-and-error, are clear and comprehensible without feeling a need to adult guidance, can be played individually or in group and are presented from simple to complex. For example, a material named "Let's count" was developed related to the indicators such as counting rhythmically, telling the number of the objects related with the "He/She counts the objects" learning outcome provided by the program for the cognitive development (Figure 2). In this material, numbers from 1 to 9 were written on the paper cups and the child was asked to put tongue depressors in each cup in the number written on them. The application was performed for 6 weeks, 2 days per week and 45 minutes per day. For this application, an environment was determined in the school outside the classroom and all the materials were placed in the way to be used by the children individually or with pairs. The children were included in this learning environment in groups of 11 people (Figure 3). In the first week of the application, 10 different materials, with which, they could use individually or in pairs, were provided to the children and observation was performed during her application and in this direction, the materials which the children lost interest in were removed from the environment and new and manipulative mathematical materials were included in the environment serving the same purpose. When the manipulatives were provided to the children, a completed example was provided showing how they would be used. In the process, there was no teacher and/or research guidance, only when the child asked for help, firstly the researchers asked questions to the child regarding the use of the material (*Did you examine the example?, How are you requested to do it? etc.*) and then if the child still could not understand what to do, he/she was informed. The children explored the materials by trial and error and performed the activities. Each child was allowed to play each of the manipulative mathematical materials. During the research application, the classroom teachers continued to apply the Republic of Turkey Ministry of Education 2013 Preschool Education Program in both the experimental and the control groups.



Figure 1. The manipulative mathematics materials used in the application



Figure 2. The material named "Let's Count"



Figure 3. The application environment

Data Analysis

The data of the research were analyzed using the Spss 22 program. The Wilcoxon Signed Ranks Test was used in the comparison of the pretest-posttest score of the experimental group and Mann Whitney-U Test was used in the comparison of the posttest scores of the groups.

Findings

The results of the Wilcoxon Signed Ranks Test performed to reveal whether there was a significant difference as statistically between the pretest scores and the posttest scores taken by the children in the experimental group in the Test of Early Mathematical Ability were demonstrated in Table 1.

Table 1. The Wilcoxon Signed Ranks Test Results of the Children, in the Experimental Group, of the Pretest-Posttest Averages Related to the Early Mathematical Ability Test

Pretest-Posttest	<i>n</i>	Mean Rank	Rank Total	<i>z</i>	<i>p</i>
Negative Rank	0	-	-		
Positive Rank	22	11.50	253.00	-4.122 ^b	.000
Equal	0	-	-		

Based on the Negative Sequences

In Table 1, it was observed that the posttest scores that the children in the experimental group took in the Early Mathematical Ability Test were statistically different from the pretest scores and this difference was statistically significant in favor of the posttest scores ($Z=-4,122^b$, $p<.05$).

The results of the Mann-Whitney U Test performed to reveal whether there was a significant difference between the pretest scores and the posttest scores taken by the children in the experimental and the control groups in the Early Mathematical Ability Test were demonstrated in Table 2.

Table 2. The Mann-Whitney U Test Results of the Children, in the Experimental and Control Groups, of the Posttest Averages Related to the Early Mathematical Ability Test

Groups	<i>n</i>	Mean Rank	Rank Total	U	<i>z</i>	<i>p</i>
Experimental	22	29.09	640.00	119.000	-3.052	.002*
Control	23	17.17	395.00			

* $p < .05$

In Table 2, it was observed that the post-test scores that the children in the experimental group took in the Early Mathematical Ability Test were statistically different from the post-test scores of the children in the control group and this difference was statistically significant in favor of the control group ($U=119$, $p < .05$).

Discussion and Conclusion

In this research examining the effect of the manipulative material on the early mathematical skills of the preschool children, it was determined that there was a significant difference ($p < .05$) between the posttest and pretest scores of the children in the experimental group taken in the Test of Early Mathematical Ability in favor of the posttest (Table 1). When the differential scores rank sums are taken into consideration, it may be said that the use of the manipulative mathematical materials in the mathematics education in the preschool period has a positive effect on the improvement of the early mathematical skills of the children. This effect may also be attributed to the characteristics of the manipulative materials. Because the manipulative materials are concrete materials that enable children to understand concrete concepts and materialize these concepts (Kontaş, 2016). Also in a study performed by Swan and Marshall (2010), the teachers have stated that the manipulative materials attract the children's interest, these materials are entertaining and motivating for the children and help the children understand the concepts. Marshall and Swan (2008) have also stated in another study that teachers have stated the use of the manipulative material in the classroom provides an opportunity of visualization, concretization, better explanation and learning by practicing. It was also determined that there was a significant difference between the posttest results of the children in the experimental and the control groups, taken in the Test of Early Mathematical Ability, in favor of the experimental group ($p < .05$) (Table 2). Accordingly, as a result of the application performed, it is possible to state that the positive change in the early mathematical skills of the children in the experimental group, compared to the children in the control group, is due to the application performed by using the manipulative materials in the experimental group. This result also reveals the importance of using the manipulative materials in the development of the early mathematical skills of the preschool children. Also at the end of the experimental research performed by Erdoğan, Parpucu and Boz (2017) examining the effect of the educational materials related to the numbers and mathematical operations on the mathematical skills of the preschool children, a significant increase has been observed in the mathematics scores of the children in the experimental group, compared to the children in the control group, and this result has been explained by the effect of the educational materials on the mathematical skills. In another study by Ojose and Sexton (2009), the effect of the manipulative materials on the mathematical success has been examined and first-year students at the age of 6-7 have been included in the research. It has been stated that the research results have supported the hypotheses stating that the use of the manipulative materials in the mathematics education affects the success of the students positively and the manipulative materials increase the interest of the children in mathematics, allow them to enjoy mathematics and have fun while learning. Similarly, Liggett (2017) have also revealed in his study performed with the children at the age of 6-8 that the manipulative materials affect the mathematics success.

When the research results are taken into consideration, preparing appropriate learning environments and including the manipulative materials in these environments are important in enabling the preschool children to gain and improve the early mathematical skills. In this direction, the teachers should actively use the manipulative materials in the preschool mathematics education and provide appropriate learning opportunities for children. The research in which the opinions of the preschool teachers on the effects of the manipulative materials on the early mathematics skills will be revealed may be performed and therefore, the current situation is determined and the teachers may be supported with various training programs. In addition, teachers may design their own mathematical materials with the children in their classroom, and the effects of these materials may be examined

with longer use of them. The longitudinal research in which the effect of the early mathematical skills acquisitions of the children or supporting these skills on their mathematical success in the following years is examined may be planned.

Acknowledgments

This study was presented as an oral presentation at the X. International Congress of Educational Research, which was performed in Nevşehir/Turkey, on 27-30 April 2018. We would like to thank the children who participated in the study and Nurbanu Parpucu, who contributed in a part of data collection process and whose name was included in the congress abstract book.

References

- Akyol, S. (2011). The effects of social constructivist learning environment design on academic achievement and learning retention of learners [Science and technology course at the 5th grade of primary school] Unpublished master's thesis. Yıldız Technical University, İstanbul, Turkey.
- Ball, D. L. (1992). Magical hopes: Manipulatives and the reform of math education. *American Educator: The Professional Journal of the American Federation of Teachers*, 16(2), 14-18.
- Bliss, S. (2006). Test review: Test of early mathematics ability, third edition. *Journal of Psychoeducational Assessment*, 24(1), 85-91.
- Boggan, M., Harper, S. & Whitmire, A. (2010). Using manipulatives to teach elementary mathematics. *Journal of Instructional Pedagogies*, 3(1), 1-6.
- Castro, M. A. (2006). Preparing elementary preservice teachers to use mathematics curriculum materials. *The Mathematics Educator*, 16(2), 14-24.
- Cope, L. (2015). Math manipulatives: Making the abstract tangible. *Delta Journal of Education*, 5(1), 10-19.
- Dağlıoğlu, H. E., Genç, H., & Dağlı, H. (2017). Gelişimsel açıdan okul öncesi dönemde matematik eğitimi [Developmental mathematics education in preschool period]. In İ. Ulutaş (Ed.), *Okul öncesinde matematik eğitimi [Mathematic education in preschool]* (pp. 11-40). Ankara: Hedef Publishing.
- Erdoğan, S. & Baran, G. (2006). Erken Matematik Yeteneği Testi-3 (TEMA-3)'ün 60-72 aylar arasında olan çocuklar için uyarlama çalışması [The study of adaptation Test of Early Mathematics Ability-3 (TEMA-3) for 60-72 month old children]. *Journal of Contemporary Education Academic*, 31(332), 32-38.
- Erdoğan, S., Parpuç, N. & Boz, M. (2017). Sayı ve işlemlerle ilgili matematik materyallerinin okul öncesidönem çocuklarının matematik becerisine etkisi [The effects of educational materials focusing on numbers and operations on mathematical ability of preschool children]. *Elementary Education Online*, 16(4), 1777-1791.
- Ergün, M. & A. Özdaş. (1997). *Öğretim İlke ve Yöntemleri [Teaching principle and methods]*. İstanbul: Kaya Typography.
- Ersoy, E. (2013). Nicel araştırma yöntemleri [Quantitative research methods]. In S. Baştürk (Ed.), *Bilimsel araştırma yöntemleri [Scientific research methods]* (pp. 339-374). Ankara: Vize Publishing.
- Fraser, B. J. & Fisher, D. L. (1983). *Assesment of classroom psychosocial environment*. Retrieved 02 March 2018, from <https://files.eric.ed.gov/fulltext/ED228296.pdf>.
- Ginsburg, H. P., & Baroody, A. J. (2003). *Test of Early Math Achievement (3rd ed.)*. Austin, TX: Pro-Ed.
- Gürbüz, R. (2007). Olasılık konusunda geliştirilen materyallere dayalı öğretime ilişkin öğretmen ve öğrenci görüşleri [Students' and their teachers' opinions about the instruction based on the materials on probability subject]. *Kastamonu Education Journal*, 15(1), 259-270.
- Heddens, J. (1986). Bridging the gap between the concrete and the abstract. *Arithmetic Teacher*, 33(6), 14-17.
- Hynes, M., (1986). Selection criteria. *Arithmetic Teacher*, 33(6), 11-13.
- Karasar, N. (2013). *Bilimsel araştırma yöntemi*. (25. Baskı). [Scientific research methods. (25th ed.)]. Ankara: Nobel Publishing.

- Kontaş, H. (2016). The effect of manipulatives on mathematics achievement and attitudes of secondary school students. *Journal of Education and Learning*, 5(3), 10-20.
- Kutluca, T. & Akın, M. F. (2013). Somut materyallerle matematik öğretimi: dört kefeli cebir terazisi kullanımı üzerine nitel bir çalışma [Teaching of mathematics with concrete materials: Qualitative study on using four-quadrant algebraic scales]. *Turkish Journal of Computer and Mathematics Education*, 4(1), 48-65.
- Laski, E., Jor'dan, J., Daoust, C., & Murray, A. K. (2015). What makes mathematics manipulatives effective? Lessons from cognitive science and Montessori education. *SAGE Open*, 1-8. doi.org/10.1177/2158244015589588.
- Liggett, R. S. (2017). The impact of use of manipulatives on the math scores of grade 2 students. *Brock Education Journal*, 26(2), 87-99.
- Marshall, L. & Swan, P. (2008). Exploring the use of mathematics manipulative materials: Is it what we think it is? *EDU-COM 2008 International Conference*, 338-350.
- McRobbie, C. J. & Fraser, B. J. (1993). Associations between student outcomes and psychosocial science environments. *Journal of Educational Research*, 87, 78-85.
- National Council of Teachers of Mathematics (NCTM) (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: Author
- Ojose, B. & Sexton, L. (2009). The effect of manipulatives materials on mathematics achievement of first grade students. *The Mathematics Educator*, 12(1), 3-14.
- Piaget, J. (1952). *The child's concept of number*. New York: Humanities Press.
- Remillard, J. (2000). Can curriculum materials support teachers' learning? Two fourth-grade teachers' use of a new mathematics text. *Elementary School Journal*, 100(4), 331-350.
- Skemp, R. R. (1987). *The psychology of learning mathematics*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sowell, E. (1989). Effects of manipulative materials in mathematics instruction. *Journal for Research in Mathematics Education*, 20(5), 498-505.
- Swan, P. & Marshall, L. (2010). Revisiting mathematics manipulative materials. *Australian Primary Mathematics Classroom*, 15(2), 13-20.
- Toptaş, V. (2008). Geometri alt öğrenme alanlarının öğretiminde kullanılan öğretim materyalleri ile öğretme-öğrenme sürecinin bir birinci sınıfta incelenmesi [An examination of the teaching-learning process and teaching materials used in the instruction of geometry sub-learning fields in a first grade classroom]. *Ankara University Journal of Faculty of Educational Sciences*, 41(1), 299-323.
- Yalın, H. İ. (2004). *Öğretim Teknolojileri ve Materyal Geliştirme*. (10. Baskı) [Instructional technology and material development. (10th ed.)]. Ankara: Nobel Publishing.
- Yaşar, Ş. (1998). Yapılandırmacı kuram ve öğrenme-öğretme süreci [Constructivist theory and learning-teaching process]. *VII. National Conference on Educational Science, Proceeding Book*, 695-701. Konya: Selçuk University Publishing.



Adaptation of the Scales of Justice in the Classroom into Turkish

Sinem Tarhan^{*a},

Article Info

DOI: 10.14686/buefad.637422

Article History:

Received: 23.10.2019

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Distributive Justice, Procedural Justice, Interactional Justice, Justice in Classroom Scale, Adapting Scale.

Article Type: Research Article

Abstract

This study aims to adapt Scales of Justice in the Classroom (SJC), which consists of Classroom Distributive Justice (SDJC) developed by Chory-Assad & Paulsel, Classroom Procedural Justice (SPJC) and Classroom Interactional Justice (SIJC) developed by R.M. Chory, into Turkish language and to determine their psychometric properties. The study was conducted on 494 secondary education students. Confirmatory factor analysis results show that twelve-item SDJC display a two-dimensional structure. Fifteen-item SPJC and seven-item SIJC display unidimensional structures. Internal consistency coefficients of SJC were calculated and it was found for SDJC as follows; in Existing Distributive Justice sub-dimension .79, in Expected Distributive Justice sub-dimension was .88, for the whole Distributive Justice was .91; in SPJC was .92; in SIJC was .92. As a result of test-retest analysis, the relationship between the first and last implementation was .89 for SDJC, .84 for SPJC, and .87 for SIJC. Results show that Turkish forms of scales are valid and reliable measurement tools for measuring justice perceptions of students in the classroom in secondary education. It is thought the Scales can support efforts of school psychological counselors in understanding students who experience problems like academic failure, difficulty in adaptation, withdrawal, aggressiveness and finding solutions to such students.

Sınıfta Adalet Ölçeklerinin Türkçe'ye Uyarlanması

Makale Bilgisi

DOI: 10.14686/buefad.637422

Makale Geçmişi:

Geliş: 23.10.2019

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Dağıtım Adalet, Süreç Adaleti, Etkileşim Adaleti, Sınıfta Adalet Ölçeği, Ölçek Uyarlama.

Makale Türü: Araştırma

Makalesi

Öz

Bu çalışmanın amacı R. M. Chory-Assad ve M. Paulsel, tarafından geliştirilen Sınıfta Dağıtım Adaleti (SDA), Sınıfta Süreç Adaleti (SSA) ile R. M. Chory tarafından geliştirilen Sınıfta Etkileşim Adaleti (SEA) ölçeğinden oluşan Sınıfta Adalet Ölçekleri'nin (SAÖ) Türkçeye çevrilmesi ve psikometrik özelliklerinin belirlenmesidir. Araştırma 494 ortaöğretim öğrencisi üzerinde yürütülmüştür. Doğrulayıcı faktör analizi sonucunda; oniki maddelik SDA Ölçeğinin iki boyutlu bir yapı sergilediği gözlenmiştir. On beş maddelik SSA Ölçeği ile yedi maddelik SEA Ölçeği'nin tek boyutlu birer yapı sergilediği belirlenmiştir. Sınıfta Adalet Ölçeklerinin iç tutarlık katsayıları hesaplanmış, SDA'nın, Mevcut Dağıtım Adaleti alt boyutunda .79, Beklenen Dağıtım Adaleti alt boyutunda .88, Dağıtım Adaletinin Tamamı için .91; SSA ölçeği için .92; SEA ölçeği için .92 olarak bulunmuştur. Test tekrar test analizi sonucunda ilk ve son uygulama arasındaki ilişki SDA için .89, SSA için .84 ve SEA için .87 olarak hesaplanmıştır. Analiz sonuçları SDA, SEA ve SSA Ölçeklerinin Türkçe formlarının ortaöğretim düzeyindeki öğrencilerin sınıftaki adalet algılarını ölçmekte kullanılabilecek geçerli ve güvenilir birer ölçme aracı olduğunu göstermektedir. Sınıfta Adalet Ölçeklerinin, akademik başarısızlık, okula uyum güçlüğü, içe kapanma, saldırganlık gibi sorunlar yaşayan öğrencileri anlayabilmek ve çözüm yolları üretebilmek noktasında okul psikolojik danışmanlarının çalışmalarına destek sağlayacağı düşünülmektedir.

*Corresponding Author: tarhansinem@gmail.com

^a Assoc. Prof. Dr., Bartın University Faculty of Education, <http://orcid.org/0000-0001-7297-2499>

Introduction

Justice is related to protecting rights and freedom of individuals, to provide their free-expression of ideas and to live proper to human dignity, arranging social life within an equalitarian and fair frame and assuring all of these. Justice is a one of the most basics of law and most difficult to describe at the same time (Gözler, 2008). Roman legist Ulpian described justice as consistently making effort to give one's share. Aristoteles approached the concept of justice in two dimensions; distributive and commutative justice. Distributive justice requires everybody to take their share according to their ability and social standing in sharing of honor and goods, however, commutative justice requires everybody to receive equal treatment when they are sides of a legal relationship (Güriz, 2001). Justice is an essential concept for the existence of individuals and order of societies. The state is responsible for providing justice for all citizens in public, parents are responsible for providing justice for their children at home, administrators are responsible for providing justice for their employee and teachers are responsible for providing justice for their students in the classroom.

Organizations led questioning the concept of justice, and as a result, Greenberg (1987) revealed the concept of organizational justice, which roots from social and interpersonal theories of justice. The main concepts of justice in classroom are based on organizational justice (Kepekçioğlu, 2015) and providing justice in the classroom is a concept closely related to classroom management. Classroom management is behaviors and strategies that teachers use in order to manage behaviors of students in the classroom (Evertson & Emmer, 2013). A classroom management which is a healthy and achieving objective depends on a classroom environment which is safe, supportive to learning, respectful for diversity, equalitarian, supportive to search and question (Whalen & Koernig, 2009; Yolcu, 2010). Management style of the teacher shapes the justice perceptions of students and according to Whalen and Koernig (2009), students' perception of justice towards educational environments affects their performance and attitudes towards courses and teachers.

Justice in the classroom includes distributive, procedural and interactional justice (Paulsel & Chory-Assad, 2005). *Distributive justice* is related to the evaluation of how fair the results (reward, punishment, opportunity, time allocated to courses) obtained (Cropanzano & Greenberg, 1997; Horan et.al, 2010). When it comes to the decisions about distributing resources, problems related to justice emerge. These problems are related to subjects like who attracts the attention of the teacher and who gets which grade. When students compare their grades with the grades of their classmates or to their expected grades, they can understand more or less whether they are fair or not (Berti et.al, 2010; Chory-Assad & Paulsel, 2004a). *Procedural justice* is related to the fairness and consistency of processes in distributing the resources and their constancy over individuals and time (Cropanzano ve Greenberg, 1997; Colquitt et. al, 2005). Procedural justice includes how the teacher follow the course schedule, how s/he manages the discussions in the class, his/her expectations from students and course program (Young et al, 2013). Paying attention to the participation of the students, to behaviors in the classroom and to examination grades when giving grades at the end of the semester is procedural justice (Chory-Assad & Paulsel, 2004). Students can perceive teachers' criteria to assess and give grades to students as fair or unfair (Berti et al., 2010). When teachers present the information clearly, provide feedback and make sure that students understood the material so that they obtain good grades, perceptions related to procedural justice become quite fair (Chesebro et al.2004, cited in Whalen & Koermig, 2009). *Interactional justice* is related to teacher's accepting the opinions of students, listening to their concerns and making contact with on an equal basis (Chory-Assad & Paulsel, 2004a; Colquitt et al. 2005). Structure of the classroom and perception of justice in the classroom depends on the communication between teacher-student, and student-student. Teachers inform students, support them and assess their knowledge and skills. In this process, teachers could act in a tough, friendly, rude, kind, hostile or empathetic style towards students. Students do not stay indifferent towards behaviors of their teachers, they can like or dislike these behaviors or can find them tough or friendly (Molinari et al., 2012). When teachers establish healthy communication with students and become consistent and fair in reward-punishment system, probability of students to perceive school environment as fair would increase.

It is asserted that there is a positive relationship among three types of justice in classroom and students' behavior of obeying the rules (Colquitt, 2001). When students find their teachers fair, their probability to perceive them as trustworthy also increase and fair behaviors of teachers positively affect their competence, efficient learning, positive attitudes towards institutions and authorities (Chory, 2007; Chory-Assad, 2002), and procosial outcomes like feeling of responsibility, inner motivation, creativeness and voluntary cooperation (Berti et al., 2010). According to Rudick (2010), students' kind behaviors show great diversity depending on their perceptions of distributive, procedural and interactional classroom. An enjoyable interaction environment positively influences

the perception of three types of justice in classroom and answering the questions of students seems important for procedural and interactional justice. When teachers make arrangements of courses and determine criteria for giving grades, students have a stronger tendency to perceive procedural and distributive justice (Young et al., 2013). There are studies demonstrating that one of the most important characteristics that students seek in teachers' behaviours is justice (Hoşgörür, 2012; 2015). Teacher implementations based on the principle of fairness protect justice by providing a frame for decisions of teachers and ensure presenting unprejudiced and consistent behaviors towards students (Reyna & Weiner, 2001). Explaining the rules of the classroom clearly, implementing the rules in an organized, consistent and objective way, creating a communication environment based on respect would strengthen the perception of justice in students.

Negative perceptions of students about classroom justice also cause them to perceive teacher-student interactions as negative (Horan et al., 2013), moreover, students can blame their teacher for their low academic success (Chowning & Campbell, 2009). When individuals get rewards lower than they think they deserved, they perceive inequality and feel anger (Töremen & Tan, 2010). Students indicate rude, insensitive, prejudiced, ostracizing or blaming behaviors they observe in their teachers as an example of unfair conditions. Additionally, students stated that they feel anger, pain, disappointment, weakness, stress, and being frustrated and cheated, and they behaviorally show being opposite, failing to act, withdrawal, expressing hostile behaviors, etc. when they experience an unfair condition in the classroom (Horan et al, 2010). Similarly, Chory-Assad (2002), Chory-Assad and Paulsel (2004b) and Paulsel & Chory-Assad (2005) found that when students perceive procedural injustice they show behaviors like indirect aggression, hostility, desire to revenge, resistance and disobedience towards teachers. In addition, unfair behaviors in the classroom result in negative outputs like decreased motivation to learn and emotionally distancing from school (Berti, et al., 2010; Chory et al., 2014).

Determining the Perception of Justice in the Classroom

When Turkish literature is reviewed, there are some measurement tools used in determining the perception of justice in educational processes. These are "Social Justice Scales in Schools" (Karacan et al., 2015) and "Social Justice Beliefs Scale in Education" (Gezer, 2017) for teachers/teacher candidates and "Scale for Causes of Experiencing Conflict in Class" (Argon, 2009) for students.

The only study focusing on the justice in the classroom within the theoretical framework of Chory-Assad and Paulsel was the research study of Kepekçioğlu (2015). In this first study focusing on adapting Justice in the Classroom scales into Turkish, the scales were valid and reliable for the level of university students. In adaptation study conducted with the sample of university students, SDJC presented a two-dimensional structure. SPJC presented a three-dimensional structure differently from the original scale and SIJC presented a 8-item unidimensional structure, which is the item number of the original scale before revision. These results brought up the idea of restudying on the SJC. Therefore, differently from Kepekçioğlu (2015), it is conceived to be important to study the concept of classroom justice in a secondary school level for the reasons listed above.

In secondary education period, seeing and questioning life and developing a philosophy of life is among developmental tasks to achieve according to Havinghurst (Erkan, 2008). In addition to knowledge gained at school, students question the moral-religious rules they obtained through their family, deal with the problems of the society and world they are in, try to lay down their personal existence, question life and try to find a meaning. It is important to have a safe classroom environment and fair teacher behaviors in experiencing and healthy process and achieving developmental tasks. Perceiving the classroom environment and implementations of the teacher as fair would make them feel valuable and this is crucial for their self-confidence, self-competency, hope, academic success and social adaptation.

In accordance with the information given, in this study, on a secondary education level, it is aimed to adapt the Scale of Justice in the Classroom, which consists of the Scale of Distributive Justice in the Classroom, the Scale of Procedural Justice in the Classroom and the Scale of Interactional Justice in the Classroom, into Turkish and to conduct reliability and validity tests. In this way, it is considered that there would be a contribution to the literature, and Turkish form of Scale of Justice in the Classroom (SJC) would be beneficial for the researchers studying with secondary education level in the field and for school psychological counselors.

Method

Study Group

The study was conducted with students who attending 9th, 10th, 11th and 12th grade in high schools (Anatolian high school, vocational high school, imam hatip high school, science high school, fine arts high school) in a city in Western Black Sea Region. In determining the study group, convenience and maximum diversity was taken into account. Convenience sampling is described as the sampling conducted with individuals who are in close environment, accessible and voluntarily participating (Erkuş, 2009). In maximum diversity method, some variables, like biological sex, school type, which can separate participants from each other are taken into account. By this way, different opinions are included in the research study (Creswell & Clark, 2015). Study group consists of voluntary participants. In the study, 508 students were attained, deficiently and defectively filled measurement tools and items with outliers were excluded from the study and at the end, data obtained from 494 forms was analyzed. Out of participants, 314 of them (63.6%) were females and 180 of them (36.4%) were males. Kline (2011, 12) stated that sample sizes of 200 or over is sufficient for structural equation modelling studies. In this context, in the process of scale adaptation, the study was completed with the assumption that a sample size of 494 was accepted to be sufficient.

Data Collection Tools

The Scales of Justice in the Classroom

The Scale of Justice in the Classroom consists of three different scales; The Scale of Distributive Justice in the Classroom, The Scale of Procedural Justice in the Classroom and the Scale of Interactional Justice in the Classroom.

The Scale of Distributive Justice in the Classroom (SDJC); the scale was developed by Chory-Assad (2002) with 14-items and then revised by Chory-Assad and Paulsel (2004a) and rearranged as 12-items. It aims to determine perceptions of students about fairness of grades they got, or they expected to get in a course. The minimum score to obtain from the scale is 12 and the maximum score is 60. The Cronbach Alpha coefficient of the scale ranges between .69 (Chory, 2007) and .92 (Chory-Assad & Paulsel, 2004a).

The Scale of Procedural Justice in the Classroom (SPJC); Based on the studies of Thibaut and Walker (1975) and Leventhal (1980), it was developed by Chory-Assad (2002). The initial form consisted of 17 items and it was reviewed by Chory-Assad and Paulsel (2004a) and a 15-item form was created. In the scale, students are expected to evaluate a particular teacher about classroom rules, course schedule and grading criteria. The minimum score to obtain from the scale is 15 and the maximum score is 75. The Cronbach Alpha coefficient of the scale ranges between .72 (Chory, 2007) and .94 (Chory-Assad & Paulsel, 2004a).

The Scale of Interactional Justice in the Classroom (SIJC); initially the scale was developed as 8-items by Chory (2007) and revised as 7 items in the final form. SIJC is based on the evaluation of students about how respectful, open and kind the behavior of a specific instructor is towards students (Chory-Assad & Paulsel, 2004b). The Cronbach Alpha coefficient of the scale is .95 (Chory, 2007). The scores to obtain from the scale range between 7 and 35.

All of SDJC, SPJC and SIJC are 5-point Likert scales [1 (never fair), 5 (completely fair)]. There is no reverse-coded item in the scales. SJC scales, which were originally developed on university students, consist of three separate scales. No total scores are obtained from the sum of these scales (Chory-Assad-Paulsel, 2004a). In order to find the perception of justice in classroom, usually these three measurement tools are used together (Chory, 2007; Paulsel, Chory- Assad & Dunleavy, 2005; Rudick, 2010).

Translating the Scales of Justice in the Classroom into Turkish

In this study, in order to adapt SJC, which is composed of SDJC, SPJC and SIJC, into Turkish, Rebecca M. Chory were contacted for permission via e-mail (permission date March 13, 2017). In the process of adaptation of SJC, as a beginning language adaptation was conducted and then validity and reliability studies were conducted.

SJC were initially translated into Turkish by taking items and item-numbers of the original form into account. The translation was made by professionals who have a good knowledge of English and Turkish and from fields of Psychological Counseling and Guidance (PCG) and Educational Psychology. Translated scales were translated

back into English by two different PCG professionals who have a good command of English. In scale adaptation studies, issues such as on which points translations show differences, appropriateness in terms of meaning, suitability to society and culture should be taken into account (Şeker & Gençdoğan, 2014). In this direction, it was examined with a professional team of three whether there is a difference in meanings in Turkish and English translations and by detecting the points where translations differ from each other, translators were reconducted. In choosing the professionals, having at least doctorate degree and having an abroad experience was a necessity.

In the second phase, SDJC, SPJC and SIJC were applied to 17 students who are on 10th grade in an Anatolian High School foreign languages department and items of the scales were discussed with students in terms of meaning and comprehensibility and opinions and suggestions of students were obtained. In translating scale items into Turkish and as a result of research studies conducted with secondary school students, items which take place in the initial forms of original scales but excluded from the original form thereafter were seem to be difficult in terms of comprehensibility and were excluded from the scale. In this direction, SDJC includes 12 items, SPJC includes 15 items and SIJC includes 7 items and analyzed accordingly.

In the original form of the Scale of Justice in the Classroom, the fairness of only one instructor was measured. However, in this research study, students were asked to evaluate their perception of general justice for all of their instructors. As a result, singular statements in the original form were transformed into plural statements in the translated scale.

Data Collection

First of all, permissions were obtained from Provincial Directorate of National Education to collect data from schools. Secondly, administrators and teachers at schools were informed and an implementation plan was prepared. Afterwards classrooms were visited, students were informed about the objective of the study and researcher and the study was conducted with the students who accepted voluntary participation. No personal data was asked to students except school, class and gender variables. They were encouraged to read informed consents, which were placed in the first sheet of the measurement tools and includes information that their decision to participate or not will not affect their school grades, collected data will be used only for this study, etc. data was collected by the researcher.

Data Analysis

After completion of Turkish translation, content and construct validity of the scales were investigated. One of the methods used in determining the content validity is getting an expert opinion (Büyüköztürk et al., 2010). SJC were examined by two academicians, one of whom is from the field of PCG and the other is from the field of Turkish Language and Literature, and they were investigated in terms of expression, meaning, comprehensibility, and appropriateness to Turkish culture. In the direction of suggestions from professionals, measurement tools were put into the final forms. By this way, content validity of SDJC, SPJC and SIJC was provided.

In order to ensure validity and reliability study of the Scales of Justice in the Classroom, data was transferred to SPSS 22.00 program. For validity analysis, AMOS 21.0 program was used and confirmatory factor analysis was conducted, also correlations among SDJC, SPJC and SIJC were calculated. Confirmatory factor analysis is based on the testing of a prediction that specific variables, on the basis of a theory, will mainly take place on predetermined factors (Sümer, 2000). When an intercultural scale adaptation study is being conducted, it is suggested to start from a confirmatory factor analysis of the tool for factor design of the target culture. As factor design of the measurement tool in question in the original culture is revealed with several qualitative and quantitative studies and by this way, experimental proofs were presented related to structural validity of the tool. Confirmatory factor analysis is a technique which is used to test or confirm the theoretical structure of the measured property (Tabachnick & Fidell, 2001). As a result of confirmatory factor analysis, if the model related to original factor design of the measurement tool is not confirmed or it does not give high fit indices, by using exploratory factor analysis, it could be tried to discover factor design of the target culture (Çokluk et al, 2010). In order to make reliability analysis, inner consistency coefficients of sub-dimensions of SDJC and the whole scale and whole scales of SPJC and SIJC were examined. In addition, test-retest method was implemented with a two-week interval and relationship between two implementations were examined.

Research Ethics

Permission was obtained from Provincial Directorate of National Education, dated 31.05.2017, numbered 64441482-605.01-E.7989707, regarding the adaptation of the scales of Justice in Classroom to Turkish and

carrying out the validity and reliability studies. After preparing the necessary documents regarding the research and ethics committee approval obligation was imposed on all articles, including the research process and publication process, the research measurement tools, research data and all processes were submitted to the Bartın University Ethical Committee and the ethics committee approval was obtained with the protocol number 2020-34, dated 06.03.2020.

Findings

Validity

Confirmatory factor analysis (CFA) was conducted in order to confirm the factors existing in the original form of the scale For construct validity of the SJC, comprised of SDJC, SPJC and SIJC. Before starting the analysis, by examining the data set, appropriateness of the data, data accuracy, sample size, missing values, missing data, outliers, normality, linearity, and multilinearity assumptions were checked and provided. Another assumption of the confirmatory factor analysis is about missing data. For each factor, after making missing data analysis, it was found that items with missing data were found to be less than 5%. In order to provide this assumption, data imputation operation to data set was applied through EM method.

Multivariate normality assumption was examined by using Multivariate Kurtosis Coefficient of Mardia (1970). In order to correspond to multivariate normality, it was expected to find coefficients below 5 (Byrne, 2009). In this study, it was found that Mardia's 102.098 coefficient, presenting multivariate normality assumption, did not meet this assumption. On the other hand, result of Kaiser-Meyer-Olkin (KMO) Test and Bartlett Test show that data provide multivariate normality ($p < .05$). Depending on these findings, assuming a normal distribution of data, confirmatory factor analysis was conducted (Can, 2014, p. 303).

Confirmatory Factor Analysis Results of the Scale for Distributive Justice in Classroom

In order to determine that the original structure of SDJC is confirmed with the sample of Turkish participants, construct validity of the scale is examined using confirmatory factor analysis. As a result of analysis, it was found that the model presents an acceptable level of fit ($c^2=204,762$; $p=.000$; $sd=.53$; $X^2/df= 3.86$; $RMSEA=.076$; $SRMR=.039$; $CFI=.94$; $GFI=.93$; $TLI=.93$). Confirmatory factor analysis for SDJC is given in Figure 1.

When the results of analyses are reviewed, it can be observed that distributive justice scale present a two-factor structure. It was found that items 1, 2, 4, 5, and 6 fall under one factor and in accordance with item contents, this 1st factor is named as "Existing Distributive Justice". Items 7, 8, 9, 11, 12, 13 and 14 fall under the 2nd factor and in accordance with its content, this factor is named "Expected Distributive Justice". Standardized factor loads range between .54 and .73.

Confirmatory Factor Analysis Results for the Scale of Procedural Justice in the Classroom

In order to find that the original structure of the SPJC is confirmed with the sample including Turkish participants, construct validity of the scale is investigated with confirmatory factor analysis. As a result of analysis, it is found that the model is out of acceptable limits ($c^2= 490,562$; $p=.000$; $sd= 90$; $\chi^2/df =5,45$; $GFI = .87$; $CFI = .89$; $TLI = .87$; $RMSEA = .095$ ve $SRMR = .053$).

Modification suggestions were reviewed and by making covariance between error variances of item 7 and 8, the model was reanalyzed. Results of analyses revealed that a single-factor model structure is maintained for the scale, however model data fit is not at an acceptable level ($c^2= 421.797$; $p=.000$; $sd= 89$; $\chi^2/df =4,74$; $GFI = .89$; $CFI = .91$; $TLI = .89$; $RMSEA = .087$ ve $SRMR = .050$). As a result of analyses, modification suggestions were reviewed and by making a covariance between error variances of item 9 and 10, model was reanalyzed. After modification, results showed that fit indices are acceptable ($c^2= 361.966$; $p=.000$; $sd= 88$; $\chi^2/df =4,11$; $GFI = .91$; $CFI = .92$; $TLI = .91$; $RMSEA = .079$ ve $SRMR= .046$). CFA results related to the scale of procedural justice in the classroom are given in Figure 2.

As a result of confirmatory factor analysis, results related to standardized factor loads of items are given in Table 1.

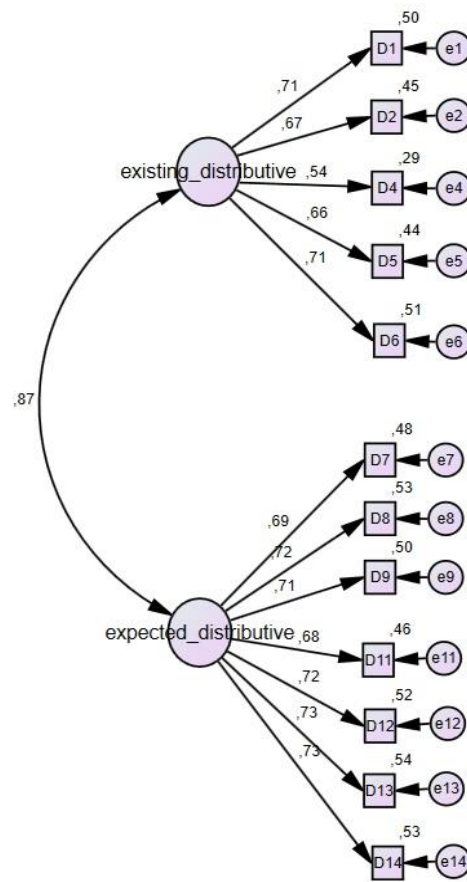


Figure 1. *Confirmatory Factor Analysis Results of the SDJC*

Table 1. Results Related to Standardized Factor Loads of Items

Factor	Item	Standardized Factor Load	<i>t</i>	R ²
MDA	D1	.71		.50
	D2	.67	13.38	.45
	D4	.54	10.89	.29
	D5	.66	13.17	.44
	D6	.71	14.11	.51
	BDA	D7	.69	
D8		.72	14.67	.53
D9		.71	14.31	.50
D11		.68	13.79	.46
D12		.72	14.64	.52
D13		.73	14.84	.54
D14		.73	14.75	.53

**p*<.001, D= Item

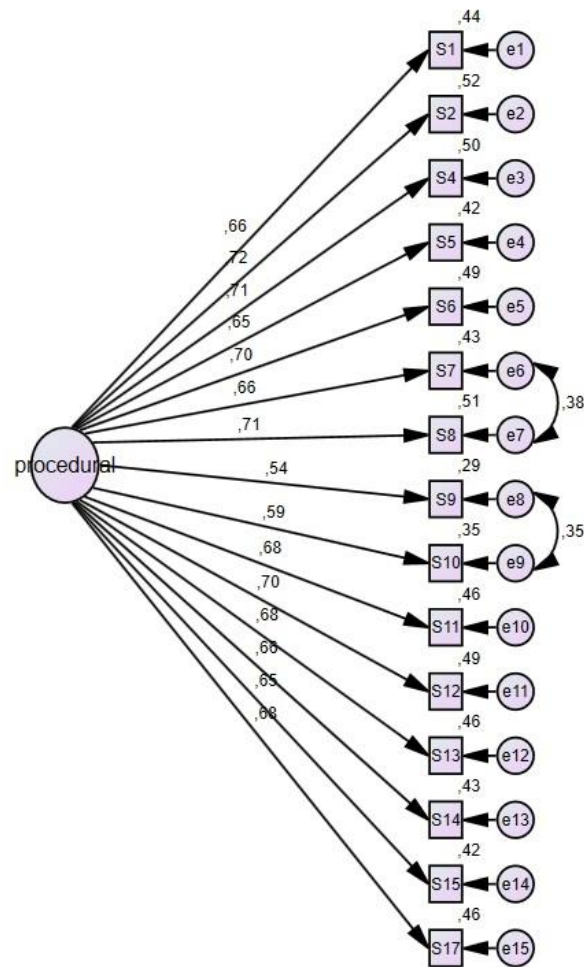


Figure 2. *Confirmatory Factor Analysis Results for the SPJC*

As a result of confirmatory factor analysis, results related to standardized factor loads of items are given in Table 2.

Table 2. Results Related to Standardized Factor Loads of Items

Item	Standardized Factor Load	<i>t</i>	R ²
S1	.66		.44
S2	.72	14.19	.52
S4	.71	13.99	.50
S5	.65	12.91	.42
S6	.70	13.80	.49
S7	.66	13.10	.43
S8	.71	14.03	.51
S9	.54	10.96	.29
S10	.59	11.92	.35
S11	.68	13.45	.46
S12	.70	13.80	.49
S13	.68	13.47	.46
S14	.66	13.14	.43
S15	.65	12.92	.42
S17	.68	13.44	.46

* $p < .001$, S= Item

When Table 2 is examined, standardized factor loads of SCPJ range between .54 and .72.

Confirmatory Factor Analysis Results for the Scale of Interactional Justice in the Classroom

In order to determine that original structure of SIJC is confirmed with the sample of Turkish participants, construct validity of the scale is investigated with confirmatory factor analysis. As a result of analysis, it was found that the model is out of acceptable limits ($c^2 = 99,919$; $p = .000$; $sd = 14$; $\chi^2/df = 7,13$; $GFI = .95$; $CFI = .96$; $TLI = .94$; $RMSEA = .112$ ve $SRMR = .031$). Modification suggestions were examined and the model was reanalyzed by establishing a covariance between error variances of item 1 and 2. When fit of indices after modification is examined, it was found that the model obtain good fit values ($c^2 = 36.024$; $p = .001$; $sd = 13$; $\chi^2/df = 2,77$; $GFI = .98$; $CFI = .99$; $TLI = .99$; $RMSEA = .060$, $SRMR = .019$). CFA results about SIJC are given in Figure 3.

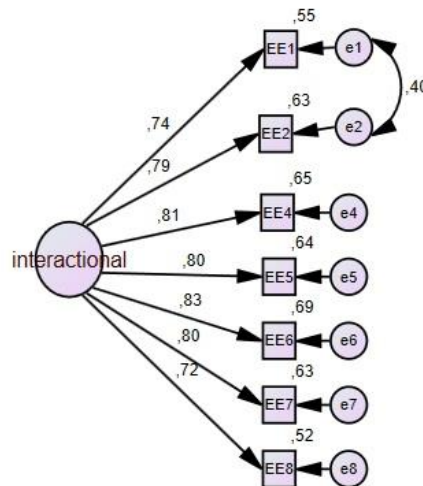


Figure 3. Results of Confirmatory Factor Analysis for the SIJC.

As a result of confirmatory factor analysis, results related to standardized factor loads of items are given in Table 3.

Table 3. Results Related to Standardized Factor Loads of Items

Item	Standardized Factor Load	<i>t</i>	R ²
EE1	.74		.55
EE2	.79	22.76	.63
EE4	.81	17.88	.65
EE5	.80	17.80	.64
EE6	.83	18.47	.69
EE7	.80	17.64	.63
EE8	.72	15.93	.52

* $p < .001$, EE= Item

When Table 3 is examined, it is found that standardized factor loads of SIJC range between .74 and .83. After evaluating all results of analyses and taking fit of indices into account, it can be stated that Turkish forms of SDJC, SCPJ and SIJC present a good fit.

Correlations among SJC are investigated and results are given in Table 4.

Table 4. Correlations among Distributive Justice, Procedural Justice and Interactional Justice Scales in the Classroom

	Interactional	Procedural	Distributive
Interactional	1		
Procedural	.69***	1	
Distributive	.39***	.52***	1

*** $p < .001$

When the Table 4 is examined, correlation between SDJC and SPJC is found $r = .52$; correlation between SDJC and SIJC is found $r = .39$ and correlation between SPJC and SIJC is found $r = .69$.

In the development phase of SJC (Chory, 2007), the correlation between SDJC and SPJC is ($r = .65$, $p < .001$), correlation between SDJC and SIJC is ($r = .41$, $p < .001$), and correlation between SPJC and SIJC is ($r = .70$, $p < .001$). Similarly, in the study conducted by Kepekçioğlu (2015) on university students, the correlation between SDJC and SPJC is ($r = .53$, $p < .01$), correlation between SDJC and SIJC is ($r = .44$, $p < .01$), and correlation between SPJC and SIJC is ($r = .68$, $p < .01$).

When results of correlations are examined, it was found that there is a strong connection between distribution of resources deservedly and clear and consistent rules in this distribution process. In addition, it can be asserted that there is a strong relationship between clear rules about distribution of resources, perception of their consistency over individuals, places or time and an equalitarian communication style with individuals.

Reliability

Reliability analyses of The Scales of Justice in the Classroom are calculated by using Cronbach Alpha inner consistency coefficients. Cronbach Alpha inner consistency coefficients are calculated for existing distributive justice and expected distributive justice sub-dimensions of distributive justice scale and for the whole distributive justice scale and for SPJC and SIJC. Reliability coefficients of SJC are given in Table 5.

Table 5. Reliability Coefficients of SJC

Scale / Name of sub-dimension	Cronbach Alpha Value	
	Turkish	Original
Distributive Justice Scale in the Classroom (SDJC)	.91	.69
SDJC, Existing Justice Sub-Dimension	.79	-
SDJC, Expected Justice Sub-dimension	.88	-
Procedural Justice Scale in the Classroom (SPJC)	.92	.72
Interactional Justice Scale in the Classroom (SIJC)	.93	.95

When Table 5 is reviewed, Cronbach Alpha coefficient is found .91 for SDJC, .92 for SPJC and .92 for SIJC. In other words, inner consistency coefficients of all scales are over .80. In accordance with this information, it can be said that reliability coefficients of adapted SDJC and adapted SPJC are higher than the original scale and reliability coefficient of the SIJC is high and close to the original scale.

Additionally, in order to statistically test stability of Turkish forms of Scales of Justice in the Classroom, in terms of the properties it measures, Test-Retest method was used. In order to determine test-retest reliability coefficient of the scales, the scales were applied to 47 students studying in 11th and 12th grades of an Anatolian High School with a two-week interval. In order to test stability of scores obtained from two implementations, Pearson Product-Moment Correlation Coefficient was examined. According to this, a positive and significant relationship was determined between both implementations of SJC. This relationship was found as $[r(47) = .89, p < 0.01]$ for SDJC, $[r(47) = .84, p < 0.01]$ for SPJC and $[r(47) = .87, p < 0.01]$ for SIJC.

Discussion and Conclusion

In this study, validity and reliability study of the Turkish versions of The Scales of Justice in the Classroom, which is composed of the scales of Distributive Justice in the Classroom (Chory-Assad and Paulsel (2004), The Procedural Justice in the Classroom (Chory-Assad & Paulsel, 2004) and The Interactional Justice in the Classroom (Chory, 2007) was conducted on students at the high school.

Two-dimensional structure of the Distributive Justice in the Classroom is consistent with the literature. According to Adams (1965; cited in Greenberg et al., 2007), who propounded the equality theory, the nature of justice is comparative. The individual compares the rewards s/he gets related to own contributions with what other equals get (Ashton-James & Ashkanasy, 2007). As an example, students who spend more time and effort for examinations and expect to get high grades but could get low grades when other students spend less time and effort but get higher grades, regard their grades as unfair (Tata, 1999). According to Greenberg (1987), conformable to prejudices in distributive justice, individuals expect their performances or the consequence of their performances to be higher from others. In addition, individuals perceive their high outcomes to be fairer from the low outcomes of others. For this reason, individuals may have different expectations related to justice about the rewards they get and they expect.

Confirmatory factor analysis and Cronbach Alpha internal consistency coefficient sign a good fit and it was claimed that SDJC, SPJC and SIJC can be used as valid and reliable measurement tools for Turkish culture. It is thought that SJC could help professionals obtain valid and reliable data in fields of psychological counseling and guidance, education, psychology, social services, child development, that work with adolescents. It is known that students show reactions like anger, disappointment and failing to act, when they face with unfair attitudes of teachers (Horan et al, 2010). In this direction, it is thought that SJC could be used in providing data in guidance and psychological counseling studies conducted to understand whether there are unfair situations behind the antisocial behaviors of students (Chory-Assad & Paulsel, 2004b, Horan et al., 2010) or behaviors like distancing from school, becoming withdrawn, academic failure, being amotivational, etc. (Chory-Assad, 2002).

Suggestions

This study is conducted with students studying in different high school in a city in Western Black Sea Region.. Additional studies could be organized to include bigger samples all across Turkey and by comparing obtained outcomes with the findings of this study, validity and reliability of the scale could be strengthened. Similar and discriminant scale validity can be tested for SJC.

It is thought that Scales of Justice at School will contribute to the studies of school psychological counselors and researchers in order to understand negative behaviors like absenteeism, failure, aggressiveness, introversion. In addition, it is assumed that the study will empower studies on school atmosphere and culture.

References

- Argon, T. (2009). Üniversite öğrencilerinin sınıf içi çatışma yaşama nedenlerinin ölçülmesine yönelik bir ölçek geliştirme çalışması. *Kuram ve Uygulamada Eğitim Bilimleri*, 9(3),1001-1041.
- Berti, C., Molinari, L.& Speltini, G. (2010). Classroom justice and psychological engagement: students' and teachers' representations. *Soc Psychol Educ*, 13, 541–556. DOI 10.1007/s11218-010-9128-9
- Can, A. (2014). *SPSS ile bilimsel araştırma sürecinde nicel veri analizi*. Ankara: Pegem .
- Chory-Assad, R. M. (2002). Classroom justice: Perceptions of fairness as a predictor of student motivation, learning, and aggression. *Communication Quarterly*, 50, 58–77.
- Chory, R. M. (2007). Enhancing student perceptions of fairness: The relationship between instructor credibility and classroom justice. *Communication Education*, 56, 89–105.
- Chory- Assad, R.M. & Paulsel, M.L. (2004a) . Classroom Justice: Student Aggression and Resistance as Reactions to Perceived Unfairness. *Communication Education*, 53 (3), 253–273.
- Chory-Assad, R. M., & Paulsel, M. L. (2004b). Antisocial classroom communication: Instructor influence and interactional justice as predictors of student aggression. *Communication Quarterly*, 52, 98-114.
- Chory, R.M., Horan, S.H., Carton ,S.T.& Houser, M.L.(2014). Toward a further understanding of students' emotional responses to classroom injustice. *Communication Education*, 63(1), 41–62.
- Chowning, K., & Campbell, N. J. (2009). Development and validation of a measure of academic entitlement: Individual differences in students' externalized responsibility and entitled expectations. *Journal of Educational Psychology*, 101, 982–997. doi:10.1037/a0016351
- Creswell, J.W. & Plano Clark, V.L. (2015). *Karma yöntem araştırmaları tasarımı ve yürütülmesi* (Çev.Edts. Y. Dede ve S. Beşir Demir), Ankara : Anı.
- Cropanzano, R., & Greenberg, J. (1997). Progress in organizational justice: Tunneling through the maze. In C. L. Cooper & I. T. Robertson (Eds.), *International Review of Industrial and Organizational Psychology*, 12, (pp. 317–372). London: Wiley.
- Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. *Journal of Applied Psychology*, 86, 424- 445.
- Çokluk, Ö., Şekercioğlu, G. ve Büyüköztürk, Ş. (2010). Sosyal bilimler için çok değişkenli istatistik: SPSS ve lisrel uygulamaları. Ankara: Pegem.
- Erkan, S. (2008). Gelişim psikolojisinde temel kavramlar. İçinde Y. Özbay ve S. Erkan (Edts.), *Eğitim Psikolojisi*, (27-49) Ankara: Pegem.
- Erkuş, A. (2009). *Davranış bilimleri için bilimsel araştırma süreci* (2. basım). Ankara: Seçkin.
- Evertson, C.M. & Emmer, E.T. (2013). *İlkokul öğretmenleri için sınıf yönetimi* (Çev. Edt. Ahmet Aypay). Ankara: Nobel.
- Gezer, M. (2017). Öğretimde Sosyal Adalet İnançları Ölçeği'nin Türkçe Uyarlaması. *Sakarya University Journal of Education*, 7(2), 295-309.
- Gözler, K. (2008). Tabii hukuk ve hukuki pozitivizme göre adalet kavramı. *Muhafazakar Düşünce*, 4 (15), 77-90.
- Greenberg, J. (1987). Reactions to procedural justice in payment decisions: Do the means justify the ends? *Journal of Applied Psychology*, 72, 55-61.
- Greenberg, J., Ashton-James, C. E. & Ashkanasy, N. M. (2007). Social comparison processes in organizations. *Organizational Behavior and Human Decision Processes*, 102(1), 22-41.
- Güriz, A. (2001). Adalet kavramının belirsizliği. İçinde Betül Çotuksöken (Edt.) *Cumhuriyet Döneminde Türkiye'de Öğretim ve Araştırma Alanı Olarak Felsefe*, (315-330). Ankara : Türkiye Felsefe Kurumu.
- Hoşgörür, T. (2012). A Discussion of what makes a good teacher: Opinions of pre-service primary school teachers. *Procedia-Social and Behavioral Sciences*, 55, 451-460.
- Hoşgörür, T. (2015). According to former school students' viewpoints, what aspects turn a bad teacher into a good teacher? *Anthropologist*, 19(3), 819-828.

- Horan, S.M., Chory, R.M. & Goodboy, A.K. (2010). Understanding students' classroom justice experiences and responses. *Communication Education*, 59 (4), 453- 474.
- Horan, S. M., Chory, R. M., Carton, S., Miller, E., & Raposo, P. (2013). Testing leader-member exchange theory as a lens to understand students' classroom justice perceptions and antisocial communication. *Communication Quarterly*, 61, 497–518.
- Karacan, H., Bağlıbel, M. ve Bindak , R. (2015). Okullarda Sosyal Adalet Ölçeğinin geliştirilmesi. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 12 (31), 54-68.
- Kepekçioğlu, E. S. (2015). *Üniversite öğrencilerinin öğretim elemanlarının inanılabilirliği algısı ve sınıfta adalet algısı arasındaki ilişki* (Yayınlanmamış doktora tezi, Abant İzzet Baysal Üniversitesi Eğitim Bilimleri Enstitüsü, Bolu).
- Kline , R. B. (2011). *Principle and practice of structural equation modeling*. New York: The Guilford Press
- Kim, C., Damewood, E. & Hodge, N. (2000). Professor attitude: Its effect on teaching evaluations. *Journal of Management Education*, 24(4), 458-473. DOI: 10.1177/105256290002400405.
- Molinari, L., Speltini, G. & Passini, S. (2012). Do perceptions of being treated fairly increase students' outcomes? Teacher–student interactions and classroom justice in Italian adolescents. *Educational Research and Evaluation: An International Journal on Theory and Practice*, 19 (1), 58-76
<http://dx.doi.org/10.1080/13803611.2012.748254>
- Paulsel ,M.L. & Chory Assad, R.M. (2005). Perceptions of instructor interactional justice as a predictor of student resistance. *Communication Research Reports*, 22 (4), 283 - 291.
- Paulsel, M.L., Chory-Assad, R.M. & Dunleavy, K.N. (2005) The Relationship between Student Perceptions of Instructor Power and Classroom Justice. *Communication Research Reports*, 22 (3), 207 -215.
- Reyna, C. & Weiner, B. (2001). Justice and utility in the classroom: an attributional analysis of the goals of teachers' punishment and intervention strategies. *Journal of Educational Psychology*, 93(2), 309-319
- Rudick, C.K. (2010). *Students' perceptions of classroom justice and their use of politeness strategies*. (Master thesis) Eberly College of Arts and Sciences at West Virginia University
- Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar. *Türk Psikoloji Yazıları*, 3 (6), 49-74.
- Şeker, H ve Gençdoğan, B. (2014). *Psikolojide ve eğitimde ölçme aracı geliştirme*. Ankara: Nobel.
- Tabachnick, G. B. & Fidell, S. L. (2001). *Using multivariate statistics*. (Fourth Edition) Boston, U.S.A.: Allyn and Bacon, A Pearson Education Company.
- Tata, J. (1999) Grade distributions, grading procedures, and students' evaluations of instructors: a justice perspective, *The Journal of Psychology*, 133 (3), 263-271.
DOI:10.1080/00223989909599739 <https://doi.org/10.1080/00223989909599739>
- Töremen, F. ve Tan,Ç. (2010). Eğitim örgütlerinde adalet: kavramsal bir çözümleme. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, 14, 58-70
- Whalen, D. J., & Koernig, S. K. (2009). Maintaining fairness when a student goes afoul of classroom rules: a procedural justice model. *Marketing Education Review*, 19(2), 27-33.
- Yolcu, H. (2010). Sınıf yönetimini etkileyen etkenler (1. bs.). Ed. C. Gülşen. *Kuram ve uygulamada sınıf yönetimi içinde* (s. 23-62). Ankara: Anı Yayıncılık.
- Young, I.,E. Horan, S.M. ve Frisby,B.N.(2013). Fair and Square? An Examination of Classroom Justice and Relational Teaching Messages. *Communication Education*, 62(4), 333-351, DOI: 10.1080/03634523.2013.800216



Analysis of Scientific Epistemological Beliefs and STEM Attitudes of the Gifted Students

İsmail Dönmez^{*a}, Semra Yalmanlı-Yücel^{lb}

Article Info

DOI: 10.14686/buefad.644698

Article History:

Received: 09.11.2019

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Scientific Epistemological Belief,
STEM,
Attitude,
Gifted Students

Article Type: Research Article

Abstract

The aim of this study is to analyze STEM (science, technology, engineering, mathematics) attitudes, epistemological beliefs and the relationship between STEM attitudes, epistemological beliefs of gifted students. For this purpose, the attitude and level of epistemological belief in STEM fields; It was analysed whether the dimensions of STEM, 21st century skills and epistemological beliefs that make up the STEM attitude dimensions differ in authority and accuracy, the process of producing knowledge, the source of knowledge, reasoning, and variability of knowledge. The sample of the study consists of totally 105 gifted students who have attended in two different science and art centres. In the study, descriptive survey model used which is one of the quantitative researches. Non-parametric tests have been used for the analysis of the data obtained. As a result of the study, it has been observed that students with superior intelligence have a scientific epistemological belief at an advanced (contemporary) level of information generation, reasoning and variance of information, while they have a traditional epistemological belief in the sub-dimensions of authority-accuracy and source of information. As for the STEM attitudes, it has been found out that they have low averages in the dimensions of math and science.

Üstün Zekâlı Öğrencilerin Bilimsel Epistemolojik İnançları ile STEM Tutumlarının İncelenmesi

Makale Bilgisi

DOI: 10.14686/buefad.644698

Makale Geçmişi:

Geliş: 09.11.2019

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Bilimsel Epistemolojik İnanç,
STEM, Tutum,
Üstün Zekâlı Öğrenciler

Makale Türü:

Araştırma Makalesi

Öz

Bu çalışmanın amacı üstün zekâlı öğrencilerin STEM tutum, epistemolojik inanç ve STEM tutum epistemolojik inançlarının arasındaki ilişkiyi incelemektir. Bu amaç doğrultusunda STEM (bilim, teknoloji, mühendislik, matematik) alanlarına yönelik tutum ve epistemolojik inanç düzeyi; STEM tutum boyutlarını oluşturan, fen, matematik, mühendislik-teknoloji, 21.yy becerileri ve epistemolojik inanç boyutlarını otorite ve doğruluk, bilgi üretme süreci, bilginin kaynağı, akıl yürütme, bilginin değişirliği boyutlarında farklılaşıp farklılaşmadığı incelenmiştir. Araştırmanın örneklemini iki bilim ve sanat merkezine (BILSEM) devam etmekte olan toplam 105 üstün zekâlı öğrenci oluşturmuştur. Nicel araştırma yöntemlerinden betimsel tarama modelinin kullanıldığı bu çalışmada verilerin çözümlenmesi için parametrik olmayan testler kullanılmıştır. Araştırma sonucunda üstün zekâlı öğrencilerin; otorite ve doğruluk ve bilginin kaynağı alt boyutunda geleneksel, bilgi üretme süreci, akıl yürütme, bilginin değişirliği gelişmiş (çağdaş) düzeyde bilimsel epistemolojik inanca sahip oldukları görülmektedir. STEM tutumlarından matematik ve fen boyutlarında düşük ortalamalar sahip olduğu görülmüştür.

*Corresponding Author: i.donmez@alparslan.edu.tr

^aDr., Muş Alparslan University, Muş/Turkey, <http://orcid.org/0000-0002-7792-0169>

^bTeacher., Kdz. Ereğli Science and Art Center (BILSEM), Zonguldak/Turkey, <http://orcid.org/0000-0002-6070-7935>

Introduction

Epistemological beliefs or beliefs are considered as individuals' perspectives on what the information is, how it is collected and what the limits and criteria of that information are (Perry, 1981). These beliefs have a deterministic effect on the variables such as the way individuals process and interpret the information they encounter, their strategies for studying, their high-level thinking and problem-solving approaches, and the effort and time they spend for learning (Tolhurst, 2007). Scientific epistemological beliefs of the students affect the way they understand how scientific information is formed and evaluated, and how they can learn science; in other words, their understanding of the nature of science (Elder, 1999). Attitude is defined as the tendency to react positively or negatively to an object, person or event (Fishbein & Ajzen, 1975). Oppenheim (1992) defines attitude in a single sentence as a belief, a choice, a decision, an emotional feeling and the position taken against anything. When considered as the process of perception, interpretation and internalization of the information; it is impossible for epistemological beliefs not to affect an individual's attitudes and behaviours. This situation reveals the importance of the development of epistemological belief that an individual has in developing positive attitudes and behaviours (Demir & Akınoğlu, 2010). Epistemological beliefs are subjective belief systems related to the accuracy of information, the source of information, the formation of information by the individual, the learning of information and the structure of information. Attitude, on the other hand, plays an important role in the process of learning due to its effect on the formation of students' decisions and behaviours. Attitudes and beliefs are in close connection with each other in terms of the cause and effect relationship (Çöllü & Öztürk, 2006). Attitudes are hidden within certain value judgments and beliefs, and they exist as long as the beliefs and value judgments on which they are based maintain continuity. When the literature on science and mathematics is examined, it becomes clear that there are significant studies that measure the students' attitudes towards science and mathematics. However, very few studies have investigated the epistemological beliefs of middle school students (Akgün & Gülmez, 2015; Aydemir et al., 2013; Önen, 2011). In the study that Önen (2011) conducted, the epistemological beliefs of high school students and their attitudes towards studying have been analyzed. As a result of the study, it has been stated that there is a significant correlation between the epistemological beliefs and the attitudes towards studying. However, when the scientific epistemological beliefs of high school students have been examined according to their genders, it has been stated that female students have more developed epistemological beliefs than male students. According to the grade level variable, it has been concluded that the beliefs develop as the grade level increases. Aydemir et al. (2013) have examined how high school students' epistemological beliefs change according to the grade level and gender variable. It has been concluded that the grade level has a significant effect on the sub-dimensions; the source, invariance and development of information. On the other hand, it is stated that the gender variable has a significant effect on the students' beliefs in the justification of information, which is in favour of female students. In their study aimed at analyzing the effect of high school students' epistemological beliefs on their academic success in chemistry courses, Akgün and Gülmez (2015) have found out that female students have more developed beliefs than male students. Aşut and Köksal (2015) have dealt with the correlation between the gifted students' epistemological beliefs and the level of their motivation and success in learning science, and they have pointed out that gifted students show a medium level of development in terms of scientific epistemological beliefs. In the study which they conducted on gifted high school students, Schommer and Dunnell (1997) have found out that the students have a medium level of development in epistemological belief within the dimensions of the source of information, the speed of learning, the ability to learn and the invariance of information. As can be seen, the relationship between epistemological beliefs and learning, comprehension and academic performance in recent years has been involved in many studies. No study examining the extent of the relationship between STEM (science, technology, engineering, mathematic) education and their scientific epistemological beliefs is encountered for gifted students.

STEM is an interdisciplinary approach that links academic content with real-world situations in science (Akgündüz et al., 2015) technology, engineering, and mathematics, incorporating this content into school, community, business and global initiatives (Lacey & Wright, 2009), and the development of new economic competition conditions through STEM literacy (Balka, 2011; Zollman, 2012). Integrated STEM activities aims for students to pursue careers in STEM fields. On the other hand, it is possible to measure STEM attitudes of students by measuring each discipline individually instead of measuring them in an integrated way. Therefore, the formation of information by the students, learning the information and understanding how subjective belief systems related to the structure of information are shaped will facilitate the understanding of their decisions and

behaviours towards STEM fields. The researchers defending the integrated approach also in STEM education argue that students' interest, motivation and success can be improved through the topics involving problems encountered in current life, and this situation will lead to an increase in the number of students who want to make their career plan in STEM fields (Gülhan & Şahin, 2016). Gifted students favour authentic learning in STEM subjects that bring meaning to the content, either personally or contextually (Morris et al., 2019). Gifted learners are responsive to a degree of autonomy over their own learning, including learning in STEM subjects (Mullet et al. 2018). Students' attitudes towards STEM, which is the most important change movement in the education field of the 21st century, are highly important. Analysing attitudes towards STEM will contribute to determining the STEM career potentials that countries will need in the future and making necessary arrangements to increase the STEM career interest. (Kennedy et al., 2016). The gifted students' beliefs in science will affect their attitudes towards STEM fields and will indirectly contribute to making career in these fields, which is one of STEM's greatest goals (Leslie et al., 2015; Smith et al., 2013). According to King and Magun-Jackson (2009), there are many attempts to increase student participation in science, technology, engineering and mathematics (STEM). It is necessary to examine the nature, histories, and epistemologies of each STEM discipline to consider the promises and perils that lay ahead for an integration effort that assumes a commonality across these fields does exist (Reynante et al. 2020). There is a growing interest to determine factors in towards STEM education. Science and technology education should be prepared in an inclusive manner for all members of the society. In this context, STEM attitudes and epistemological beliefs should be determined in order to increase the quality of science education to be provided to gifted individuals and society. It can be further explored by focusing on issues related to the epistemological nature and validity of information that tends to be addressed. The main purpose of this study is to analyze STEM attitudes, epistemological beliefs and the relationship between STEM attitudes, epistemological beliefs of gifted students. Within the framework of this purpose, some answers are also sought for the following sub-questions:

- What are the epistemological belief information levels of gifted students?
- Do epistemological beliefs of gifted students show significant differences by gender?
- What are STEM attitudes of gifted students?
- Do STEM attitudes of gifted students differ significantly by gender?
- Is there a correlation between the epistemological beliefs of gifted students and their STEM attitudes?

Method

It was used descriptive survey method, which is one of the quantitative researches. In this study, the descriptive survey model has been utilized for the purpose of analyzing the aim, scope and methodology of the researches made in the field of epistemological beliefs and STEM attitudes of gifted students. The reason why survey model has been used in this study is that these models are suitable for the researches which are aimed at describing a past or present situation as what it is (Karasar, 1999).

Population and Sample

The population of the study consists of gifted students who receiving education in two Science and Art Centers (BİLSEM) in Ankara and Zonguldak in the 2018-2019 academic year. BİLSEM is an independent private education institution that has been opened in order to ensure that specially gifted students (painting, music and general mental ability) in primary, secondary and high school age are aware of their individual abilities in their formal education and to develop their capacity and use them at the highest level (Ministry of Education [MoNE], 2017a). Children, who are considered to be gifted in terms of painting, music and mental ability, are subjected to exams held by BİLSEM in two stages. Children who achieve the desired success in the exams are admitted to BİLSEM programs in Turkey. The sample of the study consists of 105 gifted students receiving education at BİLSEM. The study consists of 42.9% female ($f = 45$) and 57.1% male ($f = 60$) gifted students. Cluster sampling was preferred in determining the sample of the study (Büyüköztürk et al., 2014). The epistemological belief scale and STEM attitudes scale were applied to the students in the classroom by researchers. After the instructions given by the researchers, the students answered the test individually. The implementation of the scales took 15-20 minutes.

Data Collection Tools

In this section, the characteristics of scientific epistemological belief scale and STEM attitude scale, which are the data collection tools used in the research, have been included.

Scientific Epistemological Beliefs Scale

In this study, "Scientific Epistemological Beliefs Scale", which was developed by Elder (1999) and adapted to Turkish by Acat et al. (2010), has been used for the purpose of determining the scientific epistemological beliefs of the students. This scale has been developed in accordance with the Likert-type five-point grading system and the levels "Totally Agree", "Agree", "Undecided", "Disagree" and "Totally Disagree" have been used for each item. There are 25 items in the scale. Scale consists five dimensions *Authority and Accuracy* (AA) (1., 5., 12., 15., 16., 20., 23., 24., 25. items), *Information Generation Process* (IGP) (3., 4., 7., 8., 11., 18. items), *Source of Information* (SI) (6., 10., 13., 14. items), *Reasoning* (R)(2., 21., 22. items) *Variance of Information* (VI) (9., 17., 19. items). 15 of the items contain negative judgments and 10 of them contain positive judgments. The lowest score that can be obtained from the scale is 25 and the highest score is 125. In the analysis performed by the researcher regarding the scale, it has been pointed out that the scale consists of five factors explaining the total variance ratio of 53.34%. The factors in question are authority and accuracy, information generation process, source of information, reasoning and variance of information. As a result of the reliability analysis of the scale, Cronbach Alpha reliability coefficients have been determined to be between 0.86 and 0.57 for the above-mentioned subscales. Cronbach's alpha reliability coefficient for the whole scale has been determined as 0.82 (Acat et al., 2010). For this study, the reliability of the scale has been re-calculated. Cronbach Alpha reliability coefficient has been found to be 0.87 for authority and accuracy while it is 0.86 for information generation process; 0.71 for source of information; 0.85 for reasoning and 0.74 for variance of information. In addition, Cronbach's alpha reliability coefficient for the whole scale has been found to be 0.83.

STEM Attitude Scale

STEM attitude scale has been developed by the Friday Institute for Innovative Practices in Education (2012) in order to determine the attitudes towards the fields of science, technology, engineering and mathematics. The scale consists 5 dimensions Mathematics (MT), Science (SC), Engineering and Technology (ET), 21st Century Skills (CS), of 37 items and has been developed in a 5-point Likert type. The items in the scale have been graded between "Strongly Agree (5)" and "Strongly Disagree (1)". The scale has a structure with a maximum score of 185 and a minimum of 37 points. The scale has been adapted to Turkish by Özcan and Koca (2019). The Cronbach Alpha internal consistency coefficient in the scale is 0.86 for mathematics, 0.87 for science, 0.86 for both engineering and technology, and 0.88 for 21st century skills. The Cronbach Alpha reliability coefficient calculated for the whole scale has been found to be 0.91. The Cronbach Alpha internal consistency coefficient calculated in this study is above 0.70, which indicates that the scale is reliable (Büyüköztürk et al., 2015; Nunnally & Bernstein, 1994). The scale developed consists of 8 items in mathematics dimension, 9 items in science dimension, 9 items in engineering and technology dimension and 11 items in 21st century skills dimension.

Data Analysis

Kolmogorov-Smirnov and Shapiro-Wilk tests (Table 1) have been used to determine whether the scientific epistemological belief scores and STEM attitudes have a normal distribution. It has been observed that the scores obtained do not meet the assumption of normality ($p < .05$). In the cases where the dependent variable scores do not meet the assumption of normality in each sub-dimension of the independent variable, Mann Whitney U-test has been used for two unrelated samples and Kruskal Wallis H-test is used for unrelated k-sample (Büyüköztürk et al., 2015). Within the scope of this research, the participant students with the scientific epistemological belief scale's score of 1.0-2.5 have been determined to be traditional; the ones with 2.5-3.5 to be mixed (medium level); and the ones with 3.5-5.0 to be constructivist. In addition; students' traditional beliefs are expressed as undeveloped (traditional) and their constructivist beliefs are also expressed as advanced (contemporary). Although 15 items in the scale contain negative judgment, 2 of them (items 3 and 7) are reverse coded. The reason for this is that the other 13 negative judgments are included in the negative sub-dimensions.

Table 1. Normality Test for Measurement Tools

Measurement Tools	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Epistemological Beliefs	.188	105	.000	.815	105	.000
STEM Attitude	.132	105	.000	.884	105	.000

Findings

In this section, findings are presented in the scope of research sub-problems.

The findings related to the first sub-problem: “What is the epistemological belief information level of gifted students?”

When table 2 is examined, it is seen that the average score of the students is 2.28 for authority and accuracy sub-dimension and it is 2.87 for source of information sub-dimension. When the students' average scores obtained from these sub-dimensions containing negative items are taken into consideration, it can be said that their beliefs in these dimensions are at a traditional level. In addition, it is seen that students have scientific epistemological belief at advanced (contemporary) level with the average scores of 4.30 in information generation process sub-dimension, 4.41 in reasoning sub-dimension and 4.33 in variance of information sub-dimension.

Table 2. Epistemological Belief Information Levels of Gifted Students

Dimension	N	X	SD
Authority and Accuracy	105	2.28	0.82
Information Generation Process	105	3.64	0.29
Source of Information	105	2.87	0.83
Reasoning	105	4.41	0.58
Variance of Information	105	4.33	0.44

The findings related to the second sub-problem: Does the epistemological beliefs of gifted students show significant differences by gender?”

Mann Whitney U test was used to examine epistemological beliefs according to gender factor in table 3. The Mann Whitney U [MWU] test is used to test the zero hypothesis that “two independent samples come from the same masses” without having to assume that the masses from which the sample was drawn fit normal distributions. When the sub-dimensions were examined in epistemological beliefs, it was observed that there was a relationship between some sub-dimensions (AA-SI, AA-VI, IGP-SI, IGP-VI, AA-R). For this reason, bonferroni correction was made to check for type I error. Bonferroni correction is determined by the formula of p / k , meaningfulness level / number of groups (Higginbotham, 1996; Miller, 1991; Yüksel, 2004). The number of groups was calculated as five dimensions. The significance level was determined as $0.05 / 5 = 0.01$. It was determined that the average scores of the female and male students in terms of authority and accuracy show a statistically significant difference, which is in favour of female students ($U_{AA} = 792.000$; $p < 0.01$). In addition, it has been determined that the average scores of female and male students in information generation process, source of information, reasoning, variance of information sub-dimension do not show a statistically significant difference according to gender ($U_{IGP} = 1017.000$, $U_{SI} = 981.000$, $U_R = 1003.500$, $U_{VI} = 1075.500$; $p > 0.01$).

Table 3. Analysis of Epistemological Beliefs of Gifted Students According to Gender Variable

Dimensions	Gender	N	Mean Rank	Total Rank	U	p
Authority and Accuracy	female	45	65.40	2943.00	792.000	.000*
	male	60	43.70	2622.00		
Information Generation Process	female	45	60.40	2718.00	1017.000	.027
	male	60	47.45	2847.00		
Source of Information	female	45	61.20	2754.00	981.000	.016
	male	60	46.85	2811.00		
Reasoning	female	45	45.30	2038.50	1003.500	.021
	male	60	58.78	3526.50		
Variance of Information	female	45	59.10	2659.50	1075.500	.067
	male	60	48.43	2905.50		

The findings related to the third sub-problem: “What are STEM attitudes of gifted students?”

Table 4 shows the STEM attitude levels of gifted students. It is seen that the average score in mathematics dimension is 3.81. It is seen that the average scores are 3.96 in science dimension, 4.27 in engineering-technology dimension and 4.46 in 21st century skills dimension. It is seen that the highest average is in the 21st century skills dimension and the lowest average is in mathematics dimension.

Table 4. STEM Attitudes of Gifted Students

STEM Dimensions	N	X	SD
Mathematics	105	3.81	0.65
Science	105	3.96	0.61
Engineering and Technology	105	4.27	0.67
21 st Century Skills	105	4.46	0.53

The findings related to the fourth sub-problem: Do STEM Attitudes of gifted students show significant differences by gender?”

Mann Whitney U test was used to examine STEM attitudes according to gender factor in table 5. When the sub-dimensions were examined in epistemological beliefs, it was observed that there was a relationship between some sub-dimensions. Bonferroni correction was made to check for type I error. Bonferroni correction is determined by the formula of p / k , meaningfulness level / number of groups (Higginbotham, 1996; Miller, 1991; Yüksel, 2004). The number of groups was calculated as four sub-dimensions. The significance level was determined as $0.05 / 4 = 0.0125$. When Table 5 is examined, it is seen that the average scores of male and female students in mathematics, science, engineering and technology sub-dimensions show a statistically significant difference, which is in favour of male students ($U_{MT} = 526.500$, $U_{SC} = 931.500$, $U_{ET} = 720.000$; $p < 0.0125$). However, it is seen that there is no significant difference in 21st century skills ($U_{CS} = 1038.000$; $p > 0.0125$).

Table 5. Analysis of STEM Attitudes of Gifted Students According to Gender Variable

Dimension	Gender	N	Mean Rank	Total Rank	U	<i>p</i>
Mathematics	female	45	34.70	1561.50	526.500	0.000*
	male	60	66.73	4003.50		
Science	female	45	43.70	1966.50	931.500	0.006*
	male	60	59.98	3598.50		
Engineering and Technology	female	45	39.00	1755.00	720.000	0.000*
	male	60	63.50	3810.00		
21st Century Skills	female	45	46.07	2073.00	1038.000	0.041
	male	60	58.20	3492.00		

The findings related to the fifth sub-problem: Is there a correlation between the epistemological beliefs of gifted students and STEM attitudes?"

Table 6 shows that there is a low correlation between epistemological beliefs and STEM attitudes ($p < 0.05$). Spearman moments multiplication correlation analysis has been applied. The significant correlation coefficients have been evaluated to be very weak with 0.00-0.25, weak with 0.26-0.49, medium with 0.50-0.69, high with 0.70-0.89 and very high with 0.90-1.00 (Kalaycı, 2010).

Table 6. Correlation Between Epistemological Beliefs and STEM Attitude

Variable	Correlation	<i>p</i>
Epistemological Belief * STEM Attitude	0.216*	0.049

It has been examined by using spearman correlation coefficient whether there is a correlation between epistemological belief dimensions and STEM attitudes of gifted students in table 7. in the dimensions of authority and accuracy, information generation process and source of information, *p* value has been observed to be greater than 0.05. in reasoning dimension, there is a strong correlation with STEM attitude ($r = 0.319$; $p = 0.01$). There is a medium-level positive correlation between epistemological beliefs and STEM attitudes.

Table 7. Correlation Between Epistemological Belief Dimensions and STEM Attitude

Variable	N	<i>r</i>	<i>p</i>
Authority and Accuracy	105	0.103	0.296
Information Generation Process	105	0.074	0.450
Source of Information	105	0.134	0.174
Reasoning	105	0.319	0.01*
Variance of Information	105	0.155	0.114

It has been examined by using spearman correlation coefficient whether there is a correlation between STEM attitude dimensions and epistemological beliefs of gifted students in table 8. It is seen that *p* value is greater than 0.05 in science, engineering and technology and 21st century skills dimensions. Therefore, there is no relationship between STEM attitude dimensions and epistemological beliefs in these areas. In mathematics dimension, there is a weak positive correlation with epistemological belief ($r = 0.300$; $p = 0.01$).

Table 8. Correlation Between STEM Dimensions and Epistemological Beliefs

Variable	N	r	p
Mathematics	105	0.300	0.002*
Science	105	0.010	0.920
Engineering and Technology	105	0.123	0.213
21 st Century Skills	105	0.186	0.058

Discussion and Conclusion

Attitudes and epistemological beliefs of gifted students in STEM fields (science, technology, engineering, mathematics) have been analysed in this research. Results, discussions and suggestions have been included following the examinations as to whether there is a differentiation in terms of STEM attitude dimensions "science, mathematics, engineering-technology and 21st century skills" and epistemological belief dimensions "authority and accuracy, information generation process, source of information, reasoning and variance of information".

According to the findings obtained in this study, it can be said that the epistemological beliefs of the students are at a traditional level in "authority and accuracy" and "source of information" dimensions. In today's traditionally-defined science approach; science is discovered by observation and experimentation, proceeds flawlessly due to its accumulated structure, produces objective results due to its structure independent of values, produces information that cannot be doubted for its accuracy, and does not deal with imagination, creativity and the limits (Ünal-Çoban & Ergin, 2008). Having traditional views in these dimensions may be the result of traditional educational practices. Therefore, 21st century education practices such as research-inquiry and STEM education should be included in the education of gifted students. It is seen that students have scientific epistemological belief at an advanced (contemporary) level in terms of "information generation process", "reasoning and variance of information" dimensions. In the contemporary understanding of science, though, scientific information is accepted as changeable truths, science research is believed to be value-laden like all other studies, and researchers are considered not to be completely objective (Mir & Watson, 2000). Aşut and Köksal (2015) found that gifted students showed a moderate level of development in terms of scientific epistemological beliefs. Schommer and Dunnell (1997) state that gifted students have a medium level of epistemological belief in the source of information, speed of learning, ability to learn and invariance of information dimensions. Therefore, it is seen that the scientific epistemological beliefs of gifted students should be strengthened with educational programs in educational environments. It has been found out that the scientific epistemological beliefs of gifted students show a statistically significant difference in favour of female students in "authority and accuracy" sub-dimensions. These findings are similar to the findings of Akgün and Gülmez (2015), Aydemir et al. (2013), Önen (2011). However; Conley et al. (2004) concluded that gender has no significant effect on epistemological belief. When the scientific epistemological beliefs of gifted students in various age groups are examined according to gender, it is observed that female students have more advanced epistemological beliefs than male students.

It has been observed that there are many studies on STEM attitudes of students (Ayдын et al. 2017; Huang et al., 2020; Leonard et al., 2016; Nugent et al., 2010; Wieselmann et al., 2020). It is seen that students develop positive attitudes towards STEM, which is the most important change movement in the education field of the 21st century. Studies on STEM fields of gifted are inadequate. It is seen that gifted students have high interest in STEM dimensions in the research. These findings are similar to the observations of Tseng et al. (2013), who have stated that STEM activities significantly help students develop a positive attitude towards engineering and the positive attitudes are mostly seen towards engineering, then science, thirdly technology and finally mathematics. It has provided positive developments in the attitudes of STEM focused education schools towards students on STEM and STEM career fields (Guzey et al., 2014). In future researches, STEM career development processes can be examined as a result of STEM attitudes of gifted students. Ayдын et al. (2017) state that students' attitudes towards STEM fields do not differ according to gender. However, in the research, when STEM attitudes have been examined in the context of gifted students, it has been observed that there is a difference in favour of male students. However, there was no difference in the 21st century skills dimension. The reason for this is that females are not so interested in the fields of engineering and technology (Mahoney, 2009), the number of the females is less in STEM environments (Murphy et al., 2007), and there are masculine objects in the STEM environments in general (Cheryan et al., 2009). Therefore, in the dimension of gifted students, it is necessary that the female students'

attitudes towards STEM should be supported by out-of-school activities. Wieselmann et al. (2020) stated that out-of-school STEM experiences can foster STEM interest and engagement among young girls.

There is a need for analysis that considers STEM disciplinary epistemologies to critically examine what is lost and gained through an integrated STEM approach (Reynante et al., 2020). STEM attitude structure is related to the epistemological beliefs and scientific methods. However, a scale that measures the scientific attitude towards STEM fields has not been developed yet. In the research, a statistically positive weak correlation has been found between STEM attitude and scientific epistemological belief values. As a result of the study, it has been concluded that students' epistemological beliefs can be a significant predictor of attitudes towards STEM. It is recommended that STEM learning environments should be strengthened in order to develop the potentials of gifted individuals by using appropriate strategies for their needs.

Epistemological belief, information is a multi-dimensional concept (Hofer, 2001). Considering that epistemological beliefs and attitudes have a crucial effect on student learning, more detailed research on the sources of the beliefs and attitudes could be beneficial for finding ways to improve students' beliefs and attitudes (Bayraktar, 2019). As the attitudes towards scientific research can be changed over time, epistemological belief can also develop and change over time (Bendixen & Rule, 2004). Therefore, strengthening of science, attitudes towards scientific research and STEM attitudes will contribute to the development of students' epistemological beliefs. This two-way correlation will also contribute to strength to STEM career interest future needs of society. Different variables can be examined between STEM attitudes and epistemological beliefs, students who participate in STEM activities and students who do not. Studies to develop epistemological beliefs of gifted students can be conducted. Based on the weak relationship between STEM attitudes and epistemological belief, studies can be conducted to investigate.

Acknowledgments

This study was presented as an oral presentation at the International Congress on Gifted and Talented Education (IGATE'19) Conference.

Statement of Publication Ethics

We declare that our research has no unethical problem. Ethical approval of this research was obtained with the decision of the scientific research and publication ethics committee of Muş Alparslan University dated 25/03/2020, number E4484/ 25.

Researchers' Contribution Rate

First author conceptualized the study and drafted the manuscript. Second author contributed with data collection and content analyses. First author reviewed drafts and contributed to manuscript revisions. All authors read and approved the final manuscript.

Conflict of Interest

We have no conflict of interest to declare

References

- Acat, M. B., Tüken, G., & Karadağ, E. (2010). Bilimsel epistemolojik inançlar ölçeği: Türk kültürüne uyarlama, dil geçerliği ve faktör yapısının incelenmesi [Scientific epistemological beliefs scale: adaptation to Turkish culture, language validity and factor structure]. *Turkish Science Education*, 7(4) 67-89.
- Akgün, A. & Gülmez, G. (2015). Analyzing the effect of epistemological beliefs of high school students on the academic achievements at chemistry course. *Electronic Journal of Social Sciences*, 54(14), 68-80.
- Akgündüz, D., Aydeniz, M., Çakmakçı, G., Çavaş, B., Çorlu, M. S., Öner, T., & Özdemir, S. (2015). *STEM eğitimi Türkiye raporu* [STEM Education Turkey Report]. İstanbul: Scala Basım.
- Aşut, N., & Köksal, M. (2015). Relationship of gifted students' epistemological beliefs with achievement and motivation towards science learning. *Journal of Düzce University Institute of Social Sciences*, 2(1), 22-44.
- Aydemir, N., Aydemir, M., & Boz, Y. (2013). High school students' epistemological beliefs. *Kastamonu Education Journal*, 2(1), 1305-1316.
- Aydın, G., Saka, M., & Guzey, S. (2017). Science, Technology, Engineering, Mathematic (STEM) attitude levels in grades 4th- 8th. *Mersin University Journal of the Faculty of Education*, 13(2), 787-802. <https://doi.org/10.17860/mersinefd.290319>
- Balka, D. (2011). *Standards of mathematical practice and STEM. Math-Science Connector Newsletter*. Stillwater, OK: School Science and Mathematics Association.
- Bayraktar, Ş. (2019). Pre-service primary school teachers' scientific epistemological beliefs and attitudes toward science: Is there a relationship?. *World Journal of Education*, 9(6), 83-97.
- Bendixen, L.D., & Rule, D.C. (2004). An integrative approach to personal epistemology: A guiding model. *Educational Psychologist*, 39(1), 69-80. https://doi.org/10.1207/s15326985ep3901_7
- Boz, Y., Aydemir, M., & Aydemir, N. (2011). 4th, 6th, and 8th Grade Turkish elementary students' epistemological beliefs, *Elementary Education Online*, 10(3), 1191- 1201.
- Büyüköztürk, Ş., Çakmak, E., K., Akgün, Ö., A., Karadeniz, Ş., & Demirel, F. (2015). *Bilimsel araştırma yöntemleri* [Scientific research methods], Ankara: Pegem Academy.
- Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, 97, 1045–1060. <https://doi.org/10.1037/a0016239>
- Conley, A. M., Pintrich, P. R., Vekiri, I., & Harrison, D. (2004). Changes in epistemological beliefs in elementary science students. *Contemporary Educational Psychology*, 29, 186-204.
- Çöllü, E. F., & Öztürk, Y. E. (2006). Örgütlerde İnançlar-Tutumlar Tutumların Ölçüm Yöntemleri ve Uygulama Örnekleri Bu Yöntemlerin Değerlendirilmesi [Beliefs-Attitudes in Organizations Measurement Methods and Examples of Attitudes Evaluation of These Methods]. *Journal of Selçuk University Social Sciences Vocational School*, 9(2), 373-404.
- Demir, S., & Akınoğlu, O. (2010). Epistemological beliefs in teaching learning processes. *Marmara University Atatürk Education Faculty Journal of Educational Sciences*, 32, 75 – 93.
- Elder, A. D. (1999). *An exploration of fifth-grade students' epistemological beliefs in science and an investigation of their relation to science learning*. Unpublished doctoral thesis, University of Michigan, Michigan, USA.
- Friday Institute for Educational Innovation (2012). *Middle and High School STEM-Student Survey*. Raleigh, NC: Author.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading MA: Addison-Wesley Publishing.

- Guzey, S. S., Harwell, M., & Moore, T. (2014). Development of an instrument to assess attitudes toward science, technology, engineering, and mathematics (STEM). *School Science and Mathematics, 114*(6), 271–279.
- Gülhan, F., & Şahin, F. (2016). The effects of science-technology-engineering-math (STEM) integration on 5th grade students' perceptions and attitudes towards these areas. *International Journal of Human Sciences, 13*(1), 602-620. <https://doi.org/10.14687/ijhs.v13i1.3447>
- Higginbotham, E. (1996). Getting all students to listen. *American Behavioral Scientist, 40*, 203- 211.
- Hofer, B. K. (2001). Personal epistemology research: Implications for learning and teaching. *Journal of Educational Psychology Review, 13*(4), 353-383.
- Honey, M., Pearson, G., & Schweingruber, H. *National Academy of Engineering and National Research Council (2014). STEM integration in K-12 education: Status, prospects, and an agenda for research.* Washington DC.: The National Academies Press.
- Huang, K.-T., Ball, C., Cotton, S. R., & O'Neal, L. T. (2020). Effective experiences: A social cognitive analysis of young students' technology self-efficacy and STEM attitudes. *Social Inclusion, 8*(2), 213–221.
- Karasar, N. (1999) *Bilimsel araştırma yöntemi [Scientific research method]*, Ankara: Nobel Publishing.
- Kalaycı, Ş. (2010). *SPSS Uygulamalı çok değişkenli istatistik teknikleri [SPSS Applied multivariate statistical techniques]*, Ankara: PegemA Publishing.
- Kennedy, J. Quinn, F., & Taylor, N. (2016). The school science attitude survey: a new instrument for measuring attitudes towards school science. *International Journal of Research & Method in Education, 39*(4), 422-445.
- King, B. A., & Magun-Jackson, S. (2009). Epistemological beliefs of engineering students. *The Journal of Technology Studies, 35*(2), 56-64.
- Lacey A. L., & Wright B. (2008). Occupational employment projection. *Monthly Labor Review, 132*(82), 82-132.
- Leslie, S., Cimpian, A., Meyer, M., & Freeland, E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science, 347*(6219), 262–265. <https://doi.org/10.1126/science.1261375>.
- Leonard, J., Buss, A., Gamboa, R., Mitchell, M., Fashola, O. S., Hubert, T., . . . Almughyirah, S. M. (2016). Using robotics and game design to enhance children's STEM attitudes and computational thinking skills. *Journal of Science Education and Technology, 28*(6), 860-876. <https://doi.org/10.1007/s10956-016-9628-2>
- Mahoney, M. P. (2009). *Student attitude toward STEM: Development of an instrument for high school STEM-based programs.* Unpublished PhD thesis, The Ohio State University, Ohio, USA.
- Miller, R. G. Jr. (1991). *Simultaneous Statistical Inference.* New York: Springer Verlag.
- Ministry of Education. [MoNE](2017a). 2017- 2018 science and art centers (BILSEM) student identification guide. Retrieved from <https://orgm.meb.gov.tr>
- Mir, R., & Watson, A. (2000). Strategic management and the philosophy of science: The case for a constructivist methodology. *Strategic Management Journal, (21)*9, 941-953.
- Morris, J., Slater, E., Fitzgerald, M. T., Lummis, G. W., & Van Etten, E. (2019). Using local rural knowledge to enhance STEM learning for gifted and talented students in Australia. *Research in Science Education, 1*-19. <https://doi.org/10.1007/s11165-019-9823-2>
- Murphy, M. C., Steele, C., & Gross, J. (2007). Signalling threat: How situational cues affect women in math, science, and engineering settings. *Psychological Science, 18*, 879-885. <https://doi.org/10.1111/j.1467-9280.2007.01995.x>
- Mullet, D. R., Kettler, T., & Sabatini, A. (2018). Gifted students' conceptions of their high school STEM education. *Journal for the Education of the Gifted, 41*(1), 60–92. <https://doi.org/10.1177 /0162353217745156>.
- Nugent G., Barker B., Grandgenett N., & Adamchuk V. I. (2010). Impact of robotics and geospatial technology interventions on youth STEM learning and attitudes. *Journal of Research on Technology in Education, 42*(4), 391-408. <https://doi.org/10.1080/15391523.2010.10782557>

- Nunnally J., & Bernstein I. (1994). *Psychological methods*. New York: McGraw-Hill.
- Oppenheim, A. N. (1992). *Questionnaire design, interviewing and attitude measurement*. London: Continuum.
- Önen, A. S. (2011). Investigation of students' epistemological beliefs and attitudes towards studying. *Hacettepe University Journal of Education*, 40, 300-309.
- Özcan, H., & Koca, E. (2018). Turkish adaptation of the attitude towards STEM scale: A validity and reliability study. *Hacettepe University Journal of Education*, 34(2), 387-401. <https://doi.org/10.16986/HUJE.2018045061>
- Perry, W. G. (1981). *Cognitive and ethical growth: The making of meaning*, In A. W. Chickering (Ed.). *The modern American college: Responding to the new realities of diverse students and a changing society*, San Francisco, CA: Jossey-Bass.,76–116.
- Reynante, B. M., Selbach-Allen, M. E., & Pimentel, D. R. (2020). Exploring the promises and perils of integrated STEM through disciplinary practices and epistemologies. *Science & Education*, 1-19. <https://doi.org/10.1007/s11191-020-00121-x>
- Schommer, M., & Dunnell, P. A. (1997). Epistemological beliefs of gifted high school students. *Roeper Review*, 19(3), 153-156.
- Smith, J. L., Lewis, K. L., Hawthorne, L., & Hodges, S. D. (2013). When trying hard isn't natural: Women's belonging with and motivation for male-dominated STEM fields as a function of effort expenditure concerns. *Personality and Social Psychology Bulletin*, 39(2), 131– 143. <https://doi.org/10.1177/0146167212468332>
- Tolhurst, D. (2007). The influence of learning environments on students' epistemological beliefs and learning outcomes. *Teaching in Higher Education*, 12(2), 219-233.
- Tseng, K. H., Chang, C. C., Lou, Ş. J., & Chen W. P. (2013). Attitudes towards science, technology, engineering and mathematics (STEM) in a project-based learning (PjBL) environment. *International Journal Technology Design Education*, 23, 87-102. <https://doi.org/10.1007/s10798-011-9160-x>
- Ünal Çoban, G., & Ergin, Ö. (2008). The scale for determining the views of primary school students about the existence domain of scientific knowledge. *Elementary Education Online*, 7(3), 706-716.
- Yüksel, S. (2004). Resistance behaviors of education faculty students to teaching and learning process. *Turkish Journal of Educational Sciences*, 2(3), 341-354.
- Wieselmann, R. J., Roehrig, G. H., & Kim, J. N. (2020). Who succeeds in STEM? Elementary girls' attitudes and beliefs about self and STEM. *School Science and Mathematics*, (120)5, 297-308. <https://doi.org/10.1111/ssm.12407>
- Zollman, A. (2012). Learning for STEM literacy: STEM literacy for learning. *School Science and Mathematics*, 112(1), 12–19.



Flipped Classroom Experiences of Preservice Teachers: Implications from a Mathematics Course

Taner Arabacıoğlu^{*a}, Ersen Yazıcı^b, Deniz Özen-Ünal^c

Article Info

DOI: 10.14686/buefad.659164

Article History:

Received: 13.12.2019

Accepted: 21.09.2020

Published: 05.10.2020

Keywords:

Mathematics courses,
Flipped classroom,
Preservice teacher.

Article Type:

Research Article

Abstract

The purpose of this research is to analyze the process of teaching mathematics through the flipped classroom model based on opinions of preservice teacher. The study group consisted of 16 preservice teachers, who were studying in the department of primary school teaching program at a state university in Turkey, and agreed to participate in the research voluntarily. The research was designed as a practical action research study. After the five-week implementation period, two separate focus group discussions occurred with the volunteer preservice teachers. Consequently, in addition to the positive contribution of the flipped classroom to learner responsibility, it was also observed that the in-class teamwork processes made a significant contribution about making the mathematics course entertaining. Moreover, peer learning was implemented, and the sense of belonging made a positive contribution to academic achievement in a teamwork process. In addition, preservice teachers started to see the academician as a role model at the end of the implementation process; this was a valuable result in terms of pedagogical contribution. Gamification or environments enriched with virtual reality applications can be suggested for further researches.

Öğretmen Adaylarının Ters-Yüz Edilmiş Sınıf Deneyimleri: Matematik Dersinden Çıkarımlar

Makale Bilgisi

DOI: 10.14686/buefad.659164

Makale Geçmişi:

Geliş: 13.12.2019

Kabul: 21.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Matematik dersi,
Dönüştürülmüş sınıf,
Öğretmen adayları.

Makale Türü:

Araştırma Makalesi

Öz

Bu araştırmanın amacı, dönüştürülmüş (tersyüz) sınıf modeli ile tasarlanan matematik öğretimi sürecini, öğretmen adaylarının görüşlerine dayalı olarak analiz etmektir. Çalışma grubu, Türkiye'de bir devlet üniversitesinde okuyan ve araştırmaya gönüllü olarak katılmayı kabul eden sınıf eğitimi programındaki 16 öğretmen adayından oluşmaktadır. Araştırma, uygulamalı eylem araştırması olarak tasarlanmıştır. Beş haftalık uygulama sürecinin ardından, gönüllü öğretmen adayları ile iki ayrı odak grup görüşmesi gerçekleştirilmiştir. Sonuç olarak, dönüştürülmüş sınıf modelinin, öğrenen sorumluluğuna olumlu katkı yapmasının yanı sıra sınıf içi grup çalışması ve matematik dersini eğlenceli hale getirmeye katkıda bulunduğu katılımcı görüşlerinden anlaşılmaktadır. Süreçte işbirlikli öğrenme etkinlikleri uygulanmıştır, grup çalışmaları sonucunda katılımcı görüşlerine yansıyan aidiyet duygusu ekip çalışması sürecinde akademik başarıya olumlu katkı sağlamıştır. Öğretmen adayları, uygulamanın sonunda dersin sorumlu öğretim üyesini rol model olarak görmeye başladıklarını ifade etmişlerdir. Bu, pedagojik açıdan değerli bir sonuç olarak değerlendirilmektedir. Yapılması planlanan araştırmalarda oyunlaştırma veya sanal gerçeklik uygulamaları ile zenginleştirilmiş ortamlar kullanılması önerilebilir.

*Corresponding Author: tarabacioglu@adu.edu.tr

^aAsst. Prof., Aydın Adnan Menderes University, Department of Computer and Instructional Technology, Aydın/Türkiye, <http://orcid.org/0000-0003-1116-1777>

^bAssoc. Prof., Aydın Adnan Menderes University, Department of Mathematics Education, Aydın/Türkiye, <http://orcid.org/0000-0002-1310-2247>

^cAsst. Prof., Aydın Adnan Menderes University, Department of Mathematics Education, Aydın/Türkiye, <http://orcid.org/0000-0002-9279-3452>

Introduction

The flipped classroom is defined as “performing the tasks that should be done in the classroom at home and performing the tasks that should be done as homework at home in the classroom” (Bergmann & Sams, 2012). This classroom also indicates that today's students are growing up with the opportunity to be web-enabled individuals. In addition, researchers have indicated that flipped classrooms align with the routine habits of today's students. For instance, students can message each other on Facebook and listen to music while doing their mathematics homework. The difference of the flipped classrooms from the traditional classrooms was suggested by Bergmann and Sams (2012) as allocating five minutes for the warm-up activity, 10 minutes for the question-answer session regarding videos, and 75 minutes for the guided standalone or laboratory activities. This classroom format enables learners to access the course contents even when they are out of school, and do the assigned homework or activities in the classroom, instead of learning course contents only in the classroom environment and doing their homework at home. Thus, learners will have the opportunity to practice about twice as much as the traditional classroom environment through their activities under the guidance of teachers.

Active learning, cooperative learning and problem-solving, highlighted by Abeysekera and Dawson (2015) and Kim, Jung, Siqueira and Huber (2016), are expressed as the reason for the interest of the academic world in the flipped classroom model by Hao (2016). Sohrabi and Iraj (2016) examined this interest through the teachers' perspectives and have emphasized that the flipped classroom model provides the teachers an opportunity for creating more active and dynamic learning environments. When applying the model, unlike the traditional formulas for teaching and doing homework, the students learn the course content at their own learning speeds through online courses, researches and online discussions. In addition, the internalization of knowledge is carried out through cooperative studies (such as discussion, or retrospective evaluation) that are between peers and under the guidance of the teacher in the classroom to solve the targeted problems (Zhai, Gu, Liu, Liang & Tsai, 2017). Another important point defined by Kim, Jung Siqueira and Huber (2016), was that the guidance of teachers was identified as "coaching", "guiding" or "mentorship".

Chen and Chuang (2016) stated that, in traditional learning methods, teachers spend most of their preparation time on forming an interaction between the students and the material, and the interactions among the students are usually neglected. The researchers have regarded the flipped classrooms as in-class workshops in which students can query the knowledge, test their skills and form interactions through the activities. Similarly, according to Mohanty and Parida (2016), flipped learning changes the teachers' distribution of teacher time. Instead of taking care of only those students who ask questions during the course, flipped learning also enables the teachers to help students who remain quiet.

Although it has been stated that flipped learning causes changes in the distribution of teacher time, according to Arnold-Garza (2014), online resources such as Khan Academy, Coursera and TED Talks, which have been associated with the flipped classroom, and finding and preparing appropriate videos on YouTube require a significant time expenditure. In addition, according to Unruh, Peters and Willis (2016), in the flipped learning model, technology integration plays a fundamental role in the course design process. In this regard, technological competence of the teachers needs to be considered. To succeed in the flipped classroom model, Mok (2014) noted 2 prerequisites. These prerequisites are that students should attend a course to engage in active learning activities and they should attend the course after watching the video lessons prepared for each session.

When the research conducted using the flipped classroom model are analyzed, the findings showing that this model increases success can be found in the researches by Little (2015), Flores, Del-Arco and Silva (2016), Turan and Goktas (2016) and Şengel (2016), Kurt (2017). On the other hand, He, Holton, Farkas and Warschauer (2016) have indicated that the model leads to a slight but statistically significant increase in final exams. In addition to these positive findings, according to Adnan (2017), there is no significant difference between the experimental and control groups in terms of mid-term exams and e-portfolio scores. Fraga and Harmon (2014) also indicated that there is no significant difference between the experimental group and the control group in terms of academic achievement.

Although various results were revealed suggesting that the flipped classroom model makes a significant difference in increasing academic achievement (Sahin, Cavlazoglu & Zetuncu, 2015), its positive effect on other

factors which are apart from academic success and also directly affect the learning process is remarkable. The examples of these positive results observed in certain researchers can be seen below:

Higher perception of self-efficacy in the experimental group (Kurt, 2017);

Positive effect on shy and quiet students (Zainuddin & Attaran, 2016);

Possible to watch the videos repeatedly (Mok, 2014);

Satisfactory learning experience (Adnan, 2017);

Positive effect on learner participation (Little, 2015);

Learning at their own speeds, flexible time and location, and 'practicing before the lecture is given in class' has a positive effect on the 'in-class activities' (Choi & Lee, 2015; Johnston, 2017);

Positive effect on the students' beliefs about their internal motivations and self-efficacies (Thai, Weber & Valcke, 2017);

Support more active courses inside or outside of class (Lesseig & Krouss, 2017);

Improvement of student learning performance (Akçayır & Akçayır, 2018); and

He, Holton, Farkas and Warschauer (2016) noted the benefits of the flipped classroom model as the following: learning at one's own speed, better preparation for class, more problem-solving and greater teacher-student interaction. However, the researchers have also criticized the model because of the fact that this model do not provide an increase in the total study time of students, but they only increase their work loads. Furthermore, the researchers have stated that all the student opinions were positive, and they emphasized the importance of the initial motivation and readiness. Similarly, O'Flaherty and Phillips (2015) indicated that there are many findings in the literature showing that the flipped classroom model increases academic performance and student and instructor satisfaction indirectly. However, the researchers also stated that there are insufficient findings related to any contribution of the model to lifelong learning and the enhancement of 21st century skills at the bachelor's and postgraduate levels.

In research based on teachers' opinions, Wang (2017) stated that there are first-level barriers, such as the access of middle-school teachers' and students' to tech-supported courses, teachers' preparation time of teachers, and technical support, and second-level barriers, such as technological and pedagogical beliefs of teachers and the teacher's self-confidence, attitude and resistance to change. Jungic, Kaur, Mulholland and Xin (2015) suggested that these elements really can teach make a difference. Moreover, Al-Zahrani (2015) stated that flipped classroom model may facilitate the creativity of students. Araujo, Otten and Birisci (2017) identified cooperation, student participation and the increased time spent in class as the main advantages and pre-course preparation time and ensuring the students watch the videos as the main difficulties. When these advantages are analyzed, the emphasis on increasing cooperation among the students can be observed. As a result of this cooperation, the students no longer wait for their teachers' help. The students who became more active due to the increase in learner participation take more responsibility regarding their learning. In addition, watching the videos in advance is another factor that positively affects student participation. The increased time spent in class led the teachers to assist the students more and to provide help to students when they attempt to overcome a difficulty. The difficulty in the process of utilizing the flipped classroom model for the first time was about the time teacher spent in preparing the materials (especially videos) and the course plan.

Researches reveal that flipped classrooms enable on active learning activities, and have positive effects upon learning performance and motivation. These advantages of flipped classroom model are considered as an opportunity to use active learning activities in the Basic Mathematics course, which has an intensive content and has two hours weekly. Whether this is regarded in the same way from the point of view of the students and determining the views of the students in order to improve the implementation process is one of the important issues to be considered. Therefore, in this research the purpose of the research was to investigate the preservice primary teachers' opinions regarding the flipped classroom model. In accordance with this primary purpose, we searched for answers to the main research question as “*What are the participants' opinions on the flipped classroom model?*” and sub-questions provided below:

SRQ1: What are the participants' opinions regarding the videos they watched?

SRQ2: How did the real-life problems affect the instructional design?

SRQ3: How did the instructional design affect participants' professional development?

SRQ4: What are the participants' suggestions for improving the instructional design?

Method

Research Design

Because the allocated time to improve problem-solving performances of preservice teachers' was insufficient, the research was designed as a practical action research study; one of the qualitative research methods, based on testing and evaluating implementation

The starting point of this research was the fact that the allocated time for the course is not sufficient when the mathematics courses are taught with the objective of increasing the preservice teachers' problem-solving performances. This fact created the need to conduct a practice-based instructional design trial with a theoretical teaching method that is supported by pre-course preparations. From this point forward, the purpose of the research was to determine the preservice primary teachers' opinions regarding the flipped classroom model.

Study Group

In the determination of the participants, approximately 110 undergraduate students studying in the primary school program teaching were interviewed and informed about the research process and about what preservice teachers are expected to do during this process. The research study group consisted of 16 preservice teachers (11 women and 5 men) from a primary school teaching program who agreed to participate voluntarily. The implementation process involved freshmen who had taken the undergraduate mathematics course. The participants of the study were composed of participants who completed their high school education in different cities, from different socioeconomic backgrounds, ages ranging from 18 to 22, and who were studying in the department of primary school teaching at the state university. Participants were asked to work in groups of three-four they chose.

Implementation

Due to the nature of the flipped classroom model, the implementation process was planned separately by the researchers as in-class and out-of-class activities. In the process of planning out-of-class activities, firstly, the researchers searched for online materials to provide the topics covered in the research. In accordance with the research purpose, Massive Open Online Courses (MOOCs) that are to be used in non-class course preparations for ordered pair and Cartesian products, relations and functions, function graphs, linear equations and graphs were reviewed. Before the lesson, the videos obtained from these resources were evaluated with respect to the suitability to the requirements, the adequacy of mathematical language usage, the technological characteristics and the mathematical content in accordance with the opinions of 1 mathematics field expert, 2 mathematics education experts and 1 technology expert; and they were also made ready for technical sharing. During the 5-week implementation period, 35 videos, total 158 minutes, were shared with the preservice teachers. The average number of videos shared per week was 7, and their mean time was 31.6 minutes. The prepared videos were delivered to the participants through WhatsApp.

In-class activities carried out during the implementation process, daily life problems and modelling activities were utilized. The activities, which were presented to the students as contextual problems, were developed by the researchers. In the structure of the activities, it was aimed to develop the competence and mathematical language use of the students in the field, and to enable them to establish the relationship between mathematics and daily life. During the in-class activities, all the problems and scenarios were solved by the preservice teachers working in groups of 4. The detailed information related to the activities implemented is provided in Table 1.

Table 1. Detailed Information Regarding Activities

Week	Name of the Activity	Course Content	Context
1	<i>Cabin Crew</i>	ordered pair and Cartesian product	Making matches of appropriate seats and meals that passengers can eat according to special dining categories,
2	<i>Flight Checklist & Valentine's Day</i>	Cartesian product, the relation and its properties (reflection)	Finding how many matches can be made independent of the tail numbers and the runway numbers of the planes. Giving presents to couples in a Valentine's Day organization,
3	<i>Blood Exchange</i>	the properties of the relation and the concept of function	Creating a model for blood exchange using the information on blood groups and the Rh antigen,
4	<i>Yoga Course</i>	the concepts of function and linear relationship	Identifying the most appropriate subscription alternative based on a fee,
5	<i>Call Center</i>	function types, inverse function, function graphs and linear relationship	Identifying the relationship between the sequence number of any customer and his/her estimated waiting time.

Data Collection

So as to collect data, two separate focus group discussions were conducted with the freshmen. Seven preservice teachers participated in each focus group discussion. There were seven female students in the 1st focus group discussion, and there were four male students and three female students in the 2nd focus group discussion. The “semi-structured interview forms” developed by the researchers were used to collect the research data. When organizing the interview forms, the research on the subject was reviewed, and the interview questions were designed. The interview form consists of 12 questions related to the collaboration, motivation, pre-class and in-class processes of the flipped classroom implementation.

Data Analysis

Approximately one-hour long interviews were recorded with a camera with the permission of the participants. The electronic data were converted into Word documents, and nicknames such as S1 and S2 were used for the participants, and R for the researcher. The raw data obtained were coded using the Content Analysis Technique (Yıldırım & Şimşek, 2008), and the themes were determined.

To determine the internal validity of the research, the findings were supported by the previous research. To determine the external validity, we attempted to delineate the research method, and essential explanations were provided to enable the findings to be tested in other research studies. To ensure external reliability, the research findings were supported by providing exact citations from the interviews; the research process was explicitly delineated. Different opinions and alternative explanations were included in the findings, and the raw data of the research was preserved so that other researchers can use them. To ensure internal reliability, the research questions were explicitly delineated, and attempts were made to collect the specific data using suitable research questions (Miles & Huberman, 1994). In addition, to increase internal reliability, a randomly designated interview form was coded separately by the researcher and by an academician who has qualitative research experience, and the inter rater reliability was examined. Using the “[Agreement / (Agreement + Disagreement)] x 100” formula, the coefficient of agreement between the two coders was found to be .89.

Findings

The analysis results of the 14 participants' answers to the open-ended focus group discussion questions are provided in this section. The content analysis results obtained from the participants' opinions were organized and collected under five main themes: *preliminary preparation, activity, professional development, flipped classroom model, and suggestions*. The code, sub-theme and themes reached within the context of the participants' opinions are presented in Table 2. Findings on the themes are presented separately and during themes below.

Table 2. Detailed Information Regarding Activities

Themes	Sub-themes	Codes and (frequencies)
Preliminary Preparation	Course videos	The problems solved (1); Content (3); Duration (2); Contribution to science (3)
	Studying	Lecture notes (4); Studying hours (5); Learner responsibility (2)
	Preferences	Needs (3); Frequent usage (6)
Activity	Group	Entertainment (4); Discussion (3); Peer learning (3); Cooperation (3); Equality of opportunity (2); The sense of belongings (2)
	Real life problems	Distinctness (1); Entertainment (3); Expectation (1); Concretization (1); Conceptual learning (5); Effective (4); Viewpoints (2); Pleasure of achievement (2)
	Active learning	Recalling knowledge (1)
Professional Development	Field instruction	Mathematical literacy (5); Guidance (2); Special field knowledge (3)
	Skill	Problem-solving (2); Critical thinking (3); Patience (1)
	Professional teaching knowledge	Concrete operations (2); Storifying (1); Role model (5); Personal development (2)
Flipped Classroom Model	Learning	Learning through experience and practicing (3); Entertaining course (3)
	Communication	Instructor (5); Educational environment (6); Peer-to-peer communication (3); Intra-group communication (2)
	Motivation	Expectation of qualification (1); Hesitation (1); Classroom size (14)
Suggestions	Course content	Central System Common Exams (1); Instructor videos (1)
	Incentive reward	Chocolate (1); Score (1); Candy (1)
	Competition	Duration (1); Participation (1)
	Concrete materials	Model (1)

The Preliminary Preparation Process

The theme, sub-theme and code list of the preliminary preparation theme and sample opinions of participants are presented in Table 3.

Table 3. Sub-theme and code list of the preliminary preparation theme

Preliminary Preparation		
Sub-Themes	Codes and (frequencies)	Sample opinion
Course videos	The problems solved (1); Content (3); Duration (2); Contribution to science (3)	S10. <i>I think their short durations are fine but I didn't like it as they were not taken too short. Interrupting the subject in every 2 minutes, 3 minutes distracts. I think interrupting the subject was not good; duration of 6-7 minutes was better. Concluding a subject rapidly was better.</i> S12. <i>The content of the videos was sufficient. We didn't need to do any work on it.</i> S7. <i>I think there could be more clear examples. For example, I could not understand some examples.</i>
Studying	Lecture notes (4); Studying hours (5); Learner responsibility (2)	S5: <i>My brother just started high school. When he was at secondary school he used study watching videos, but studying like this was difficult for me cause I feel the need of seeing the questions written on a paper, taking notes from the course books and making researches. If I can't understand through the books, then I may search in the internet.</i> S9. <i>And also as we have watched the videos in advance, I realized that in fact I am a student. I comprehended this responsibility.</i>
Preference	Needs (3); Frequent usage (6)	S1. <i>WhatsApp is the commonly used application.</i> S4. <i>We were able to open and watch them on our smartphones while walking or when we took a bus, or while doing a teamwork assignment where we were hanging out with my frequent or normal group of friends.</i>

The participant opinions regarding the course videos, which provided the foundation for the flipped classroom, can be dealt with the problem solved, content, duration and contribution to science topics. Three participants evaluated the content of the videos sent before the course as "sufficient"; however, S7 indicated that the problems solved in videos should be more explicit. As it can be seen from the participants' statements (S10 and S14), the ideal duration of the course videos is approximately seven minutes. Furthermore, the results show that the subject was lectured as a whole and did not cause a loss of motivation as it was not excessively long. Participant opinions regarding video durations are provided as: "*S14. I was watching them completely anyway, but I think to watch in parts is the best method for not only one student, but everyone. I think 7-8 minute-videos were the most appropriate ones. It was possible to watch a video and conclude a subject in one sitting. Because this way you were able to know where to keep going*".

The lecture notes, studying hours, the effects of learner responsibility upon the course preparation were also noted. The participants who preferred the lecture notes provided notes as a summary to the videos. That these participants did not seek lecture notes from another resource is noted in their opinions. In this regard, from the statements of S14, it is understood that the study durations were "as much as the durations of the videos". The most remarkable point was set forth by the learner responsibility. Opinions regarding this topic are provided below:

S9. And also as we have watched the videos in advance, I realized that in fact I am a student. I comprehended this responsibility.

S11. We were trying to deduce from those videos in our own rights, but everyone assigned a different meaning to the videos you have sent in the last week. For example, some students stated that they used to draw the disequilibrium in that system in a different way. Everybody may consider from their own viewpoints. This is because the subjects are not lectured to the whole class.

S9's statement "I realized that in fact I am a student", and S11's statement, "Everyone interprets in a different way" both provide important insights regarding the usage of flipped classroom.

There are "entertaining, needs and frequent usage" topics in the concept of "preference in preliminary preparations" headings. About the "entertaining" code, it was observed that the videos were deemed as more entertaining than the lecture notes, and with the "needs" code, that the participants prepared lecture notes using the course videos with the objective of ensuring permanent learning. Also, for the "frequent usage", the participants explained why they preferred WhatsApp to access the course videos: "*S1. WhatsApp is the commonly used application. For example, some of our friends do not have a Facebook account, and some of them do not use Instagram*".

As it can be understood from the participant opinions, WhatsApp is used more commonly than the other social media applications. Another finding is that this application can be used as an effective and favourite communication channel to send the participants approximately seven-minute course videos; this was also proffered by the participants. The reasons for the WhatsApp preference can be observed more explicitly through the "repeating and location" codes.

S5. After downloading a video in WhatsApp, there will be no problem if you watch it even 50 times. But downloading and waiting for it may be a problem on social media.

S4. We were able to open and watch them on our smartphones while walking or when we took a bus, or while doing a teamwork assignment where we were hanging out with my frequent or normal group of friends.

The participants evaluated being able to watch the course videos repeatedly as a significant convenience while getting around or during the teamwork assignment without an internet connection after they downloaded these to their smart phones via the WhatsApp application. In addition, the feedback regarding the duration of these videos are considered important. The comments on mobile learning advantage showed that the fact that WhatsApp is proffered as a tool that can be used for the flipped classroom model is an important finding.

The Activities

The theme, sub-theme and code list of the activity theme and sample opinions of participants are presented in Table 4.

Table 4. Sub-theme and code list of the activity theme

Activity		
Sub-Themes	Codes and (frequencies)	Sample opinion
Group	Entertainment (4); Discussion (3); Peer learning (3); Cooperation (3); Equality of opportunity (2); The sense of belongings (2)	S11. <i>We really enjoyed this.</i> S5: <i>It was a discussion environment in which we discussed through intellectualizing and asking if it would be better if it was done another way.</i> S12. <i>All of us were participating in a different way and we were completing each other.</i> S5. <i>Sometimes we can't understand when our teacher lectures, but we think that we understood it when one of our friends explains it.</i> S13. <i>When the classroom size was 50, each of us didn't have a chance to speak, but being in groups had the advantage of having the right to speak.</i> S9. <i>I reviewed my previous year's notes after watching the videos only in the first week, just to understand the subject better and not to be embarrassed toward my friends.</i>
Real life problems	Distinctness (1); Entertainment (3); Expectation (1); Concretization (1); Conceptual learning (5); Effective (4); Viewpoints (2); Pleasure of achievement (2)	S5. <i>... it was better that way. For example, we were framing it; when a question was asked about the planes, we were visualizing a plane and asking ourselves how they used to do...</i> S7. <i>We used to study considering the input-output. Instead of reasoning, we used to proceed only using the formulas directly. We were not engaging in any discussions. But when we started to reason and to interpret a little bit, we opened a new window; I mean our perspectives were broadened.</i> S11. <i>It is possible to achieve permanent learning only when you put your existing knowledge into practice.</i> S2. <i>"It was difficult, but I solved it". Feeling this pleasure is also very important.</i>
Active Learning	Recalling knowledge (1)	S5. <i>Our teacher was solving it in the classroom, or asking one of us to solve it at most. But in here, our teacher gave us the sheet and we got used to solving problems. We were trying to recall our previous knowledge; therefore it was more effective for us.</i>

The participants' thoughts regarding the activities they engaged in during the course hours were compiled under the "group, active learning and real-life problems" headings. The "group" sub-theme provides important insights about the contribution of the group activities to the academic achievement or about their social contributions. Especially the "entertainment" code they strongly expressed in the interview shows that the problem-solving process became more entertaining. S11's opinions regarding entertainment are "*S11. I am sure you have observed in the voice records or videos how our group studied and laughed raucously. We really enjoyed this*".

In addition to identifying the learning-teaching process as an entertaining process, S5 explains the contribution of the discussion environment within the group, which was enriched by the academician's facilitation: "*S5: It was a discussion environment in which we discussed through intellectualizing and asking if it would be better if it was done another way*".

Creating an entertaining discussion environment to which participants contribute with their own ideas is deemed very significant. After creating such a discussion environment, the "cooperation and peer learning" codes produced results that corroborate the current learning-teaching approaches. The statements of S12 explicitly show the positive results of the cooperation and peer learning (S5's opinion) actualized through the teamwork.

S12. I really liked being altogether during the teamwork process. For instance, S8 was very good at equating, and S9 was suggesting realistic ideas. S13 was watching silently and then suggesting something else and was suddenly solving the problem. All of us were participating in a different way and we were completing each other.

S5. I saw how my friend was doing it; how he was using that formula. Sometimes we can't understand when our teacher lectures, but we think that we understood it when one of our friends explains it. Now it just happened the same.

The “equality of opportunity” and “sense of belonging” codes, which can be viewed as prerequisites to generating the important points noted above, reveal other important issues that reflect the participant opinions. S13 who emphasized the equality of opportunity theme through referring to the classroom size summarized the contribution of teamwork process as “*S13. When the classroom size was 50, each of us didn't have a chance to speak, but being in groups had the advantage of having the right to speak. But as we were only 4 students in the group, a part of that 25% was individualized*”.

Besides ‘the equality of opportunity’ code, S5 and S9 stated that the emotion which is the basis for the success of any activities with the belonging code, by emphasizing the responsibility of collaboration.

S5. And another important thing is that we are a group, so how can I let down my friend?

S9. I reviewed my previous year's notes after watching the videos only in the first week, just to understand the subject better and not to be embarrassed toward my friends.

In the interview, through the questions about real-life problems, the participants' thoughts regarding the in-class activities were examined. These questions set forward the most extensive topics: “distinctness, entertainment, expectation, concretization, conceptual learning, effective, viewpoints, memorability, pleasure of achievement, researching and acquaintance”. The participants' opinions that summarize the expectations at the beginning of the course are provided as “*S5. ... it was better that way. For example, we were framing it; when a question was asked about the planes, we were visualizing a plane and asking ourselves how they used to do...*”.

Since the activities are expected to consist of classic-type questions including daily life or modelling problems, the difficulties encountered during the acquaintance stage were resolved within a short time, and the distinctness evolved into an entertaining process through various viewpoints. S7 defined this situation below by comparing it to the previous learning processes: “*S7. We used to study considering the input-output. Instead of reasoning, we used to proceed only using the formulas directly. We were not engaging in any discussions. But when we started to reason and to interpret a little bit, we opened a new window; I mean our perspectives were broadened*”.

After different viewpoints were offered to solve the problems encountered, positive feedback on permanent learning was obtained as a result of actualizing the conceptual learning. This situation was summarized by S11 as “*S11. It is possible to achieve permanent learning only when you put your existing knowledge into practice. It doesn't matter if you read too much or if you have knowledge about many things. As long as you don't put them into practice and apply them in your daily life, you will be putting aside and will forget them sometime later, because they will not be serving a useful purpose. But we are always repeating. As soon as we receive the videos, we are repeating at home, and also the more we watch, the more we repeat. Besides, when we come here, we put them into practice, and this way they become permanent*”.

Another important point to note is the “pleasure of achievement”, which was identified as a case experienced after solving modelling or real-life problems. The pleasure created by the different perspectives’ reaching a conclusion in cooperation can be understood from the opinions of the S2 as an important motivation source: “*S2. It was difficult, but I solved it. Feeling this pleasure is also very important*”.

As a consequence of solving real life problems through group activities, how it was concluded as “active learning” was summarized by S5 as follows: “*S5. Our teacher was solving it in the classroom or asking one of us to solve it at most. But in here, our teacher gave us the sheet and we got used to solving problems. We were trying to recall our previous knowledge; therefore, it was more effective for us*”.

Implementing peer learning effectively in an entertaining discussion environment through teamwork processes and concretizing the real-life usage of mathematics through activities are deemed important

achievements. In addition, the reinforcement of the sense of belonging and the pleasure of achievement must also be emphasized.

Contribution of the Professional Development

The theme, sub-theme and code list of the professional development theme and sample opinions of participants are presented in Table 5.

Table 5. Sub-theme and code list of the professional development theme

Professional Development		
Sub-Themes	Codes and (frequencies)	Sample opinion
Field instruction	Mathematical literacy (5); Guidance (2); Special field knowledge (3)	S10. <i>But I have difficulties in using mathematical literacy.</i> S14. <i>I learned how to form an equation now. I will never forget it because it is engraved on my mind. I learned what the injective function is, what the surjective function is.</i>
Skill	Problem-solving (2); Critical thinking (3); Patience (1)	S7. <i>I think we should not see it only as mathematics; it will be useful also when we encounter with a different problem.</i> S9. <i>I think this project also enriched me. It makes me a critical thinker.</i> S2. <i>I think our patience thresholds improved.</i>
Professional teaching knowledge	Concrete operations (2); Storifying (1); Role model (5); Personal development (2)	S7. <i>As a matter of fact, they don't have high levels of intelligence required to understand it abstractly. So I have to explain by giving examples to ensure permanent learning.</i> S5. <i>Sir, at the end of the day, we are going to be primary teachers. We need to be able to teach mathematics to the children in a way that is related to real life.</i> S4. <i>For example, we may storify.</i> S1. <i>I am going to be a teacher. The way I will instruct the children will be like this.</i>

The professional development theme that conveys the remarkable results of this research consists of 3 sub-themes, which are “the field instruction, skills and professional teaching knowledge”. In the “field instruction”, the situation that was primarily emphasized and considered a "difficulty" was reflected through “mathematical literacy” as “S10. *As a matter of fact, I am normally good at mathematics. I don't have too many difficulties in solving the problems. But I have difficulties in using mathematical literacy. I have great difficulty in expressing. However, I think I made a progress in this. Now I can write to some degree*”.

The steps of the process are considered a possible reason for the difficulty encountered in the mathematical literacy used during the problem-solving process. To lessen the effect, the academician's guidance was restated by a preservice teacher through the “guidance” code. Despite opposing thoughts, S14 summarized the participants’ positive thoughts regarding the mathematics instruction through the “content knowledge” code as follows: “S14. *I learned how to form an equation now. I will never forget it because it is engraved on my mind. I learned what the injective function is, what the surjective function is. In fact they are very easy, but I used to be unsuccessful. Well, they are very easy, our teacher was explaining, I was studying for the exams but later I was forgetting what I have learned. Although they are easy, I was unable to recall*”.

In accordance with the participants’ opinions, “the problem-solving, critical thinking and patience” topics were found under the “skills” sub-theme. Whereas the problem-solving is assessed as an expected situation, the critical thinking and patience can be defined as the skills that play an important role in the learning-teaching process. The participants’ opinions are provided below:

S9. *I think this project also enriched me. It makes me a critical thinker.*

S2 I think our patience thresholds improved. We thought of quitting a few times, but we stayed because we knew that we should solve the problem.

Another important sub-theme under the “professional development” theme is “professional knowledge for teaching”. In addition to the learning and teaching dimensions of the flipped classroom model, this model also sets forth pedagogical contribution to preservice teachers. The “concrete operations, storifying, role model and personal development” codes, which were emphasized by the participants, constitute the pedagogical effect. Besides, the contribution of the activities conducted through the ‘personal development’ code to mathematical knowledge for teaching, an opinion that summarizes that these activities have contributions to different areas is as follows: “*S7. I think we should not see it only as mathematics; it will be useful also when we encounter a different problem*”.

The “concrete operations and storifying” codes draw attention pedagogically. In both codes, the opinions addressing the ages the elementary school students and how important it is to relate with real life are provided below:

S7. We will take care of the underage children. It is required to give examples of real-life situations. The children ask me to give illustrations. As a matter of fact, they don't have high levels of intelligence required to understand it abstractly. So I have to explain by giving examples to ensure permanent learning.

S5. Sir, at the end of the day, we are going to be primary teachers. We need to be able to teach mathematics to the children in a way that is related to real life.

S4. For example, we may storify.

The “role model”, which was reflected on participants’ comments, lead to the belief that the mathematics course activity incorporated functions of the Teaching Methods course. The opinions supporting these findings are provided below:

S1. I am going to be a teacher. The way I will instruct the children will be like this.

S4. For example, in our courses, we may think about performing flipped classroom together with practical examples for the kids.

S11. Through being students in here, we observed how our students may act when conducting an activity at school. ... We have quit implementing teamwork processes and conducting activities... But while studying at the university and being so close to our professional life; you gave us a chance to observe those studies again.

When the professional development is regarded in general terms, it enables the research to be evaluated as productive in terms of both the mathematics instruction and the pedagogical principles. The belief that this theme may also contribute to the problem-solving processes beyond mathematics is considered an important acquirement.

The Flipped Classroom Model

The theme, sub-theme and code list of the flipped classroom theme and sample opinions of participants are presented in Table 6.

Table 6. Sub-theme and code list of the flipped classroom theme

Flipped Classroom Model		
Sub-Themes	Codes and (frequencies)	Sample opinion
Learning	Learning through experience and practicing (3); Entertaining course (3)	S10. <i>Since primary school, I have never had this much fun in a mathematics course.</i> S8. <i>Within this process, I learned what mathematics knowledge is supposed to do in our daily lives.</i>
Communication	Instructor (5); Educational environment (6); Peer-to-peer communication (3); Intra-group communication (2)	S5. <i>We communicated with our instructor so easily.</i> S13. <i>Furthermore, our friendships became stronger.</i> S2. <i>... In such an environment we could express our thoughts so easily because the atmosphere became warmer. When appropriate, we had discussions with our peers.</i>
Motivation	Expectation of qualification (1); Hesitation (1); Classroom size (14)	S4. <i>In a usual system of education there is a teacher lecturing in the mathematics course. Let's see if it will be more beneficial, or not? What kind of experience will it be for us? Just to have something different.</i> S7. <i>I preferred it mainly because the other classroom is too crowded. It is more difficult to understand the course in a crowded classroom.</i>

The participants' opinions on the learning-teaching process is combined under the “motivation, learning, and communication” sub-themes. As for “motivation”, according to S4’s opinion, one of the important issue on the learning-teaching process is that participants had some question marks before the implementation: “*In general, the teacher lectures in the mathematics course. Let's see if it will be more beneficial, or not. What kind of experience will it be for us?*” S4's opinions are remarkable since these opinions explained an expectation qualitatively, and the participants defined the traditional methods' ordinariness. Another reason why the participants agreed to participate was set forth through the classroom size. When the participants compared themselves to the other group, all consider themselves advantageous. The “entertaining course flipped classroom and learning through experience and practicing” codes arise as the reasons why the participants considered themselves advantageous. S10’s comments that the course was entertaining are summarized below: “*It was highly enjoyable. Since primary school, I have never had this much fun in a mathematics course. I did not see it as an activity.*”

The fact that a course was identified as “entertaining” by the participants can be interpreted as the first step towards success. In addition to entertainment, the fact that mathematics ceased to be an abstract course in which the participants attempted to find solutions using real-life problems was an important point according to S8. Also, another advantage of having the in-class activities that consist of real-life problems was defined by S10.

S8. Within this process, I learned what mathematics knowledge is supposed to do in our daily lives. You did not ask us what two times two is, but how two times two is four.

S10. ... When I first watched it in here, I did not understand so much. It was effective for me after I attended the course, started to solve problems by associating them. I was trying to solve by linking them with that week's video. This way of learning was more permanent.

It is understood from S10’s comments that a course becomes more effective through the combination of conducting in-class activities and watching the videos before the course. The communication (instructor, peer-to-peer communication) should be considered in explaining the in-class activities' effect within the flipped classroom model. Some opinions showing that there was effective and warm communication in the educational environment are provided below:

S5. We communicated with our instructor so easily.

S13. Furthermore, our friendships became stronger. As a matter of fact it was our 3rd week, I guess S2 made a cake for us and brought it to the classroom.

S2. ... In such an environment we could express our thoughts so easily because the atmosphere became warmer. When appropriate, we had discussions with our peers. We expressed ourselves in a better way.

When the process is evaluated as a whole, it is possible that the flipped classroom, which begins with the questions of "Can we do it?", "Can we understand it?", and "How productive can it be?" was perceived as a productive and entertaining course through activities including real-life problems. It was observed that the activities conducted with four-student groups and in an educational environment suitable for the teamwork process provides positive results academically and in terms of communication.

Suggestions for the Instructional Design

The theme, sub-theme and code list of the suggestions theme and sample opinions of participants are presented in Table 7.

Table 7. Sub-theme and code list of the suggestions theme

Suggestions		
Sub-Themes	Codes and (frequencies)	Sample opinion
Course content	Central System Common Exams (1); Instructor videos (1)	S14. <i>I am not sure whether I can answer the questions correctly using the knowledge you instructed if I take again the Transition to Higher Education Examination (YGS). By increasing the number of the questions we may vary them. Learning is the most logical thing but in the end we have to accept that the system is doesn't let. We have nothing to do. We have to study according to the system.</i> S12. <i>We find it more sympathetic to hear a tone of voice we are familiar to.</i>
Incentive reward	Chocolate (1); Score (1); Candy (1)	S14. <i>At the end, only a 25 cents candy.</i> S12. <i>We will be very happy if you put in an incentive reward. For example, chocolates will be appreciated... Sir, as an incentive reward, maybe you could give each of us 10 points as we studied hard.</i>
Competition	Duration (1); Participation (1)	S5. <i>For example, after proceeding a while we could utilize a duration button to see how each group proceeds in the process in how many minutes.</i> S3. <i>... Conducting some activities during the course such as simple competitions may be useful for enabling all group members to participate. They may have a tendency to finish the activity quickly and to get the incentive reward.</i> S12. <i>We were always the last ones leaving the class. I was always competing for leaving earlier. At least we may leave as the second last ones; I mean not being the last group.</i>
Concrete materials	Model (1)	S5. <i>If there was something concrete such as a garden or a house question, we could review its shape and make inferences directly.</i>

The participants' suggestions for making the implementation more effective can be summarized as “course content, incentive reward, competition and concrete materials” sub-themes. As for the “instructor videos” code, certain comments showed that the videos made by the instructor can be more motivating and more sympathetic. In addition, the “model usage” shows that participants believed that concrete models of the real-life problems that they attempted to solve during the course can be used as “S5. *There might have been systems in which we could solve the problems using a more concrete material... It could be customized for us [grade level]... If there was something concrete such as a garden or a house question, we could review its shape and make inferences directly*”.

The “competition and incentive reward” sub-themes that are considered interrelated refer to using small incentive but non irritating rewards that will corroborate the sense of competition and that can be used among the

groups in the flipped classroom model. The chocolate, score and candy examples of participants are reflective belief that incentives should be provided after the abovementioned entertaining competition.

S12. We will be very happy if you put in an incentive reward. For example, chocolates will be appreciated... Sir, as an incentive reward, maybe you could give each of us 10 points as we studied hard.

In reference to “competition”, S5’s comments show that participants prefer the problem-solving process should be focus on sequencing instead of time limitations. Additionally, S3’s opinions reflect providing motivation within the group as well as the intergroup competition.

S5. For example, after proceeding a while we could utilize a duration button to see how each group proceeds in the process in how many minutes.

S3. ... Conducting some activities during the course such as simple competitions may be useful for enabling all group members to participate. They may have a tendency to finish the activity quickly and to get the incentive reward.

When the participants' suggestions for promoting the implementation process were evaluated, competition that cannot attain higher levels and corroboration of competition with minimal incentives became obvious. It is possible to state that the usage of factors that will support intergroup competition at the entertainment level can make the implementation more entertaining. In addition, providing preservice teachers with concrete models of real-life problems can be effective in stimulating participant motivations.

Discussion and Conclusion

The research results include various negative opinions in addition to positive feedback. It was stated by the pre-service teachers that there are some negative implications for freshmen in the process of skipping the steps in solving real-life problems or strengthening their mathematical literacy because of the fact that they are studying similar subjects with a different model after they have passed a new placement test. For the experimental study to proceed properly, as a prerequisite, the preservice teachers must watch the videos sent to them before the courses. Here, it is notable that the video duration suggested by the participants was approximately seven minutes, providing the whole subject was lectured on. Similarly, McGivney-Burelle and Xue (2013) suggested the appropriate duration for videos as approximately five minutes. Notably, instead of social networks or learning management systems, the “WhatsApp” application, which is a frequently used instant messaging service, was the preferred mobile learning environment, because students were able to watch the course videos without being in need of redownloading them, and they could use their smartphones to study without any location or time limitations. Johnston (2017) and Sahin, Cavlazoglu and Zeytuncu (2015) similarly noted the time and location flexibility enabled by the videos. Although it was expressed only by one participant under the preliminary preparation theme, another notable positive effect is that watching the course videos before the in-class lecture has a positive effect on learner responsibility. As stated by Jungic, Kaur, Mulholland and Xin (2015), the flipped classroom model encourages students to participate in the process actively before and during the course.

The in-class activities that comprise a significant aspect of the flipped classroom model also generate the significant outcomes of this research. The in-class activities that provide a basis for the teamwork process and consist of real-life problems enabled the participants to regard themselves as active learners. The participants' opinions showed that the teamwork processes play a vital role in forming the perception of an “entertaining mathematics course”. It is believed that the equality of opportunity, the effective discussion environment, and the cooperation developed for solving the problem that each of the preservice teachers have facilitate peer learning. Lesseig and Krauss (2017) indicated that the factor that lies at the center of the flipped classroom model is the enriched time spent in class through the cooperative learning activities conducted among small groups. Ziegelmeier and Topaz (2015) mentioned that the discussions among the students build a community of learning. Guerrero, Beal, Lamb, Sonderegger and Baumgartel (2015) pointed out to the flipped learning's positive contribution to the attitudes towards mathematics since it enables more student-centered activities and problem-solving. Murpy, Chang and Suaray (2016) reported a similar result related to a positive change in the students' attitudes and thoughts towards mathematics. Furthermore, the participants' views indicating that the sense of belonging also developed besides the peer learning suggest that there were positive affective behaviors in

addition to the academic contribution. Another result is the pleasure of achievement that the students felt after the in-class activities. It was observed that the pleasure of achievement students felt after solving real-life problems in an entertaining manner as a group had a positive effect on the students' motivation. Another matter that affected motivation was the "usage of knowledge in real life". The positive effect of flipped classroom model on the students' motivation is in accordance with the research findings of Bhagat, Chang and Chang (2016).

Another important finding from the focus group discussions was the professional development theme. This theme provides an evidence that the experimental study conducted resulted in an outcome similar to the Teaching Methods course. Thus, the freshmen opinions are the most significant result of this research. Through the field instruction, the acquisition of the field efficacies was defined; through the skills, the 21st Century Skills such as critical thinking and showing patience were noted. Wright (2015) reported the improvement in the students' knowledge and understanding levels for not only linear algebra but also for all branches of mathematics. The professional teaching knowledge notes that the preservice teachers began to observe the Academician in charge as a role model. It is believed that this finding assigns a different meaning to the experimental study since the teachers used the concepts of concrete operations and storifying by referring to the age range and characteristics of their preservice students. At the end of the research conducted with the students of Faculty of Education, Al-Zahrani (2015) indicated that a well-designed flipped classroom will motivate college students to generate specific ideas on the real-life problems.

At the end of the implementation that begins with qualification expectations and question marks, the opinions indicated that the Mathematics course was entertaining for the first time and it answers the question regarding what mathematics knowledge should do in our daily lives; this is an indicator that an important prejudice was overcome. Although certain students indicated that they continued to dislike mathematics courses, at the end of the experimental study by Ogden (2015), they also declared that they were no longer afraid of mathematics and were felt skilled more. It appears that there was healthy peer-to-peer communication and student-academician communication; these are considered factors that played a significant role in overcoming this prejudice. This finding is in accordance with the research conducted by Anderson and Brennan (2015) and Ziegelmeier and Topaz (2015). However, slight failure in communication, which was also noted by the researchers, was criticized by the participants.

When the preservice teachers' suggestions for developing the implementation were requested in the last focus group discussion question, the teachers suggested organizing competitions in which the competitive level is not increased and the process becomes more entertaining and motivating. Another suggestion was to provide incentive rewards such as candies or chocolates at the end of these time-limited competitions. Another suggestion that is thought to increase motivation is the request of the videos to be used in the flipped classroom applications to be shot by the responsible lecturer of the course. Students expect the process to be fun. It is thought that the competitions to be held or the chocolate to be distributed will increase the motivation. The point to be considered here is the use of external motivational elements. It is important not to drift apart the process as a result of the competitions to be held. The research results show similarities between the flipped classroom model's positive effects in terms of motivation, participation and interaction and the 28 research studies that were conducted until the end of 2014 and analyzed by O'Flaherty and Phillips (2015) and the 20 research studies that were conducted between 2013-2015 and analyzed by Zainuddin and Halili (2016). It is believed that this model in which the learner is at the center can make significant contributions to the acquisition of 21st century skills. Further research, with the objective of justifying or developing this idea, in which gamification items are used or environments enriched with virtual reality applications can be performed. Consequently, conducting similar research over several courses and at various course levels should make contributions to the field.

References

- Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. *Higher Education Research & Development*, 34(1), 1–14. doi: 10.1080/07294360.2014.934336
- Adnan, M. (2017). Perceptions of senior-year ELT students for flipped classroom: a materials development course, *Computer Assisted Language Learning*, 30(3-4), 204-222. doi: 10.1080/09588221.2017.1301958
- Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education*, 126, 334–345. doi: 10.1016/j.compedu.2018.07.021
- Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational technology*. 46(6), 1133-1148, doi:10.1111/bjet.12353
- Anderson, L., & Brennan, J. P. (2015). An experiment in flipped teaching in freshman calculus. *Primus*, 25(9), 861–875. doi:10.1080/10511970.2015.1059916
- Araujo, Z., Otten, S., & Birisci, S. (2017). Mathematics teachers' motivations for, conceptions of, and experiences with flipped instruction. *Teaching and Teacher Education*, 62, 60–70. doi:10.1016/j.tate.2016.11.006
- Arnold-Garza, S. (2014). The flipped classroom teaching model and its use for information literacy instruction. *Communications in Information Instruction*. 8(1), 7-22. doi:10.15760/comminfolit.2014.8.1.161
- Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. *International Society for Technology in Education*.
- Bhagat, K. K., Chang, C. N., & Chang, C. Y. (2016). The Impact of the Flipped Classroom on Mathematics Concept Learning in High School. *Educational Technology & Society*, 19(3), 134–142.
- Chen, K., & Chuang, K. (2016). Building a cooperative learning environment in a flipped classroom. *Academy of Educational Leadership Journal*, 20(2), 8–16.
- Choi, J., & Lee, Y. (2015). To what extent does 'flipping' make lessons effective in a multimedia production class?, *Innovations in Education and Teaching International*. doi: 10.1080/14703297.2015.1123105
- Flores, O., Del-Arco, I., & Silva, P. (2016). The flipped classroom model at the university: analysis based on professors' and students' assessment in the educational field. *International Journal of Educational Technology in Higher Education*, 13(21), 1–12. doi: 10.1186/s41239-016-0022-1
- Fraga, L., M. & Harmon, J. (2014). The Flipped Classroom Model of Learning in Higher Education: An Investigation of Preservice Teachers' Perspectives and Achievement, *Journal of Digital Learning in Teacher Education*, 31(1), 18-27. doi:10.1080/21532974.2014.967420
- Guerrero, S., Beal, M., Lamb, C., Sonderegger, D. & Baumgartel, D. (2015). Flipping Undergraduate Finite Mathematics: Findings and Implications, *PRIMUS*, 25(9-10), 814-832. doi: 10.1080/10511970.2015.1046003
- Hao, Y. (2016). Exploring undergraduates' perspectives and flipped learning readiness in their flipped classrooms. *Computers in Human Behavior*, 59, 82–92. doi: 10.1016/j.chb.2016.01.032.
- He, W., Holton, A., Farkas, G., & Warschauer, M. (2016). The effects of flipped instruction on out-of-class study time, exam performance and student perceptions. *Learning and Instruction*, 45, 61–71. doi: 10.1016/j.learninstruc.2016.07.001
- Johnston, B. M. (2017). Implementing a flipped classroom approach in a university numerical methods mathematics course, *International Journal of Mathematical Education in Science and Technology*, 48(4), 485-498. doi: 10.1080/0020739X.2016.1259516

- Jungic, V., Kaur, H., Mulholland, J. & Xin, C. (2015). On flipping the classroom in large first year calculus courses, *International Journal of Mathematical Education in Science and Technology*, 46(4), 508-520. doi: 10.1080/0020739X.2014.990529
- Kim, M., Jung, E., Siqueira, A., & Huber, L. (2016). An Investigation into Effective Pedagogies in a Flipped Classroom: A Case Study. *International Journal of E-Learning & Distance Education*, 32(2), 1–16.
- Kurt, G. (2017). Implementing the Flipped Classroom in Teacher Education: Evidence from Turkey. *Educational Technology & Society*, 20(1), 211–221.
- Lesseig, K. & Krauss, P (2017). Implementing a flipped instructional model in college algebra: profiles of student activity, *International Journal of Mathematical Education in Science and Technology*, 48(2), 202-214. doi: 10.1080/0020739X.2016.1233586
- Little, C. (2015). The flipped classroom in further education: literature review and case study, *Research in Post-Compulsory Education*, 20(3), 265-279. doi: 10.1080/13596748.2015.1063260
- McGivney-Burrelle, J., & Xue, F. (2013). Flipping Calculus, *PRIMUS*, 23(5), 477-486. doi: 10.1080/10511970.2012.757571
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded Sourcebook*. (2nd ed). Thousand Oaks, CA: Sage.
- Mohanty, A., & Parida, D. (2016). Exploring the Efficacy & Suitability of Flipped Classroom Instruction at School Level in India: A Pilot Study. *Creative Education*, 7, 768-776. doi: 10.4236/ce.2016.75079
- Mok, N., H. (2014). Teaching tip: The flipped Classroom. *Journal of Information Systems Education*, 25(1), 7-11.
- Murphy, J., Chang, J-M., & Suaray, K. (2016) Student performance and attitudes in a collaborative and flipped linear algebra course, *International Journal of Mathematical Education in Science and Technology*, 47(5), 653-673. doi: 10.1080/0020739X.2015.1102979
- O’Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *Internet and Higher Education*, 25, 85-95. doi: 10.1016/j.iheduc.2015.02.002
- Ogden, L. (2015). Student Perceptions of the Flipped Classroom in College Algebra, *PRIMUS*, 25(9-10), 782-791. doi: 10.1080/10511970.2015.1054011
- Sahin, A., Cavlazoglu, B., & Zeytuncu, E. Z. (2015). Flipping a College Calculus Course: A Case Study, *Journal of Educational Technology & Society*, 18(3) 142-152.
- Sohrabi, B., & Iraj, H. (2016). Implementing flipped classroom using digital media: A comparison of two demographically different groups perceptions. *Computers in Human Behavior*, 60, 514–524. doi: 10.1016/j.chb.2016.02.056.
- Şengel, E. (2016). To FLIP or not to FLIP: Comparative case study in higher education in Turkey. *Computers in Human Behavior*. 64, 547-555. doi:10.1016/j.chb.2016.07.034
- Thai, N., Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best “blend” of lectures and guiding questions with feedback. *Computers & Education*, 107, 113-126. doi: 10.1016/j.compedu.2017.01.003
- Turan, Z., & Goktas, Y. (2016). The flipped classroom: Instructional Efficiency and impact on achievement and cognitive load levels , *Journal of e-Learning and Knowledge Society*, 12(4), 51-62.
- Unruh, T., Peters, M. L., & Willis, J. (2016). Flip This Classroom: A Comparative Study. *Computers in the Schools*. 33(1), 38-58. doi: 10.1080/07380569.2016.1139988
- Wang, T. (2017). Overcoming barriers to ‘flip’: building teacher’s capacity for the adoption of flipped classroom in Hong Kong secondary schools. *Research and Practice in Technology Enhanced Learning*. 12(6), 1-11. doi: 0.1186/s41039-017-0047-7

- Wright, S. E. (2015). Linear Algebra and the Experiences of a “Flipper”, *PRIMUS*, 25(8), 627-640. doi: 10.1080/10511970.2015.1031304
- Yıldırım, A., & Şimşek, H. (2008). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. Ankara: Seçkin Yayıncılık.
- Zainuddin, Z., & Attaran, M. (2016). Malaysian students’ perceptions of flipped classroom: a case study, *Innovations in Education and Teaching International*, 53(6), 660-670. doi: 10.1080/14703297.2015.1102079
- Zainuddin, Z., & Halili, H. S. (2016). Flipped classroom research and trends from different field study, *International Review of Research in Open and Distributed Learning*, 17(3), 313-340. doi: 10.19173/irrodl.v17i3.2274
- Zhai, X., Gu, J., Liu, H., Liang, J.-C., & Tsai, C.-C. (2017). An Experiential Learning Perspective on Students’ Satisfaction Model in a Flipped Classroom Context. *Educational Technology & Society*, 20 (1), 198–210.
- Ziegelmeier, L. B., & Topaz, C. M. (2015). Flipped Calculus: A Study of Student performance and Perceptions, *PRIMUS*, 25(9-10), 847-860. doi: 10.1080/10511970.2015.1031305



Investigating Middle School Students' Metacognition and Mathematical Reasoning of Problem-Solving Skills

Sevim Sevgi^{*a}, Yavuz Macun^b, Cemalettin Işık^c

Article Info

DOI: 10.14686/buefad.675770

Article History:

Received: 16.01.2020

Accepted: 21.09.2020

Published: 05.10.2020

Keywords:

Metacognition,
Problem-solving,
Middle school mathematics.

Article Type:

Research Article

Abstract

Described as being aware of and controlling one's own thinking processes and a benefit of consequences, metacognition is known to be related to both academic achievement and students' thinking. This study aimed to investigate the problem-solving and metacognition skills of middle school students with regard to gender, grade level, number of siblings, financial status of the family and educational background of the parents. For this purpose, 280 middle school students were selected from a public middle school in Melikgazi, Kayseri by using convenience sampling method. As a result of the analysis based on the four factors of metacognition scale and problem-solving inventory, male participants were better than female not only at solving problems requiring mathematical reasoning but also at monitoring what they did, what they would do and, most importantly, their own thinking processes. Surprisingly, 5th grade students had higher predictive abilities than 8th graders. Although predictive skills were higher, 5th and 6th graders had lower level of problem-solving skills than upper-class levels. Also, students whose mothers have undergraduate and graduate degrees were better at solving problems than those whose mothers had never attended a school or who graduated from elementary school.

Ortaokul Öğrencilerinin Üstbilis ve Problem Çözmede Kullandıkları Matematiksel Muhakeme Becerilerinin İncelenmesi

Makale Bilgisi

DOI: 10.14686/buefad.675770

Makale Geçmişi:

Geliş: 16.01.2020

Kabul: 21.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Üstbilis,
Problem çözme,
Ortaokul öğrencileri.

Makale Türü:

Araştırma Makalesi

Öz

Kişinin kendi düşünme süreçlerinin farkında olması ve bu süreçleri kontrol etmesi olarak tanımlanan üstbilis hem düşünce hem de akademik başarı ile ilişkili olduğu bilinmektedir. Bu çalışmada ortaokul öğrencilerinin cinsiyet, sınıf düzeyi, kardeş sayısı, ailenin mali durumu ve ebeveynlerin eğitim durumuna göre problem çözme ve üstbilis becerilerinin incelenmesi amaçlanmıştır. Bu amaçla, Kayseri ili Melikgazi ilçesinde bulunan bir devlet ortaokulundan kolay örnekleme yöntemi ile 280 ortaokul öğrencisi seçilmiştir. Problem çözme envanteri ve üstbilis ölçeğinin dört faktörüne dayanan analizler sonucunda, erkek öğrencilerin hem muhakeme gerektiren problemleri çözmede hem de kendi düşünme süreçlerini yönlendirmede daha iyi oldukları, 5. sınıf öğrencilerinin 8. sınıf öğrencilerine göre daha yüksek tahmin yeteneğine sahip oldukları, 5. ve 6. sınıf öğrencilerinin üst sınıflara kıyasla daha düşük problem çözme becerilerine sahip oldukları ve anneleri lisans ve/ya lisansüstü derecesine sahip olan öğrencilerin problem çözmede anneleri hiçbir okula gitmemiş veya ilkokul mezunu olanlardan daha iyi oldukları sonucuna ulaşılan, kardeş sayısının iki ölçekten elde edilen puanlar üzerinde anlamlı bir etkisi bulunmamıştır.

*Corresponding Author: sevimsevgi@erciyes.edu.tr, sevimsevgi@gmail.com

^a Assistant Prof. Dr., Erciyes University, Faculty of Education, <https://orcid.org/0000-0002-6611-5543>

^b Ph.D. Student, Erciyes University, Institute of Educational Sciences, <https://orcid.org/0000-0003-4983-2601>

^c Prof. Dr., Erciyes University, Faculty of Education, <https://orcid.org/0000-0001-6326-0043>

Introduction

For most middle school students, mathematics is seen as difficult to understand due to the fact that it involves complex mental processes. In order to make mathematics understandable, it is necessary to use cognitive, metacognitive, and self-regulation skills to overcome these complex mental processes (Kaplan & Duran, 2016). Metacognition is a concept linked to cognition and expressed as a benefit of consciousness. For a better understanding of metacognition, it is important to first know what cognition is (Erez & Peled, 2001). According to Fidan (1996), cognition is all the mental processes that the human mind does to understand the world and the events around it. Metacognition, on the other hand, means that one is aware of and can control his or her own thinking processes (Flavell, 1976, 1979) and involves an individual's ability to predict, plan, monitor and evaluate his or her mental activities (Brown, 1980; Swanson, 1990). Although cognition and metacognition are related, they are actually different. The function of cognition is to provide cognitive interventions to solve problems while the function of metacognition is to regulate or manage an individual's cognitive performance in problem solving (Akturk & Sahin, 2011). Metacognitive skill is a more advanced thinking ability that enables people to become successful in all areas of life and aids effective control of cognitive processes during learning. This awareness about the individuals' own thinking process has a significant relation with other mental activities and academic achievements (Deseote & Roeyers, 2002; Eggen & Kauchak, 2001; Victor, 2004).

According to Flavell (1976), individuals with metacognitive skills use metacognitive knowledge, a deeper point of view and knowledge of one's own cognitive abilities and outcomes, consisting of three components namely person variable, task variable, and strategy variable. Studies on how individuals' metacognitive skills and knowledge change in terms of these variables generally focus on four metacognitive skills which are orientation or prediction, planning, monitoring, and evaluation (Deseote, 2001; Lucangeli & Cornoldi, 1997; Schoenfeld, 1992). First of all, orientation skill requires thinking slowly and determining the appropriate learning environment, time and characteristics. With this skill, children estimate the difficulty level of a task or mission and organize what needs to be done in their mind to accomplish (Winne, 1997). Secondly, planning skill enables children to think in advance of how, when and why to take action to complete a particular task successfully. Thirdly, monitoring skill is connected self-regulating controls of cognitive strategies used with simultaneous verbal narratives during actual performance, to identify problems, and change plans (Tobias & Everson, 1996). Lastly, evaluation skill is defined as reflective verbal statements in which children look at what strategies were used after the activity ended and whether they took it to the anticipated outcomes (Deseote, 2001).

The use of metacognition in mathematics is considered crucial by some researchers especially in problem solving (Borkowski, 1992; De Clercq, Desoete, & Roeyers, 2000; Schoenfeld, 1992). Not only in the first stage of mathematical problem-solving, students are involved in metacognition, while creating an appropriate representation of the problem, but also in the final stage of interpretation and checking the result of calculations (Verschaffel, 1999). Schoenfeld (1987) stated that the metacognition levels of the students can be improved with problem-solving in the best way. For this purpose, he organized courses that included problem-solving strategies and proposed a model for effective problem solving that emphasized the students' monitoring, organizing and evaluating their own studies. While there is such an important link between problem-solving and metacognition, it has been crucial to examine the relationships between these skills of middle school students and other factors affect middle school students' metacognition levels.

Method

This study is aimed to investigate the factors affecting middle school students' metacognitions and problem-solving skills requiring mathematical reasoning. The strategies used by middle grade students in problem solving process were also examined. For this purpose, the study aimed to answer the following research problem: "What are the factors affecting middle school students' metacognitions and problem-solving skills requiring mathematical reasoning?"

Research Design

In this study, quantitative techniques were used to realize the analyse of the research problem. Descriptive research methods were used to determine the metacognitive skill levels and the factors affecting these skills (Creswell, 2009). The descriptive method is a research approach based on collecting data over a certain period of

time, aiming to describe a situation that exists in the past or present and compare the relationships between variables (Fraenkel & Wallen, 2010).

Population and Sample

The sample of the study which was selected using the convenience sampling method consisted of 135 male and 145 female participants studying in a public middle school in Melikgazi, Kayseri, Turkey in 2019-2020 academic year. Convenience sampling, which is a frequently used method in educational studies, is appropriate compared to other methods and is commonly used when the researcher is not able to use other sampling methods (Creswell & Plano Clark, 2017). In addition, studying an acquainted sample can give practicality and speed to the study.

Table 1. Sample of the Study by Grade Level and Gender

Grade Level	f	%	Gender	f	%
5	57	20.4	Girl	29	50.9
			Boy	28	49.1
6	59	21.1	Girl	38	64.4
			Boy	21	35.6
7	72	25.7	Girl	32	44.4
			Boy	40	55.6
8	92	32.9	Girl	46	50
			Boy	46	50

Due to the structure of the sample, the number of 8th grade students is slightly higher than the other grade levels. This would be beneficial in achieving better results for research rather than a disadvantage. The distribution percentage between grade levels are nearly close to each other. In Turkey, eighth graders are not volunteer to be participant in research projects so this could be advantage.

Data Collection Tools

In the study, to determine metacognitive skills of middle school students, a personal information form was used together with the Metacognitive Scale (MS) developed by Yildiz, Akpınar, Tatar, and Ergin (2009), which consisted of 30 items and whose reliability coefficient was calculated as 0.96 by the researchers. There were 30 positive items in the Likert type in total. The options are “None (1), Sometimes (2), Frequently (3)” and “Always (4)”. There are two factors of the scale which are knowledge of cognition and knowledge of regulation according to the factor analysis. The knowledge of cognition has three components as declarative knowledge, procedural knowledge, and conditional knowledge while the knowledge of regulation has five components namely planning, self-control, cognitive strategies, self-evaluation, and self-monitoring. In parallel to the study of Yildiz et al. (2009), it was seen that the items in the metacognition scale were loaded under four factors namely prediction (3, 6, 15, 20, 21, 22, 23, 25, 28, 29, 30), planning (9, 13, 17, 19, 27), monitoring (4, 5, 11, 12, 16, 24, 26), and evaluation (1, 2, 7, 8, 10, 14, 18) as a result of the explanatory factor analysis (EFA) conducted with 50 iterations of the data collected from 280 middle school students. Costello and Osborne (2005) states that the final decision on the number of factors belongs to the researcher and the number of factors is determined not only by the data but also by the theoretical expectations. So, it was decided that the items of metacognition scale were loaded in four factors for the purpose of the research. According to the Tabachnick and Fidell (2015), there must be at least 0.10 differences between the highest values a substance is loaded in successive factors as a result of EFA. When the rotated components matrix is examined in Table 2, it is seen that this difference is greater than 0.10 in all substances. The sphericity test, which tested the general significance of all correlations within the Bartlett correlation matrix, was significant [$\chi^2(435) = 2406.38, p = .000 < .001$] and showed that it was appropriate to use the factor analysis in this group of data. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy showed that the relationships between variables were extremely high (KMO = .914), so it was acceptable to continue the analysis (Field, 2005).




Table 2. Rotated Component Matrix Results

Items	Factors			
	Prediction	Evaluation	Planning	Monitoring
28	.577			
29	.619			
23	.572			
22	.550			
3	.549			
15	.485			
30	.470			
25	.461			
21	.420			
6	.338			
20	.300			
1		.681		
2		.650		
10		.563		
18		.518		
7		.472		
14		.457		
8		.448		
9			.670	
13			.561	
17			.508	
19			.435	
27			.390	
16				.587
24				.574
11				.492
26				.429
4				.427
12				.371
5				.359

In addition, in order to examine the strategies used by students to solve problems that require mathematical reasoning, the program inventory consisting of five items was selected by taking expert opinion from the Program for International Student Assessment (PISA) questions applied in 2012 was used in Figure 1 (OECD, 2012). The personal information form used with metacognition scale and problem-solving inventory consisted of the information about genders, grade levels, parents' educational backgrounds, number of siblings, and family financial status.

MP3 PLAYERS

Music City MP3 Specialists

<p>MP3 player</p>  <p style="background-color: #cccccc; margin: 0;">155 zeds</p>	<p>Headphones</p>  <p style="background-color: #cccccc; margin: 0;">86 zeds</p>	<p>Speakers</p>  <p style="background-color: #cccccc; margin: 0;">79 zeds</p>
--	---	---

Translation Note: The use of zeds is important to the unit, so please do not adapt "zed" into an existing currency.

Olivia added the prices for the MP3 player, the headphones and the speakers on her calculator.

The answer she got was 248.

248

Olivia's answer is incorrect. She made one of the following errors. Which error did she make?


A. She added one of the prices in twice.
 B. She forgot to include one of the three prices.
 C. She left off the last digit in one of the prices.
 D. She subtracted one of the prices instead of adding it.

(Item 1)

WHICH CAR?

Chris has just received her car driving licence and wants to buy her first car.

This table below shows the details of four cars she finds at a local car dealer.



Model:	Alpha	Bolte	Castel	Dezal
Year	2003	2000	2001	1999
Advertised price (zeds)	4800	4450	4250	3990
Distance travelled (kilometres)	105 000	115 000	128 000	109 000
Engine capacity (litres)	1.79	1.796	1.82	1.783

Translation Note: Change the car's names to other more suitable fictional names if necessary – but keep the other numbers and values the same.

Translation Note: The use of zeds is important to the Unit, so please do not adapt "zed" into an existing currency.

Translation Note: Change to . instead of . for decimal points, if that is your standard usage, in EACH occurrence.

Chris wants a car that meets all of these conditions:

- The distance travelled is **not** higher than 120 000 kilometres.
- It was made in the year 2000 or a later year.
- The advertised price is **not** higher than 4500 zeds.

Which car meets Chris's conditions?

A. Alpha
 B. Bolte
 C. Castel
 D. Dezal

(Item 2)

Which car's engine capacity is the smallest?

A. Alpha
 B. Bolte
 C. Castel
 D. Dezal

(Item 3)


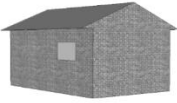
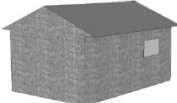
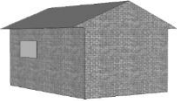
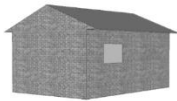

<p style="text-align: center;">GARAGE</p> <p>A garage manufacturer's "basic" range includes models with just one window and one door.</p> <p>George chooses the following model from the "basic" range. The position of the window and the door are shown here.</p> <div style="text-align: center;">  </div> <p>The illustrations below show different "basic" models as viewed from the back. Only one of these illustrations matches the model above chosen by George.</p> <p>Which model did George choose? Circle A, B, C or D.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>A</p>  </div> <div style="text-align: center;"> <p>B</p>  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>C</p>  </div> <div style="text-align: center;"> <p>D</p>  </div> </div> <p style="text-align: right;">(Item 4)</p>	<p style="text-align: center;">CLIMBING MOUNT FUJI</p> <p>Mount Fuji is a famous dormant volcano in Japan.</p> <div style="text-align: center;">  </div> <p>Translation Note: Please do not change the names of locations or people in this unit: retain "Mount Fuji", "Gotemba" and "Toshi".</p> <p>Mount Fuji is only open to the public for climbing from 1 July to 27 August each year. About 200 000 people climb Mount Fuji during this time.</p> <p>On average, about how many people climb Mount Fuji each day?</p> <p>A. 340 B. 710 C. 3400 D. 7100 E. 7400</p> <p style="text-align: right;">(Item 5)</p>
---	---

Figure 1. Items of the Problem-Solving Inventory

As shown in Figure 1, five items of the Problem-Solving Inventory were selected according to the cognitive levels and grade levels of the students since they should be at a level that can be answered by students at each grade.

Table 3. Reliability Coefficients of the Scales

Scales	Cronbach's Alpha	Number of Items
Metacognition	.910	30
Prediction	.803	11
Evaluation	.780	7
Planning	.699	5
Monitoring	.676	7
Problem-Solving Inventory	.457	5

Table 3 shows that metacognition scale has a high reliability value whereas problem-solving inventory has a low reliability value due to the small number of questions. If both the number of questions was more than five and the sample of the study was big enough, this value of the scale would be expected to be higher. Similar to the whole Metacognition Scale, the reliability results of the four factors are in the appropriate range as shown in Table 3.

Data Collection

MS and Problem-Solving Inventory were applied at the beginning of the 2019-2020 academic year in order to examine the metacognition and problem-solving skills of a public middle school in Kayseri with 280 students at different grade levels. In addition, students were asked to fill out a personal information form to obtain their demographic information at the same time.

Data Analysis

It is important whether the data obtained in the analysis of quantitative data show normal distribution (Buyukozturk, Cakmak, Akgun, Karadeniz, & Demirel, 2013). Tabachnick and Fidell (2015) state that in multivariate analyses, it is one of the first actions to see whether continuous variables have a normal distribution. The normal distribution of variables gives better results in the analysis. Therefore, it was tested firstly whether the data obtained with the scales showed normal distribution. Kolmogorov-Smirnov test was applied as the sample size was more than 50. In the Kolmogorov-Smirnov test, it is assumed that the data is normally distributed when $p > 0.05$. In addition, some studies indicate that skewness and kurtosis values are considered to be excellent in the ± 1 range for most psychometric purposes, but that ± 2 are considered sufficient criteria for normality in most cases (George & Mallery, 2010; Gravetter & Wallnau, 2014).

Table 4. Normality Tests of Data by Gender

Scales	Gender	df	p	Skewness	Kurtosis
Metacognition	Both	280	.200	-.076	-.471
	Girls	145	.200	.052	-.900
	Boys	135	.195	-.212	.165
Problem-Solving Inventory	Both	280	.000	.276	-.579
	Girls	145	.000	.128	-.624
	Boys	135	.000	.260	-.781

As shown in Table 4, metacognition scale and the problem-solving inventory showed a normal distribution not only as a whole but also by gender.

Table 5. Normality Tests of Data by Grade Levels

Scales	Grade Levels	df	p	Skewness	Kurtosis
Problem-Solving Inventory	5 th Grade	57	.000	-.059	-.843
	6 th Grade	59	.000	-.087	-.771
	7 th Grade	72	.000	.219	-.813
	8 th Grade	92	.000	.053	-.813
Metacognition	5 th Grade	57	.020	.081	-.594
	6 th Grade	59	.191	-.364	-.222
	7 th Grade	72	.200	-.215	-.329
	8 th Grade	92	.200	.168	-.506

Similar to the normality test results by gender, metacognition scale and the problem-solving inventory showed a normal distribution by grade levels as given in Table 5. In addition to looking at the normality values of both scales as a whole, it would be useful to look at the normality results of the four factors that emerged as a result of factor analysis applied to the metacognition scale by the independent variables as gender, grade level, financial status of the family, number of siblings, and educational backgrounds of the parents to apply parametric tests.

Table 6. Normality Tests of the Factors of Metacognition Scale by Gender

Factors	Gender	df	p	Skewness	Kurtosis
Prediction	Female	145	.078	-.102	-.625
	Male	135	.023	-.170	-.345
Evaluation	Female	145	.000	-.157	-.921
	Male	135	.000	-.608	.220
Planning	Female	145	.003	.124	-.765
	Male	135	.000	-.286	-.345
Monitoring	Female	145	.001	-.556	-.066
	Male	135	.001	-.643	.367

As shown in Table 6, skewness and kurtosis values of four factors according to gender are within the limits accepted for normality.

Table 7. Normality Tests of the Factors of Metacognition Scale by Grade Levels

Metacognitive Factors	Grade Levels	df	p	Skewness	Kurtosis
Prediction	5 th Grade	57	.076	-.177	-.654
	6 th Grade	59	.071	-.428	-.114
	7 th Grade	72	.200	-.006	-.311
	8 th Grade	92	.200	.054	-.569
Evaluation	5 th Grade	57	.042	-.400	-.801
	6 th Grade	59	.011	-.255	-.843
	7 th Grade	72	.020	-.631	.047
	8 th Grade	92	.041	-.257	-.098
Planning	5 th Grade	57	.000	.252	-1.039
	6 th Grade	59	.200	-.223	-.482
	7 th Grade	72	.200	-.198	-.525
	8 th Grade	92	.133	.017	-.684
Monitoring	5 th Grade	57	.067	-.423	-.283
	6 th Grade	59	.008	-.626	-.148
	7 th Grade	72	.001	-.788	.144
	8 th Grade	92	.048	-.693	1.169

According to the normality test of the factors by grade levels, it is seen in Table 7 that all data are in the acceptable normal distribution range.

Table 8. Normality Tests of the Factors of Metacognition Scale by Parents' Educational Backgrounds

Metacognitive Factors	Educational Background	Parents	df	p	Skewness	Kurtosis
Prediction	Non or Elementary School	Mother	105	.200	-.172	-.041
		Father	64	.200	-.390	-.347
	Middle or High School	Mother	141	.031	-.083	-.700
		Father	153	.063	-.006	-.645
	Undergraduate or Graduate	Mother	34	.200	-.293	-.572
		Father	63	.200	-.140	-.341
Evaluation	Non or Elementary School	Mother	105	.005	-.443	-.186
		Father	64	.056	-.316	-.449
	Middle or High School	Mother	141	.031	-.315	-.378
		Father	153	.000	-.454	-.295
	Undergraduate or Graduate	Mother	34	.138	-.369	-1.072
		Father	63	.200	-.113	-.691
Planning	Non or Elementary School	Mother	105	.020	.050	-.764
		Father	64	.014	.077	-.698
	Middle or High School	Mother	141	.007	-.148	-.422
		Father	153	.002	-.127	-.596
	Undergraduate or Graduate	Mother	34	.200	-.203	-.992
		Father	63	.044	-.101	-.576
Monitoring	Non or Elementary School	Mother	105	.018	-.649	.680
		Father	64	.030	-.389	-.763
	Middle or High School	Mother	141	.000	-.664	.081
		Father	153	.000	-.875	1.033
	Undergraduate or Graduate	Mother	34	.136	-.657	-.277
		Father	63	.038	-.421	-.538

The normality values of the four factors of the metacognition scale according to the educational status of the mother and father are observed to be within the desired skewness and kurtosis ranges for normality in Table 8.

Table 9. Normality Tests of the Factors of Problem-Solving Inventory by Parents' Educational Backgrounds

Scale	Educational Background	Parents	df	p	Skewness	Kurtosis
Problem-Solving Inventory	Non or Elementary School	Mother	105	.000	.495	-.076
		Father	64	.000	.249	-.579
	Middle School or High School	Mother	141	.000	.180	-.733
		Father	153	.000	.275	-.575
	Undergraduate or Graduate	Mother	34	.036	-.058	-.563
		Father	63	.001	.163	-.759

It is seen in Table 9 that the problem-solving inventory shows a normal distribution by the educational backgrounds of the parents, similar to the results obtained from the normality test of the metacognition scale considering the skewness and kurtosis values in the appropriate range.

Table 10. Normality Tests of the Factors of Metacognition Scale by Number of Siblings

Metacognitive Factors	Number of Siblings	df	p	Skewness	Kurtosis
Prediction	1 or 2 siblings	68	.183	.215	-.560
	3 siblings	120	.048	-.264	-.469
	More than 3 siblings	92	.091	-.201	-.315
Evaluation	1 or 2 siblings	68	.200	-.058	-.504
	3 siblings	120	.005	-.385	-.357
	More than 3 siblings	92	.002	-.529	-.298
Planning	1 or 2 siblings	68	.177	-.114	-.607
	3 siblings	120	.005	.029	-.773
	More than 3 siblings	92	.047	-.082	-.674
Monitoring	1 or 2 siblings	68	.050	-1.007	1.684
	3 siblings	120	.001	-.566	-.137
	More than 3 siblings	92	.051	-.446	-.341

According to the number of siblings of the students, the data obtained from the metacognition scale shows normal distribution as shown in Table 10 since either the significance values are greater than .05 or the skewness and kurtosis values are between -1 and +1.

Table 11. Normality Tests of the Factors of Problem-Solving Inventory by Number of Siblings

Scale	Number of Siblings	df	p	Skewness	Kurtosis
Problem-Solving Inventory	1 or 2 siblings	68	.000	.664	-.227
	3 siblings	120	.000	.173	-.669
	More than 3 siblings	92	.000	.108	-.645

Similar to the results of metacognition scale, problem-solving inventory by number of siblings has a normal distribution with respect to the skewness and kurtosis values as shown in Table 11.

Table 12. Normality Tests of the Factors of Metacognition Scale by Financial Status of the Family

Metacognitive Factors	Financial Status of the Family	df	p	Skewness	Kurtosis
Prediction	Low	12	.200	.561	-1.428
	Medium	120	.003	-.337	-.308
	High	148	.026	.015	-.608
Evaluation	Low	12	.200	.080	-1.400
	Medium	120	.001	-.601	.070
	High	148	.005	-.227	-.740

Planning	Low	12	.200	.614	-.153
	Medium	120	.006	-.044	-.611
	High	148	.005	-.111	-.694
Monitoring	Low	12	.200	-.580	-.699
	Medium	120	.002	-.828	.758
	High	148	.000	-.375	-.607

Parallel to the other variables, it is seen that the data obtained from the metacognition scale shows a normal distribution according to the financial situation of the students' families in Table 12 with respect to either the significance values or the skewness and kurtosis values.

Table 13. Normality Tests of the Factors of Problem-Solving Inventory by Financial Status of the Family

Scale	Financial Status of the Family	df	p	Skewness	Kurtosis
Problem Solving Inventory	Low	12	.000	.664	-.227
	Medium	120	.000	.173	-.669
	High	148	.000	.108	-.645

Finally, whether the problem-solving inventory is distributed normally according to the family financial situation, skewness and kurtosis values are found to be within the desired ranges in Table 13. As a result of the normality test of the metacognition scale and problem-solving inventory by all independent variables, all the data appeared to meet the normality requirements. Therefore, according to Tabachnick and Fidell (2015), parametric tests can be used. Hence, metacognition scale and problem-solving inventory were analyzed with descriptive statistics, independent samples t-test, ANOVA, and Pearson Correlation by using IBM SPSS 25.0.

Findings

In this section, the total scores of the middle school students from metacognition scale and problem inventory were analyzed in terms of gender, grade level, parents' educational status, number of siblings, and family financial status. Also, the relation between the total scores of metacognition scale and problem-solving inventory were inspected.

Gender Differences at Metacognition Scale and Problem-Solving Inventory

The total scores of the middle school students from metacognition scale and problem-solving inventory were analyzed in terms of gender with independent samples t test. Descriptive statistics and t test results were given at Table 14.

Table 14. Mean Scores of the Middle School Students with respect to the Gender

Scale	Gender	n	\bar{X}	SD	min	max	t	p
Problem-Solving Inventory	Male	145	1.88	1.181	0	5	-2.622	.009*
	Female	135	2.29	1.392	0	5		
Metacognition	Male	145	91.10	13.971	62	120	-1.312	.190
	Female	135	93.26	13.474	57	120		
Prediction	Male	145	32.48	5.642	19	44	-.844	.399
	Female	135	33.06	5.787	18	44		
Evaluation	Male	145	21.49	4.055	12	28	-.138	.890
	Female	135	21.56	3.903	9	28		
Planning	Male	145	14.12	3.142	8	20	-1.600	.111
	Female	135	14.72	3.066	6	20		
Monitoring	Male	145	23.01	3.497	12	28	-2.396	.017*
	Female	135	23.93	2.911	14	28		

* $p < .05$

As shown in the Table 14, as a result of independent samples t-test there are statistically significant mean differences between problem-solving inventory scores of female ($\bar{X}=1.88$) and male ($\bar{X}=2.29$) [$t_{(278)} = -2.622$, $p=.009<.000$] and monitoring factor scores of metacognition scale between female ($\bar{X}=3.497$) and male ($\bar{X}=2.911$) [$t_{(278)} = -2.396$, $p=.017<.000$]. Result shows that there are no significant mean differences between the scores of female and male of not only though the whole scale but also in the factors of the prediction, evaluation, and planning.

Grade Level differences at Metacognition Scale and Problem-Solving Inventory

The total scores of the middle school students from metacognition scale including the factors and problem-solving inventory were analyzed in terms of grade level with ANOVA. Before applying the ANOVA test, it is necessary to show the homogeneity of the variances which is an important requirement of this test.

Table 15. Test of Homogeneity of Variances Results by Grade Levels

Scale	Levene Statistic	df (between groups)	df (within groups)	p
Problem-Solving Inventory	5.003	3	276	.002
Metacognition	.166	3	276	.919
Prediction	.477	3	276	.698
Evaluation	1.502	3	276	.214
Planning	.428	3	276	.733
Monitoring	2.014	3	276	.112

According to the test of homogeneity of variances, it is seen in Table 15 that metacognition scale provides homogeneity of variances both as a whole and sub-factors separately whereas problem-solving inventory does not. In cases where the assumption of homogeneity of variances is not provided in ANOVA, the Welch test, which does not require this assumption and has a high statistical power, can be performed (Field, 2005).

Table 16. Welch Test of Problem-Solving Inventory for Homogeneity of Variances

Scale	Statistic	df ₁	df ₂	p
Problem-Solving Inventory	12.260	3	148.892	.000

According to Welch test in Table 16, it is seen that problem-solving inventory does not provide homogeneity of variances ($p=.000$). This means that if there is a significant difference between the means of problem-solving inventory by grade level, then the tests to be performed in case of the lack of homogeneity of variances from post hoc tests are applied.

Table 17. Metacognition Scale and Problem-Solving Inventory by the Grade Levels (ANOVA)

Scales		Sum of Squares	df	Mean Square	F	p
Problem-Solving Inventory	Between Groups	45.181	3	15.060	9.733	.000*
	Within Groups	427.090	276	1.547		
Metacognition	Between Groups	673.336	3	224.445	1.189	.314
	Within Groups	52086.949	276	188.721		
Prediction	Between Groups	285.509	3	95.170	2.982	.032*
	Within Groups	8809.459	276	31.918		
Evaluation	Between Groups	32.753	3	10.918	.688	.560
	Within Groups	4377.118	276	15.859		
Planning	Between Groups	23.002	3	7.667	.789	.501
	Within Groups	2682.766	276	9.720		
Monitoring	Between Groups	11.343	3	3.781	.354	.786
	Within Groups	2943.957	276	10.667		

* $p < .05$

In Table 17, it was given that there were significant mean differences between the scores of the middle school students by grade levels in the Problem-Solving Inventory [$F(3, 276) = 9.733, p = .000 < .05$] and prediction factor of the Metacognition Scale [$F(3, 276) = 2.982, p = .032 < .05$]. On the other hand, there was no significant mean difference between the metacognition scale and the other factors except the prediction factor and the whole metacognition scale in terms of grade levels.

To find out the source of this significant difference in the prediction factor of Metacognition Scale and Problem-Solving Inventory, Tukey HSD and Tamhane tests from Post Hoc tests were applied.

Table 18. Tukey HSD Results of Metacognition Scale by Grade Levels

Scale	Grade Levels		M.D.	S.E.	p	
Metacognition	5 th Grade	6 th Grade	-.074	2.551	1.000	
		7 th Grade	1.988	2.436	.847	
		8 th Grade	3.557	2.316	.417	
	6 th Grade	7 th Grade	2.062	2.412	.828	
		8 th Grade	3.631	2.291	.389	
		7 th Grade	1.569	2.162	.887	
	Prediction	5 th Grade	6 th Grade	.289	1.049	.993
			7 th Grade	1.577	1.002	.395
			8 th Grade	2.459*	.952	.050
6 th Grade		7 th Grade	1.287	.992	.565	
		8 th Grade	2.170	.942	.100	
		7 th Grade	.882	.889	.754	
Evaluation		5 th Grade	6 th Grade	.580	.740	.862
			7 th Grade	.564	.706	.855
			8 th Grade	.964	.671	.478
	6 th Grade	7 th Grade	-.016	.699	1.000	
		8 th Grade	.384	.664	.939	
		7 th Grade	.400	.627	.919	
	Planning	5 th Grade	6 th Grade	-.321	.579	.945
			7 th Grade	.124	.553	.996
			8 th Grade	.461	.526	.817
6 th Grade		7 th Grade	.445	.547	.849	
		8 th Grade	.782	.520	.436	
		7 th Grade	.338	.491	.902	
Monitoring		5 th Grade	6 th Grade	-.622	.607	.734
			7 th Grade	-.276	.579	.964
			8 th Grade	-.327	.551	.934
	6 th Grade	7 th Grade	.346	.574	.931	
		8 th Grade	.295	.545	.949	
		7 th Grade	-.051	.514	1.000	

* $p < .05$

As a result of Tukey HSD test, it was seen in the Table 18 that only the mean of prediction factor of Metacognition Scale made a significant difference between 5th grade middle school students ($\bar{X}=34.04$) and 8th grade middle school students ($\bar{X}=31.58$) in favor of 5th graders.

Table 19. Tamhane Results of Problem-Solving Inventory by Grade Levels

Scale	Grade Levels		M.D.	S.E.	p
Problem-Solving Inventory	5 th Grade	6 th Grade	-.529	.231	.103
		7 th Grade	-.777*	.221	.003*
		8 th Grade	-1.107*	.210	.000**
	6 th Grade	7 th Grade	-.248	.218	.667
		8 th Grade	-.579*	.207	.029*
		8 th Grade	-.330	.196	.332

*p<.05; **p<.01

According to the results obtained from the Tamhane test, in Table 19, Problem-Solving Inventory by the grade levels had significant mean differences between 5th (\bar{X} =1.40) and 7th (\bar{X} =2.18) graders, between 5th (\bar{X} =1.40) and 8th (\bar{X} =2.51) graders, and between 6th (\bar{X} =1.93) and 8th (\bar{X} =2.51) graders.

Parents' Educational Backgrounds Differences at Metacognition Scale and Problem-Solving Inventory

In order to see whether the means of the scores of the two scales have significant differences with respect to parents' educational backgrounds, ANOVA is applied. For this purpose, data was recoded into three groups for each variable as "Non or Elementary School", "Middle School or High School", and "Undergraduate or Graduate". According to the ANOVA results, it is clearly seen after providing the homogeneity of variances that the educational backgrounds of the parents has a significant mean difference among the groups for both two scales.

Table 20. Test of Homogeneity of Variances Results by Parents' Educational Backgrounds

Variable	Scale	Levene Statistic	df (between groups)	df (within groups)	p
Mothers' Educational Status	Problem-Solving Inventory	.869	2	277	.421
	Metacognition	1.726	2	277	.180
	Prediction	.678	2	277	.508
	Evaluation	3.129	2	277	.045
	Planning	1.604	2	277	.203
	Monitoring	.290	2	277	.748
Fathers' Educational Status	Problem-Solving Inventory	1.607	2	277	.202
	Metacognition	.392	2	277	.676
	Prediction	.152	2	277	.859
	Evaluation	1.161	2	277	.315
	Planning	.053	2	277	.948
	Monitoring	.766	2	277	.466

According to the test of homogeneity of variances by educational backgrounds of parents, it is seen in Table 20 that both problem-solving inventory and metacognition scale provides homogeneity of variances except "evaluation" factor of Metacognition Scale by mothers' educational backgrounds.

Table 21. Welch Test of the Evaluation factor of Metacognition Scale by Mothers' Educational Backgrounds for Homogeneity of Variances

Factor	Statistic	df ₁	df ₂	p
Evaluation	.738	2	88.338	.481

According to Welch test in Table 21, it is seen that evaluation factor of the Metacognition Scale by mothers' educational backgrounds provides homogeneity of variances (p=.481). Thus, in case of significant mean differences, Tukey HSD test can be applied for all data.

Table 22. Metacognition and Problem-Solving Inventory Scales by the Educational Backgrounds of the Parents (ANOVA)

Variable	Scale	Sum of Squares	df	Mean Square	F	p		
Mothers' Educational Background	Problem-Solving Inventory	Between Groups	11.040	2	5.520	3.315	.038*	
		Within Groups	461.231	277	1.665			
	Metacognition	Between Groups	186.293	2	93.146	.491	.613	
		Within Groups	52573.993	277	189.798			
	Prediction	Between Groups	46.429	2	23.215	.711	.492	
		Within Groups	9048.539	277	32.666			
	Evaluation	Between Groups	24.577	2	12.288	.776	.461	
		Within Groups	4385.295	277	15.831			
	Planning	Between Groups	3.449	2	1.725	.177	.838	
		Within Groups	2702.319	277	9.756			
	Monitoring	Between Groups	1.534	2	.767	.072	.931	
		Within Groups	2953.766	277	10.663			
	Fathers' Educational Background	Problem-Solving Inventory	Between Groups	5.212	2	2.606	1.546	.215
			Within Groups	467.059	277	1.686		
Metacognition		Between Groups	168.517	2	84.259	.444	.642	
		Within Groups	52591.768	277	189.862			
Prediction		Between Groups	15.860	2	7.930	.242	.785	
		Within Groups	9079.107	277	32.777			
Evaluation		Between Groups	44.665	2	22.333	1.417	.244	
		Within Groups	4365.206	277	15.759			
Planning		Between Groups	16.963	2	8.481	.874	.419	
		Within Groups	2688.805	277	9.707			
Monitoring		Between Groups	.450	2	.225	.021	.979	
		Within Groups	2954.850	277	10.667			

* p < .05

According to the ANOVA results in Table 22, there were significant mean differences between the scores of the middle school students by educational backgrounds of parents in the Problem-Solving Inventory whereas there was no significant mean difference in the metacognition scale both as a whole and factor by factor.

Table 23. Tukey HSD results of Problem-Solving Inventory by Mothers' Educational Status

Scale	Mothers' Educational Status	M.D.	S.E.	p
Problem-Solving Inventory	Middle School or High School	-.187	.166	.498
	Non or Elementary School	-.654*	.255	.029
	Middle School or High School	-.467	.247	.143

* p < .05

According to the results obtained from the Tukey HSD test in Table 23, Problem-Solving Inventory by the mothers' educational backgrounds had significant mean differences between "Non or Elementary School" ($\bar{X}=1.90$) and "Undergraduate or Graduate" ($\bar{X}=2.56$) in favor of "Undergraduate or Graduate".

Family Financial Status Differences at Metacognition and Problem-Solving Inventory

In order to examine whether there are significant mean differences of the scores of problem-solving inventory and metacognition scale ANOVA test was used. But first, the data of the middle school students about financial

status of their families recoded into three groups as “low”, “medium”, and “high”. Then, homogeneity of variance was tested.

Table 24. Test of Homogeneity of Variances Results by Family Financial Status

Scale	Levene Statistic	df (between groups)	df (within groups)	p
Problem-Solving Inventory	1.532	2	277	.218
Metacognition	.776	2	277	.461
Prediction	1.299	2	277	.274
Evaluation	.210	2	277	.811
Planning	.406	2	277	.667
Monitoring	3.685	2	277	.026

In Table 24, it is seen that both problem-solving inventory and metacognition scale provides homogeneity of variances except the monitoring factor of metacognition scale. For this factor, Welch test is applied to get strong statistic power.

Table 25. Welch Test of the Monitoring factor of Metacognition Scale by Family Financial Status for Homogeneity of Variances

Factor	Statistic	df ₁	df ₂	p
Monitoring	.213	2	29.033	.809

As seen in the Welch test from Table 25, homogeneity of variance of monitoring factor of metacognition scale by family financial status is provided since $p=.809>.000$.

Table 26. Metacognition and Problem-Solving Inventory Scales by Family Financial Status (ANOVA)

Scale		Sum of Squares	df	Mean Square	F	p
Problem-Solving Inventory	Between Groups	1.908	2	.954	.562	.571
	Within Groups	470.363	277	1.698		
Metacognition	Between Groups	347.822	2	173.911	.919	.400
	Within Groups	52412.464	277	189.215		
Prediction	Between Groups	77.993	2	38.996	1.198	.303
	Within Groups	9016.975	277	32.552		
Evaluation	Between Groups	22.557	2	11.278	.712	.492
	Within Groups	4387.315	277	15.839		
Planning	Between Groups	15.212	2	7.606	.783	.458
	Within Groups	2690.556	277	9.713		
Monitoring	Between Groups	8.710	2	4.355	.409	.664
	Within Groups	2946.590	277	10.638		

According to the ANOVA results of the problem-solving inventory and metacognition scale by family financial status, there are no mean differences of the scores of middle school students as shown in Table 26.

Correlation between Metacognition Scale and Problem-Solving Inventory

The relation between the total scores of metacognition scale and problem-solving inventory were examined with Pearson correlation coefficient. Based on the analyze results of Pearson correlation, relationship between the means of metacognition scores and problem inventory scores is not remarkable [$r(280) = .064, p = .288$].

Table 27. Pearson Correlation Results of Metacognition Scale and Problem-Solving Inventory

Scales	Metacognition Scale	Prediction	Evaluation	Planning	Monitoring
Problem-Solving Inventory	.064	-.029	.027	.130*	.163**
Metacognition Scale		.902**	.869**	.841**	.776**
Prediction			.680**	.702**	.557**
Evaluation				.657**	.629**
Planning					.560**

* $p < .05$; ** $p < .01$

Although there is no significant relationship between problem-solving inventory and metacognition scale as a whole, the relationships between problem-solving inventory and the two factors, monitoring [$r(280) = .163, p = .006$] and planning [$r(280) = .130, p = .030$], are significant as shown in Table 27.

Discussion and Conclusion

In this section, the findings from metacognition scale and problem inventory which were analyzed with respect to gender, grade level, parents' educational backgrounds, family financial status, and number of siblings are discussed in order to investigate the factors affecting middle school students' metacognition and problem-solving skills requiring mathematical reasoning. First of all, the mean scores from the metacognition scale and problem-solving inventory of middle school students were analyzed by gender. The results show that the means of problem-solving inventory has a significant mean difference in favor of male. Also, as a result of examining the metacognition scale and its factors according to gender, it was seen that only the monitoring factor made a significant mean difference in favor of male in parallel with the result of previous studies (Lemieux Collin, & Watier, 2019; Peclak & Pecjak, 2002; Yildiz, Baltaci, &, Kuzu, 2018). At monitoring stage of metacognition, individuals follow their mental activities and processes in the learning process and think about what they should do to achieve better results (Garofalo & Lester, 1985). Secondly, problem-solving inventory and metacognition scale were analyzed according to grade levels and the results of these two scales were almost opposite. On behalf of metacognition scale, only the prediction factor of metacognition scale has a significant mean difference between 5th and 8th grade middle school students in favor of 5th graders (Sevgi & Caglikose, 2020). It means that as students' grade levels increase, there is a decrease in their predictive skills in metacognition. In other words, students who are just starting middle school level are better at metacognitive prediction than students who are about to graduate from middle school (Sevgi & Orman, 2020). In the problem-solving inventory, on the other hand, the mean of the 8th grade middle school students' total scores are significantly higher than the means of 5th and 6th graders' scores. Also, the mean of the 7th grade middle school students' total scores are significantly higher than the mean of 5th graders. This result is similar to Lutfiyya's (1998) study about determining the effects of the grade level and student's gender on the mathematical thinking of high school students in Nebraska. He found that the mean scores of the higher-grade level students from mathematical thinking instrument developed by himself of were significantly higher than lower graders excepting the mean difference between 11th and 12th grade high school students. Thirdly, the data from metacognition scale and problem-solving inventory have been analyzed with respect to parents' educational status. Results showed that father's and mother's educational levels do not make any significant mean differences in students' metacognition scores which were obtained from whole scale also in factors of metacognition as predicting, evaluation, monitoring and planning. On the contrary, mothers' educational backgrounds had significant mean differences in favor of "Undergraduate or Graduate" compared with "Non or Elementary School" (Sevgi & Caglikose, 2020). This means that mothers' educational status has a significant effect on students' problem solving and reasoning abilities. This situation may be influenced by the fact that students' relationships with their mothers are stronger than their fathers. Next, when the effects of the financial situation of the families on the problem-solving and metacognitive abilities of middle school students were examined, no significant mean difference was found between the scores obtained from both metacognition scale and problem-solving inventory. In other words, it was seen that the economic opportunities provided to children in families or the financial situation of the family did not cause significant differences in problem-solving, reasoning and metacognitive abilities. Finally, it would be beneficial to examine the relationship between the two scales as well as the variables affecting the mean scores of middle school students obtained from the problem-solving inventory and metacognition scale. As a result of the Pearson Correlation, there are statistically significant but weak

relationship between the mean scores of problem-solving inventory and both monitoring and planning factors of metacognition scale. This means that students who have good skills in planning and monitoring are also good at solving the problems requiring advanced mathematical reasoning and vice versa.

References

- Akturk, A. O. & Sahin, I. (2011). Literature review on metacognition and its measurement. *Procedia-Social and Behavioral Sciences*, 15, 3731-3736.
- Borkowski, J. G. (1992). Metacognitive theory: A framework for teaching literacy, writing, and math skills. *Journal of Learning Disabilities*, 25, 253-257.
- Brown, A. L. (1980). Metacognitive development and reading. In R. J. Spiro, B. Bruce, W. Brewer (Eds.), *Theoretical issues in reading comprehension*. Hillsdale, NJ: Lawrence Erlbaum.
- Buyukozturk, S., Cakmak, E., Akgun, O., Karadeniz, S., & Demirel, F. (2013). *Bilimsel araştırma yöntemleri*. Ankara: Pegem Akademi Yayınları.
- Costello, A. B. & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, 10(1), 7. DOI: <https://doi.org/10.7275/jyj1-4868>
- Creswell, J. W. (2009). *Research design: qualitative, quantitative, and mixed methods approaches*. London: SAGE Publication.
- Creswell, J. W. & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research*. Sage publications.
- De Clercq, A., Desoete, A., & Roeyers, H. (2000). EPA 2000: A multilingual, programmable computer assessment of offline metacognition in children with mathematical learning disabilities. *Behavior Research Methods, Instruments, & Computers*, 32, 304-311.
- Deseote, A. (2001). *Off-line metacognition in children with mathematics learning disabilities*. Unpublished Doctoral dissertation, Ghent University.
- Deseote, A. & Roeyers, H. (2002). Off-line metacognition – a domain-specific retardation in young children with learning disabilities. *Learning Disability Quarterly*, 25, 123-139.
- Edgerton, P. & Kauchak, D. (2001). *Educational psychology*. New Jersey, NJ: Merrill Prentice Hall.
- Erez, G., & Peled, I. (2001). Cognition and metacognition: Evidence of higher thinking in problem-solving of adolescents with mental retardation. *Education and Training in Mental Retardation and Developmental Disabilities*, 36(1), 83-93.
- Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. Resnick (Ed.). *The Nature of Intelligence* (pp. 231-236). Hillsdale, NJ: Lawrence Erlbaum.
- Flavell, J. H. (1979). Metacognitive and cognitive monitoring: A new area of cognitive developmental inquiry. *American Psychologist*, 34, 906-911.
- Field, A. (2005). *Discovering statistics using SPSS* (2nd Edition), Sage Publications.
- Fidan, N. (1996). *Okulda öğrenme ve öğretme*. İstanbul: Alkim Yayınları.
- Fraenkel, J., R. & Wallen, N. E. (2010). *How to design and evaluate research in education*. (7th ed.). McGraw-Hill, New York: NY.
- Garofalo, J. & Lester, F. K. (1985). Metacognition, cognitive monitoring, and mathematical performance. *Journal for Research in Mathematics Education*, 16(3), 163-176.
- George, D. & Mallery, M. (2010). *SPSS for windows step by step: A simple guide and reference*. 17.0 update (10 ed.) Boston: Pearson.
- Gravetter, F. & Wallnau, L. (2014). *Essentials of statistics for the behavioral sciences* (8th ed.). Belmont, CA: Wadsworth.

- Kaplan, A. & Duran, M. (2016). Ortaokul öğrencilerine yönelik matematiksel üstbiliş farkındalık ölçeği: Geçerlik ve güvenilirlik çalışması. *Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi*, (32), 1-17.
- Lemieux, C. L., Collin, C. A., & Watier, N. N. (2019). Gender differences in metacognitive judgments and performance on a goal-directed wayfinding task. *Journal of Cognitive Psychology*, 31(4), 1-14. Doi: 10.1080/20445911.2019.1625905
- Lucangeli, D. & Cornoldi, C. (1997). Mathematics and metacognition: What is the nature of the relationship? *Mathematical Cognition*, 3, 121-139.
- Lutfiyya, L. A. (1998). Mathematical thinking of high school students in Nebraska. *International Journal of Mathematical Education in Science and Technology*, 29(1), 55-64.
- Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.
- Peklaj, C. & Pecjak S. 2002. Differences in students' self-regulated learning according to their achievement and sex. *Studia Psychology*, 44, 29-43.
- Schoenfeld, A. (1987). What's all the fuss about metacognition? In: A. H. Schoenfeld (Ed.), *Cognitive Science and Mathematics Education*, 189-215. Lawrence Erlbaum.
- Schoenfeld, A.H. (1992). Learning to think mathematically: problem solving, metacognition and sense making in arithmetics. In D.A. Grouws (Ed.), *Handbook of Research on Teaching and Learning. A Project of the National Council of Teachers of Arithmetics*. (pp. 334-370).
- Sevgi, S. & Orman, F. (2020). An investigation, based on some variables, into the attitudes of middle school students towards mathematics and metacognitive skills. *Elementary Education Online*, 19(1), 183-197.
- Sevgi, S. & Çaglıkose, M. (2020). Altıncı sınıf öğrencilerinin üstbiliş becerilerinin bazı değişkenler açısından incelenmesi. *Cumhuriyet International Journal of Education*, 9(1), 139-157. DOI:10.30703/cije.546885
- Swanson, H. L. (1990). Influence of metacognitive knowledge and aptitude on problem solving. *Journal of Educational Psychology*, 82(2), 306-667.
- Tabachnick, G. B. & Fidell, S. L. (2015). *Çok değişkenli istatistiklerin kullanımı- Using multivariate statistics* (6. Baskı). (Çev. Edt. Baloğlu. M.). Ankara: Nobel Akademik Yayıncılık.
- Tobias, S., & Everson, H.T. (1996). Assessing metacognitive knowledge monitoring. In K. Hagtvet (Ed.), *Advances in Test Anxiety Research*. 7, 18-31. Hillsdale, NJ: Erlbaum.
- Verschaffel, L. (1999). Realistic mathematical modelling and problem solving in the upper elementary school: Analysis and improvement. In J. H. M. Hamers, J. E. H. Van Luit, & B. Csapo (Eds.), *Teaching and learning thinking skills. Contexts of learning* (pp. 215-240). Lisse: Swets & Zeitlinger.
- Victor, A. M. (2004). *The effects of metacognitive instruction on the planning and academic achievement of first and second grade children*. Unpublished doctoral dissertation, II Graduate College of the Illinois Institute of Technology, Chicago.
- Winne, P.H. (1997). Experimenting to bootstrap self-regulated learning. *Journal of Educational Psychology*, 89, 397-410.
- Yildiz, E., Akpınar, E., Tatar, N., & Ergin, O. (2009). Exploratory and confirmatory factor analysis of the metacognition scale for primary school students. *Educational Sciences: Theory and Practice*. 9(3), 1591-1604.
- Yildiz, A., Baltacı, S., & Kuzu, O. (2018). The Investigation of students' cognitive and metacognitive competencies according to different variables. *European Journal of Education Studies*. 4(10), 81-98. DOI: 10.5281/zenodo.1307430



A Scale Development Study on Middle School Students' Resistance Behaviors

Ece Yolcu*^a, Mediha Sari^b

Article Info

DOI: 10.14686/buefad.685056

Article History:

Received: 05.02.2020

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Students' resistance behaviors,
Middle school students,
Scale development.

Article Type:

Research Article

Abstract

It is vital to detect the students' behaviors which can adversely affect the flow of learning process. Resistance behaviors are among the factors affecting the flow. It is important to determine these behaviors without mixing them with other behaviors however the number of the related studies is restricted. Therefore, it was thought that developing a scale for determining the students' resistance behaviors could contribute to the literature. Accordingly, the aim of the study was to develop such a scale. The sample of the research consisted of 1082 middle school students in central towns of Adana within 2017-2018 Education Year. Through the development of Students' Resistance Behaviors Scale-Student Form (SRBS-S), exploratory, confirmatory factor analyses and reliability analyses were conducted. At the end of the analyses a scale of 34 items and four dimensions was developed and the Cronbach Alpha values for these dimensions and the whole scale were between .78 and .90. Consequently, SRBS-S was found to be a reliable scale to be used to determine students' resistance behaviors.

Ortaokul Öğrencilerinin Direnç Davranışları Üzerine Bir Ölçek Geliştirme Çalışması

Makale Bilgisi

DOI: 10.14686/buefad.685056

Makale Geçmişi:

Geliş: 05.02.2020

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Öğrenci direnç davranışları,
Ortaokul öğrencileri,
Ölçek geliştirme.

Makale Türü:

Araştırma Makalesi

Öz

Öğretim sürecini olumsuz etkileyen öğrenci davranışlarını belirlemek oldukça önemlidir. Direnç davranışları bu davranışlardan biridir. Bu davranışları diğer öğrenci davranışlarıyla karıştırmadan belirlemek önemlidir ancak bu konuyla ilgili yapılan araştırmaların sayısı kısıtlıdır. Bu bağlamda, öğrenci direnç davranışlarına yönelik bir ölçek geliştirmenin alanyazına katkı sağlayacağı düşünülmüştür. Araştırmanın amacı, böyle bir ölçek geliştirmektir. Araştırmanın örneklemini, 2017-2018 Eğitim-Öğretim yılında Adana'nın merkez ilçelerindeki 1082 ortaokul öğrencisi oluşturmuştur. Öğrenci Direnç Davranışları Ölçeği-Öğrenci Formu (ÖDDÖ-S) nun geliştirilmesinde, açıklayıcı, doğrulayıcı faktör analizleri ve güvenilirlik analizleri yapılmıştır. Analizler sonucunda 34 madde ve 4 boyuttan oluşan bir ölçek geliştirilmiş ve bu boyutlara ve bütün yapıya yönelik Cronbach Alpha değerleri .78 ve .90 arasında bulunmuştur. Sonuç olarak, ÖDDÖ-S'nin, öğrenci direnç davranışlarını belirlemek üzere kullanılacak güvenilir bir ölçek olduğu görülmüştür.

*Corresponding Author: ece_duser@hotmail.com

^a Res. Assist., Adana/Çukurova University, <https://orcid.org/0000-0003-4266-7957>

^b Prof. Dr., Adana/Çukurova University, <https://orcid.org/0000-0002-1663-648X>

Introduction

Interventions within education could not be explained only by one specific reason. This could result from many factors such as teacher, the structure of curriculum, educational environment, student, administrators, and parents. In this picture, the effect of students who are at the center of teaching-learning process cannot be denied. The elements such as student's motivation, interest in education process, active participation, readiness etc., would be determinant of student's attitude towards teaching-learning process. Students not having these due to various reasons or feeling inefficient about them could emerge as resistance against teaching process and teacher. Throughout history, resistance behaviors have been much more identified with problems and bad behaviors; characterized as negative, rebellious, undesired. However, sociological and psychological theories put forward that overfitting could have adverse effects as well and resistance is an important social and political tool should be enhanced (Kearney & Plax, 1991). McLaren (1985, p.85), addressed resistance as student behavior which is symbolic, historical and possess a living meaning, stand up and involve a struggle with school culture and teaching process. It is assumed that students resist to school mostly feel independent from school, have feelings about questioning the purpose of school and reflect this as resistance. However, teachers and administrators generally interpret these students' behaviors as evil and apply discipline procedures (Hendrickson, 2012, p.37).

Students' behaviors such as standing up, staying passive in a way destroying the flow of learning-teaching process, sabotaging the process by planning in advance or without any plan, showing hostile attitudes towards teacher or other authorities could be accepted as indicators of student resistance. Yüksel (2004, p. 342) stated that students react to situations that do not match with their style of thinking or living and meet their expectations, these reactions turn into resistance. Resistance behaviors are the behaviors students mostly display when they feel angry, upset or out of the goings on in the classroom (Seidel & Tanner, 2013, p.586).

Student resistance behaviors are mostly mixed up with negative behaviors and used as synonyms. Yet, while negative behaviors could be sudden behaviors during an ongoing class activity, resistance behaviors contain determination with many sources (Sever, 2018, p. 127). Giroux (1983, cited in Erickson, 1984, p.538) also mentioned that not every negative behavior such as failure to do homework, fighting, drug-use, absence from school can be a sign of resistance. Moreover, it is seen that resistance behaviors involve a purpose; could be hidden in its way of occurrence or being displayed. Yüksel (2004, p.342) indicated that contrary to negative behaviors, resistance behaviors occur suddenly and at irregular intervals, resistance behaviors are planned beforehand and become permanent. Problematic behaviors are the behaviors displayed suddenly in various situations whereas resistance behaviors are purposeful ones exhibited knowingly and willfully (Sarı, 2018, p.227).

Resistance behaviors might be perceived as both negative and positive and classified in different ways. Abowitz (2000, p. 880) indicates that resistance is a complicated human communication style changing everyone involved creating either better adaptation or a completely hopeless situation. Burroughs, Kearney and Plax (1989, cited in Kearney & Plax, 1991) define resistance behaviors as either constructive or destructive. Constructive resistance behaviors contain behaviors not familiar as a concept and having results such as correcting teachers' misbehaviors, making constructive criticism, helping other students to learn. On the other hand, destructive resistance behaviors include more familiar behaviors such as cheating, not attending the class, not fulfilling given duties or distracting the teacher. Generally, many teachers think that resistance behaviors are destructive and prevent resisting students' and the others' learning as well (Seidel & Tanner, 2013, p.587). Another classification regarding resistance behaviors is as active and passive. McLaren (1985, p.87), defines active resistance rituals as students' intentional and conscious behaviors intended to delay or destroy teaching process, rules and norms while indicates passive resistance as behaviors aimed at sabotage dominant school order in an unconscious or hidden way. Within this study, both active and passive resistance behaviors were based on and much more destructive behaviors were handled.

Students' attitudes within teaching-learning process effect many fields such as the effectiveness of teaching, teachers' job satisfaction. Therefore, analyzing the resistance behaviors of students and activities for finding solutions could be vital in terms of not having any troubles within education process, not preventing resisting or not resisting students' learning, teachers' having more constructive attitudes. Besides, the result of students' resistance behaviors could be more dangerous. When the student's resistance behaviors are not detected and not any precautions are taken, this could turn into a violence situation (Başar, 1991, p.148). In order to prevent these behaviors could have very serious results and hinder learning process, revealing these behaviors seems critical.

Student resistance behaviors could be related to different variables effecting teaching process and education itself. However, these behaviors are much more associated with teachers' personal characteristics and behaviors (Zhang, Zhang & Castelluccio, 2011, p.451). In this regard, teachers encounter resistance behaviors very frequently. Seidel and Tanner (2013) emphasized teachers' false behaviors as well in addition to peer interaction, students' own experiences and expectations while explaining the main reasons for student resistance in the university. When the effect of teachers through teaching-learning process was considered, it seems obvious that they could have effects on transformation of students' behaviors into resistance. Similar experiences could be seen with primary and middle school students as well. In this respect, realizing resistance behaviors against teachers and producing strategies for dealing with them could be significant for a healthier education process. Within this context, it was planned to develop a scale to show the frequency of students' resistance behaviors and which are the most frequently displayed. Therefore, the main research questions were: "Which resistance behaviours are the most frequently displayed and how frequently are they displayed?". Based on these questions, a scale development process was conducted.

Method

Research Design

This study is scale development research regarding determining the middle school students' resistance behaviors they exhibit in their schools. Scale development consists of many steps and procedures. Carpenter (2018) put forwards ten steps in scale development; which are: 1. Research the intended meaning and breadth of the theoretical concept, 2. Determine sampling procedure, 3. Examine data quality, 4. Verify the factorability of the data, 5. Conduct common factor analysis, 6. Select factor extraction method, 7. Determine number of factors, 8. Rotate factors, 9. Retain and delete items based on a priori criteria, 10. Present results. Such as Carpenter, DeVellis (2014) puts forward some principles for scale development process. Some of these principles are; putting forward the structure will be measured, preparing an item pool, determining the type of measurement, getting expert opinion, etc..

Within this study, based on these steps, some phases were followed as well. These were;

- Literature review and putting the theoretical background; then forming an item pool
- Expert opinion
- Pilot study
- Application of the scale for exploratory factor analysis
- Exploratory factor analysis and reliability analyses
- Retain and delete items based on a priori criteria
- Application of the scale for confirmatory factor analysis
- Confirmatory factor analysis and reliability analyses
- Retain and delete items based on a priori criteria
- Present results

After exploratory and confirmatory factor analyses, the results were reported in detail below.

Study Group

The target population of the study consisted of 6th, 7th and 8th graders in middle schools in central towns of Adana in 2017-2018 Education Year. Among these schools, state schools with low, middle and high socio-economical level were chosen via stratified cluster sampling method. In the study, there were two samples, one for exploratory factor analysis (EFA) and the other for confirmatory factor analysis (CFA). The detailed information about these processes was presented below.

Group 1: Exploratory factor analysis: The data for exploratory factor analysis was collected in six state schools as two from each socio-economical level (low-middle-high) determined through the processes explained above.

In these schools, the volunteer students in one randomly assigned class at each grade level (6th, 7th and 8th grades) constituted the sample. Then, 558 students participated in the study. The mean age of the students was 13.03 while the standard deviation was 1.03. The demographic information of students was presented on Table 1.

Table 1. Demographic Information about the Participants in Sample I

		F	%
Sex	Female	284	50.9
	Male	274	49.1
Grade	6th Grade	188	33.7
	7th Grade	166	29.7
	8th Grade	204	36.6

N=558, Age average =13.03 (Sd=1.03)

Group 2: Confirmatory factor analysis: Within confirmatory factor analysis, to collect the data six state schools having low, middle and high socio economical level were chosen. In these schools, 524 volunteer students in one randomly assigned class at each grade were the participants of the study. The age average of students (10-15 years) was 12.95. Their personal information was shown on Table 2.

Table 2. Personal Information about the Participants in Sample II

		F	%
Sex	Female	252	48.1
	Male	261	49.8
	No answer	11	2.1
Grade	6th Grade	170	32.4
	7th Grade	208	39.7
	8th Grade	146	27.9

N= 524, Age average = 12.95 (Sd=.96)

Data Collection

At the beginning of development process of SRBS-S the steps to be followed for a scale development were analyzed from sources within literature (Erkuş, 2007; Güngör, 2016; Karakoç & Dönmez, 2014; Şahin & Boztunç-Öztürk, 2018; Tavşancıl, 2014; Tezbaşaran, 1996). Moreover, the literature was analyzed regarding the classifications made for resistance behaviors. In line with these analyses, it was found that resistance behaviors are mostly classified as active and passive or constructive and destructive; under these classifications resistance behaviors against teachers and their authority, hostile behaviors towards them, passive resistance were some types of resistance behaviors (McLaren, 1985; Sever, 2018; Kearney & Plax, 1991; Seidel & Tanner, 2013). Hence, preparing the item pool, these categories were taken into consideration. After definition of student resistance and theoretical explanations were examined, an item pool with 75 items was prepared. For this item pool expert opinion was provided by six instructors in Çukurova University Faculty of Education Educational Sciences Department and two teachers. According to their views, some changes were applied to the statements of some items, eight items were subtracted and four items were added. This pilot form of 71 items was checked for language and expression conducted to a group of middle school students. In line with this pilot study, some items were revised. As a result of all these studies, the last version of the form was applied to 558 students chosen in six middle schools and data was collected. After the exploratory factor analysis conducted on this data a structure of 34 items and 4 factors were obtained. These factors were "Hostile Attitudes Towards Teacher", "Continuous Anger", "Resistance to Teacher Authority" and "Passive Resistance". The reliability values for both subscales and total scale scores were calculated. In order to conduct confirmatory factor analysis, 34-item form was reapplied to 524 students in sample II. Conducting CFA on these data, the structure obtained by EFA was tested.

Data Analysis

Within the validity and reliability studies of SRBS-S, for reliability Cronbach Alpha analysis via SPSS Package Program (17.0), for content validity expert opinions and as for construct validity exploratory and confirmatory factor analyses were used. Moreover, mean and standard deviation values and item-total score correlations of items were examined as well.

Findings

Findings regarding construct validity and reliability of SRBS-S

In this study, concerning the construct validity and reliability of SRBS-S, exploratory and confirmatory factor analyses were conducted and the related findings were presented below.

Results regarding exploratory factor analysis

Before starting factor analysis on data collected from 558 students in sample I, firstly missing and extreme values were examined for preparing the data for analysis. Therefore, for each participant, Mahalanobis distance and z standard scores were analyzed over total scores. As a result of these analyses, 51 participants with very extreme values were decided to be excluded from analyses and factor analysis was conducted on the data from 507 students. At the beginning of this analysis, the Kaiser-Meyer-Olkin (KMO) coefficient and Barlett Sphericity test results were examined in order to examine the suitability of the data for analysis and these values were found to be statistically significant (KMO = 0.90; Barlett Sphericity test $\chi^2 = 5123.305$, $df = 561$, $p < .001$). In addition, skewness and kurtosis values of the items included in the scale were analyzed. Through this analysis, + 1 interval was taken as criterion (Çokluk, Şekercioğlu & Büyüköztürk, 2014, 16). Within the conducted analyses, evaluating the items, item-total score correlations, communalities, factor loads (min .40) and the differences between the loads of items loaded on more than one factor (min. .15) were analyzed and as a result 51 items were required to be removed. These operations were carried out using principal components factor extraction method and orthogonal (varimax) rotation process. The analysis process is presented in detail below.

The first results of factor analysis showed that the scale consisted of 18 factors with eigenvalue above 1.00. Eigenvalue, number of items, the percent of contribution to total variance and scree plot were among the criteria suggested to be used for determining the number of factors (Büyüköztürk, 2002; Çokluk, Şekercioğlu, Büyüköztürk, 2014; Güngör, 2016; Kalaycı, 2009; Stevens, 2009; Tavşancıl, 2014). According to these criteria, when the first analysis results were examined, it was observed that six of the factors showed up consisted of only one item each, items were loaded above .30 on other factors as well within several factors and these loads were very close to each other. When eigenvalues of factors were analyzed, it was seen that eigenvalues of first four factors were above 2.00, the others' were getting closer to 1.00. Evaluating the criterion of contribution to explained variance, it was obvious that first eight factors' contribution was above 2.054, first four factors' contribution was above 3.356; while the rates of explained variance by the rest of factors were seem to get lower significantly. The other criterion taken into consideration through determining the number of factors was analysis of scree plot. According to Büyüköztürk (2002), the point that there are decreases at higher acceleration rate indicates the number of significant factors. The break point of the graphic was between 4. and 5. factors (Figure 1).

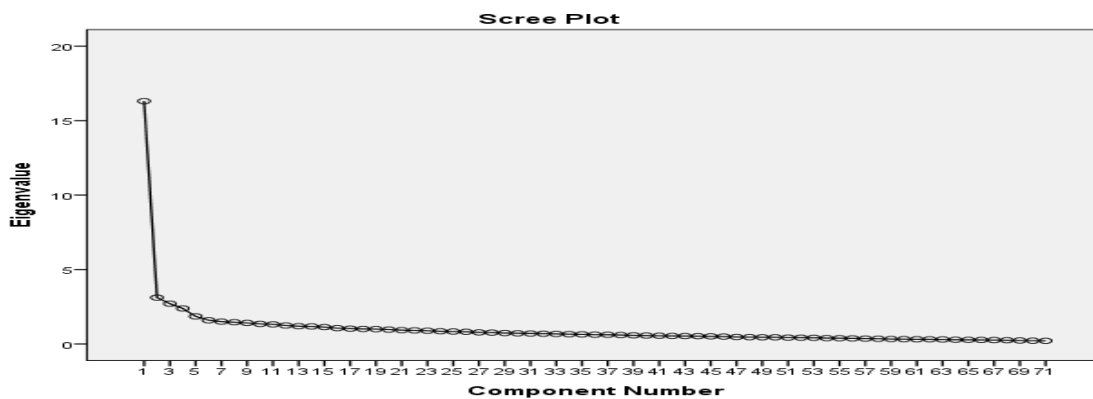


Figure 1. Scree Plot Obtained at the End of First Analysis

Besides all these examinations, considering that the item pool prepared in line with theoretical explanations regarding student resistance behaviors also consisted four different resistance dimensions, it was determined that factor numbers should be four within the rest of analyses. In scree plot, it was seen that the breaking point at the 4th factor was very clear. (Figure 2).

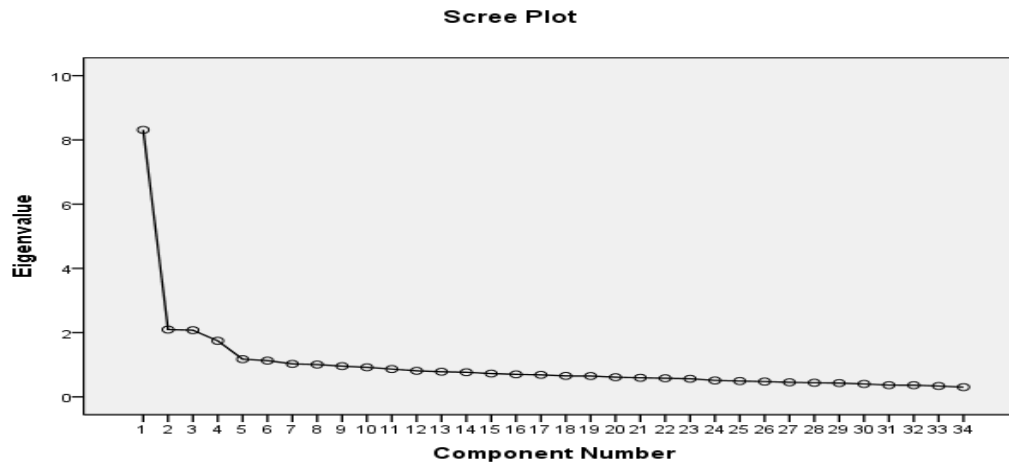


Figure 2. Scree Plot of the Last Analysis

After the factor analyses were completed, the reliability analyses of the scale were also carried out. Factors, factor loads, eigenvalues, explained variance percentages by factors and Cronbach Alpha internal consistency coefficients; item-total score correlations (r), communalities, mean and standard deviation values of items were presented on Table 3.

Table 3. Factors, Factor Loads, Percentages of Explained Variance by Factors, Item-total score correlations (r), Communalities, Mean and Standard Deviation Values of Items in SRBS-S

New Item Number	CFA. No	F1	F2	F3	F4	r^*	$h2^{**}$	\bar{X}	Sd
1	M1	.66				.57	.47	1.42	.81
2	M5	.64				.62	.54	1.67	1.15
3	M9	.62				.52	.43	1.77	1.23
4	M13	.62				.53	.50	1.41	.81
5	M17	.55				.47	.35	1.31	.68
6	M21	.53				.53	.39	1.54	.97
7	M25	.53				.51	.37	1.61	1.00
8	M28	.52			.32	.43	.40	1.35	.74
9	M30	.52	.35			.54	.40	1.74	1.11
10	M32	.50	.35			.50	.38	1.67	1.10
11	M33	.45	.34			.52	.37	1.68	1.08
12	M34	.38				.47	.30	1.47	.88
13	M2		.77			.66	.63	2.62	1.62
14	M6		.73			.64	.60	2.73	1.54
15	M10		.67			.57	.49	2.84	1.54
16	M14		.63			.53	.48	2.02	1.27
17	M18		.63			.55	.46	2.50	1.51
18	M22		.40			.42	.33	1.85	1.14
19	M3			.57		.49	.40	1.62	.973
20	M7	.31		.57		.44	.42	1.53	.89
21	M11			.56		.39	.36	1.52	.86
22	M15	.34		.55		.49	.44	1.66	1.05
23	M19	.34		.54		.46	.43	1.77	1.15
24	M23			.50		.42	.36	1.75	1.07
25	M26			.48	.33	.41	.36	1.57	.96
26	M29			.48		.34	.32	2.63	1.22
27	M31			.43		.31	.27	2.48	1.28
28	M4				.68	.58	.57	1.59	1.05
29	M8				.66	.49	.45	1.52	.90
30	M12				.63	.49	.47	1.68	1.07
31	M16				.59	.35	.41	2.04	1.29
32	M20	.31			.48	.43	.37	1.65	1.01
33	M24				.47	.38	.32	1.78	1.14
34	M27				.42	.33	.25	1.57	.86
Eigenvalue		8.313	2.095	2.076	1.745	Total			
Variance %		24.45	6.16	6.10	5.13	41.85			
Cronbach Alpha		.85	.80	.73	.72	.89			

* r : Item-total score correlations, ** $h2$: Mutual factor variance (communality)

Notes: To follow more easily factor loads under .30 were not shown on the table. F1: Hostile Attitudes Towards Teachers, F2: Continuous Anger, F3: Resistance to Teacher Authority, F4: Passive Resistance

The first factor obtained as a result of exploratory factor analysis was “Hostile Attitudes towards Teachers” dimension consisting of behaviors students feel and consciously exhibit towards their teachers. Some of the items within this factor were as: “I intentionally break the classroom rules, I frequently gibe to some teachers, I incite my classmates against teachers I don’t like.” The number of items in this factor was 12 (Item no: 1-2-3-4-5-6-7-8-9-10-11-12). The factor loads of items ranged between .38-.66; while item-total score correlations were between .43-.62. Cronbach Alpha value for this dimension was .85.

The second factor of SRBS-S included the items reflecting the students’ anger and aggressiveness towards teachers, named as “Continuous Anger”. Through this dimension, six items (Item no: 13-14-15-16-17-18) such as “Teachers’ mistakes make me very angry, I get angry very quickly at school, some teachers annoy me too much”. These items’ factor loads were changing between .40-.77, on the other hand the item-total score correlations were between .42-.66. Cronbach Alpha coefficient was .80 for this dimension.

“Resistance to Teacher Authority” was the third factor of the scale. Some of the nine items (Item no: 19-20-21-22-23-24-25-26-27) in this dimension were as “I try to push some teachers’ limits, I do intentionally not bring my stuff for some courses, I mostly think that I’m right against teachers”. The factor loads ranged between .43 and .57; while item-total score correlations were between .31-.49. Cronbach Alpha value was calculated as .73.

Within the last factor of SRBS-S, seven items (Item no: 28-29-30-31-32-33-34) including students’ behaviors such as not attending the teaching process on purpose, showing a hidden resistance towards teacher. Some of the items in “Passive Resistance” were: “I prefer sitting at desks that teacher could hardly see me, I do not like to attend to lesson even if I am interested in the topic, and I do not like to talk about the topic in the lesson”. The factor loads of items were between .42 and .68. Item-total score correlations ranged between .33-.58 while Cronbach Alpha of this factor was .72.

Four factors of scale explained 41.85 % of total variance. Cronbach Alpha internal consistency coefficient for the whole scale was .89. Mean values for 34 items in the scale ranged between 1.31 and 2.63; standard deviation values were between .68 and 1.62. Items’ factor loads ranged between .38-.77, mostly seem to be loaded under the related factor. However, in the first factor 11th item, within the third factor item 2 and item 32 in the fourth factor loaded on two different factors and there was .10 difference between these loads. Yet, it was considered to keep these items where they were as they were more compatible with the factors they loaded more and they matched with the items semantically. Furthermore, it was also seen that it is accepted in some resources to have at least .10 difference between the loads of items loaded on two different factors (Büyüköztürk, 2005; Tavşancıl, 2014).

Results regarding confirmatory factor analysis

The data for Confirmatory Factor Analysis of scale were collected from 524 students in Sample II. Before conducting factor analysis on collected data, primarily missing values and outliers were examined to prepare the data for analysis. As a consequence of these examinations data from 21 students determined to include outliers were removed from the analyses, then the factor analysis was conducted on 503 students. Through confirmatory factor analysis, the validity of the structure revealed within exploratory factor analysis. The structure with four factors and the fit indexes regarding this structure were presented on Figure 3 and Table 4. It was seen that fit indexes of SRBS-S for 34 items and four dimensions were significant and mostly showed good fit ($\chi^2=1204.87$, $df=495$, $p=.000$, $\chi^2/df=2.43$).

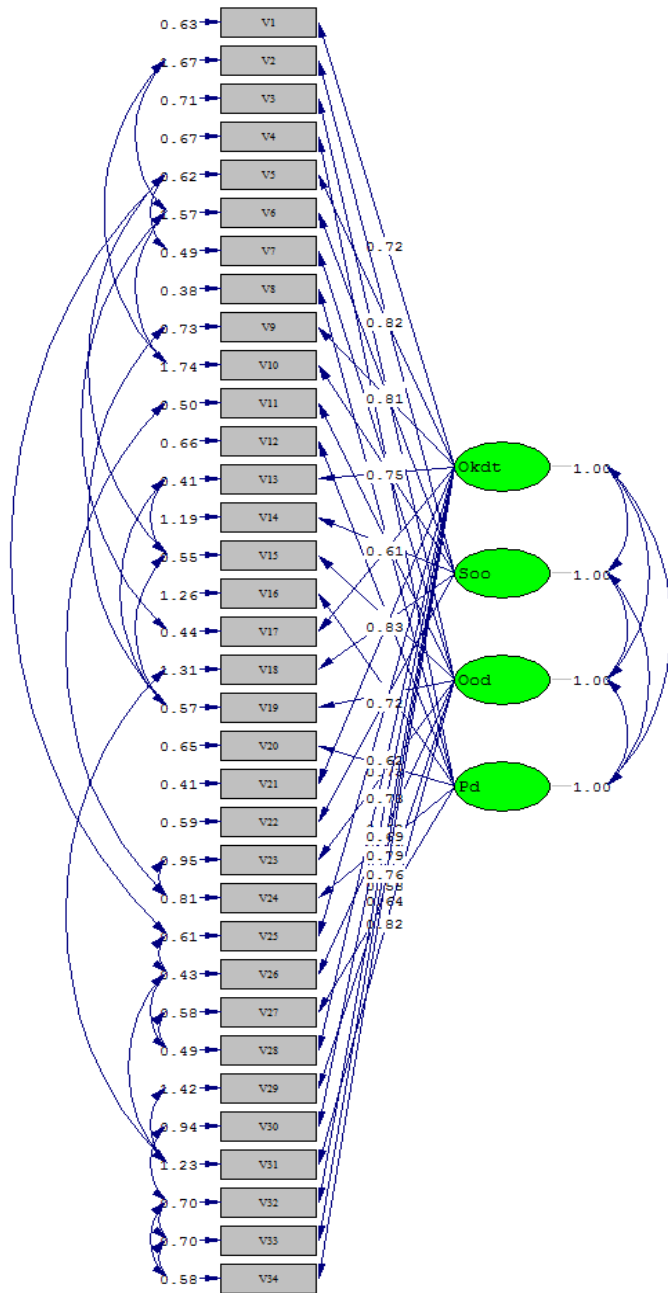


Figure 3. *Confirmatory Factor Analysis Results for Student Resistance Behaviors Scale-S Form*
 Okdt: F1, Söo: F2, Öod: F3, Pd: F4

Table 4. Fit Indexes and Good Fit Values of the Scale

Fit Indexes	Good Fit Values	Acceptable Fit Values	Acquired Values
*X ² /df	0 ≤ X ² /df ≤ 2	2 ≤ X ² /df ≤ 3	2.43
*P value	0.05 ≤ p ≤ 1	0.01 ≤ p ≤ 0.05	.000
*RMSEA (Root Mean Square Error of Approximation)	0 ≤ RMSEA ≤ 0.05	0.05 ≤ RMSEA ≤ 0.08	0.05
*NFI (Normed Fit Index)	0.95 ≤ NFI ≤ 1.00	0.90 ≤ NFI ≤ 0.95	0.97
*NNFI (Non-Normed Fit Index)	0.97 ≤ NNFI ≤ 1.00	0.95 ≤ NNFI ≤ 0.97	0.98
*SRMR (Standardized Root Mean Square Residual)	0 ≤ SRMR ≤ 0.05	0.05 ≤ SRMR ≤ 0.10	0.05
*GFI (Goodness of Fit Index)	0.95 ≤ GFI ≤ 1.00	0.90 ≤ GFI ≤ 0.95	0.88
*AGFI (Adjusted Goodness of Fit Index)	0.90 ≤ AGFI ≤ 1.00	0.85 ≤ AGFI ≤ 0.90	0.85
*CFI (Comparative Fit Index)	0.97 ≤ CFI ≤ 1.00	0.95 ≤ CFI ≤ 0.97	0.99
*RFI (Relative Fit Index)	0.90 ≤ RFI ≤ 1.00	0.85 ≤ RFI ≤ 0.90	0.97
**IFI (Incremental Fit Index)	0.90 ≤ IFI ≤ 1.00	0.80 ≤ IFI ≤ 0.90	0.99
**RMR (Root Mean Square Residual)	0 ≤ RMR ≤ 0.05	0.05 ≤ RMR ≤ 0.08	0.078

*Schermelleh-Engel-Moosbrugger, 2003 (cited in Özabacı, 2011); **Nayır, 2013

As seen on Figure 3 and Table 4, the fit indexes regarding confirmatory factor analysis were significant. When the fit values obtained for the scale were compared to standard values, X²/df, RMSEA, SRMR, RMR, GFI and AGFI values had acceptable fit values whereas NFI, NNFI, CFI, RFI and IFI were the ones showed good fit.

Regarding the last structure acquired by confirmatory factor analysis, reliability analysis was carried out again. According to these analyses, Cronbach Alpha internal consistency coefficient were calculated; for Hostile Attitudes Towards Teacher dimension .90, for Continuous Anger .78, for Resistance to Teacher Authority .84 and for Passive Resistance .81. Cronbach Alpha value for the whole scale was .94. Looking at these values, it was observed that internal consistency coefficients were high for both sub-scales and the whole scale.

The correlation matrix belongs to Student Resistance Behaviors Scale-S Form (SRBS-S) total scores and subscales and mean, and standard deviation values were shown on Table 5.

Table 5. Correlation matrix, Mean and Standard Deviation Values belong to Student Resistance Behaviors Scale-S Form (SRBS-S) Total Scores and Subscales

	1	2	3	4	X	Sd
1. Hostile Attitudes Towards Teacher	-				1.81	.53
2. Continuous Anger	.64**	-			2.13	.70
3. Resistance to Teacher Authority	.71**	.64**	-		1.64	.56
4. Passive Resistance	.68**	.64**	.62**	-	1.91	.64
5. SRBS-S Total Scores	.90**	.82**	.86**	.84**	1.84	.51

N= 507, **p<0.01

It is seen on Table, four subscales of SRBS-S showed significant correlations with each other and total scores (p<0.01). Hostile Attitudes Towards Teacher dimension had significant correlations with the other dimensions

respectively .64, .71, .68 and total scores .90. Continuous Anger dimension's significant correlation values with the other dimensions were .64, .64 and total scores .82; while Resistance to Teacher Authority had significant correlations with Passive Resistance dimension as .62 and total scores as .86. Passive Resistance subscale showed significant correlations with total scores at the value of .84. Mean values for the subscales ranged between 1.64 and 2.13 whereas standard deviation values were between .51 and .70.

Answering and scoring Student Resistance Behaviors Scale-Student form

SRBS-S as a tool could be used to determine the existence and frequency of resistance behaviors primary and middle school students exhibit is a 5 point Likert scale (1. Strongly Disagree, 2. Disagree, 3. Don't Know, 4. Agree, 5. Strongly Agree). There are 34 items in the scale. Through these items, the resistance behaviors of students were stated and they were asked to mention whether they agree with them or not. As all the items consisted of negative statements, there is no need to make any transformations. High scores on the scale imply that students frequently exhibit resistance behaviors. The highest score could be got from the scale is 170 points while the lowest score is 34. When the scoring is done for subscales, for the first subscale "Hostile Attitudes Towards Teacher" with 12 items from 12 to 60 points, for "Continuous Anger" subscale with 6 items between 6-30 points, for "Resistance to Teacher Authority" with 9 items from 9 to 45 and for "Passive Resistance" subscale with 7 items from 7 to 35 points were the scores could be got. In order to interpret the scores, each subscale score should be divided by item numbers to transform 1-5 scale. The interpretation about the scale mean values is as 1.00-1.80 "very low resistance"; 1.80-2.60 "low resistance"; 2.60-3.40 'medium'; 3.40-4.20 'high'; 4.20-5.00 'very high'.

Discussion and Conclusion

As a result of exploratory and confirmatory factor analyses regarding SRBS-S developed within this research, a structure of four factors which are "Hostile Attitudes towards Teachers", "Continuous Anger", "Resistance to Teacher Authority", "Passive Resistance" was obtained. The resistance behaviors mentioned within 34 items in the subscales are compatible with the behavior types could mostly be destructive and shown actively or passively throughout the teaching process as also explained in the literature (McLaren, 1985; Sever, 2018; Kearney & Plax, 1991; Seidel & Tanner, 2013). Therefore, it could be asserted that the items within four subscales also compose a comprehensive structure regarding resistance behaviors.

The values obtained by the reliability and validity studies of the scale are seen as complying with the accepted values within literature. Firstly, sample size for exploratory and confirmatory factor analyses was matching the suggestions through literature (Tabachnick & Fidell, 2001; Gorsuch, 1997; Büyüköztürk, 2002). The factor loads within exploratory factor analysis were between .38-.77. However, apart from several items factor loads were mostly around .45 and above. Büyüköztürk (2002) indicated that factor loads between .30 and .59 are at medium level and values could be accepted for a scale, and values as .60 and above could be accepted as high. Also within SRBS-S scale, items' factor loads seem to be medium and high values. Besides, explained variance value for the whole scale was found as 41.85 %. For the analyses in social sciences, 40% and above is stated as acceptable values (Scherer, Wiebe, Luther & Adams, 1988; Çokluk, Şekercioğlu & Büyüköztürk, 2014). The correlations between the factors of scale and the factors and total scores were calculated as well. It was observed that the factors (subscales) had a lower significant correlation (at medium level) with each other, while they had a high significant correlation with total scores.

As for reliability of the scale, Cronbach Alpha internal consistency coefficients were calculated. These coefficients were calculated after both exploratory and confirmatory factor analyses. While after exploratory factor analyses these values were .85, .80, .73, .72 for subscales and .89 for the scale, the values calculated after the confirmatory factor analyses were .90, .78, .84, .81 for subscales and .94 for the whole scale. These reliability values are seen as parallel to the accepted values within the literature (Çokluk, Şekercioğlu & Büyüköztürk, 2014; Nunnally & Bernstein, 1994; Pallant, 2001; Downing, 2004).

The structure of four factors obtained by exploratory factor analysis was tested by conducting confirmatory analysis. Primarily, Chi-Square goodness of fit value (X^2/Sd) was 2.43. This value is interpreted as good fit in many sources within the field (Çokluk, Şekercioğlu & Büyüköztürk, 2014; Barrett, 2007). The other fit indexes (GFI, AGFI, CFI, NFI, NNFI, RMSEA, etc.) also match the accepted values through literature (Schermelleh-Engel-Moosbrugger, 2003, cited in Özabacı, 2011; Nayır, 2013; Hooper, Coughlan & Mullen, 2008; Barrett, 2007; Jöreskog & Sörbom, 1993; Sümer, 2000; Tabachnick & Fidell, 2001; Harrington, 2009).

When exploratory and confirmatory factor analyses were examined together, it is seen that all the values are compatible with the literature and the scale structure obtained point out a valid and reliable scale. In this respect, SRBS-S could be used in studies would be conducted to put forward students' resistance behaviors. Moreover, it could be used as a tool in other studies dealing with different variables with resistance behaviors. Revealing the students' resistance behaviors deeply influencing student learning forms the basis for the studies related to preventing or decreasing the resistance behaviors. With respect to this, this scale is considered to be vital in terms of determining the frequency and level of students' resistance behaviors.

Acknowledgments

This study was supported by project numbered "SBA-2018-10009" within Scientific Research Projects Department of Çukurova University. This paper was presented at VI. International Multidisciplinary Congress of Eurasia, Roma, Italy (2018, September).

References

- Abowitz, K. K. (2000) A pragmatist revisioning of resistance theory. *American Educational Research Journal*, 37 (4), 877-907 .
- Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences*, 42(5), 815-824.
- Başar, H. (1991). Sınıf yönetimi (3.bs.) [Classroom management]. Ankara: Pegem Yayıncılık.
- Büyüköztürk, Ş. (2002). Faktör analizi: Temel kavramlar ve ölçek geliştirmede kullanımı [Factor analysis: Basic concepts and their usage within scale development]. *Kuram ve Uygulamada Eğitim Yönetimi*. 32. 470-483
- Büyüköztürk, Ş. (2005). Sosyal bilimler için veri analizi el kitabı (2 bs.) [Data analysis handbook for social sciences]. Ankara: PegemA Yayıncılık
- Carpenter, S. (2018). Ten Steps in Scale Development and Reporting: A Guide for Researchers. *Communication Methods and Measures*, 12 (1), 25-44. DOI:10.1080/19312458.2017.1396583
- Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2014). Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları [Multivariate statistics for social sciences: SPSS and LISREL applications]. Ankara: Pegem Akademi.
- DeVellis, R. (2014). Ölçek Geliştirme: Kuram ve Uygulamalar [Scale Development: Theory and Applications] (Çev. T. Totan). Ankara: Nobel Akademik Yayıncılık.
- Downing, S. M. (2004). Reliability: on the reproducibility of assessment data. *Medical education*, 38(9), 1006-1012.
- Erickson, F. (1984). School literacy, reasoning and civility: an anthropologist's perspective. *Review of Educational Research*, 54, 542- 546.
- Erkuş, A. (2007). Ölçek geliştirme ve uyarlama çalışmalarında karşılaşılan sorunlar [The problems encountered in scale development and adaptation studies]. *Türk Psikoloji Bülteni*, 13 (40), 17-25.
- Gorsuch, R. L. (1997) Exploratory Factor Analysis: Its Role in Item Analysis. *Journal of Personality Assessment*, 68 (3), 532-560, DOI: 10.1207/s15327752jpa6803_5
- Güngör, D. (2016). Psikolojide ölçme araçlarının geliştirilmesi ve uyarlanması kılavuzu [Guide for developing and adapting measuring instruments in psychology] . *Türk Psikoloji Yazıları*, 19 (38), 104-112.
- Harrington, D. (2009). Confirmatory factor analysis. New York: Oxford University Press, Inc.
- Hendrickson, K., A. (2012). Student resistance to schooling: Disconnections with education in rural appalachia. *The High School Journal*, 95 (4), 37-49.
- Hooper, D., Coughlan, J., Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6(1), 53-60.
- Jöreskog, K. G., & Sörbom, D. (1993). LISREL 8: Structural equation modeling with the SIMPLIS command language. Scientific Software International.
- Kalaycı, Ş. (Ed.). (2009). SPSS uygulamalı çok değişkenli istatistik teknikleri(4.bs.) [SPSS applied multivariate statistical technics]. Ankara: Asil Yayın dağıtım.
- Karakoç, F. Y. & Dönmez, L. (2014). Ölçek geliştirme çalışmalarında temel ilkeler [Basic principles of scale development]. *Tıp Eğitimi Dünyası*, 40, 39-49.
- Kearney, P. & Plax, T., G. (1991). Student resistance to control. In V. P. Richmond & J. C Mc Croskey (Eds.), *Power in the Classroom* (pp.85-100). Routledge:New York.
- McLaren, P. (1985). The ritual dimensions of resistance: Clowning and symbolic inversion. *The Journal of Education*, 167 (2), 84-97.

- Nayır, F. (2013). “Algılanan Örgütsel Destek Ölçeğinin” kısa form geçerlik güvenirlik çalışması [Perceived Organizational Support Scale- short form validity-reliability study] . Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 28, 89-106.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.
- Pallant, J. (2001). *SPSS survival manuel: A step by step guide to data analysis using SPSS for Windows (Version 10)*. NSW, Australia: Allen & Unwin.
- Özabacı, N. (2011). İlişki Niteliği Ölçeği'nin türkçe uyarlaması: geçerlik ve güvenirlik çalışması [Turkish adaption of The Relationship Quality Scale]. *Eğitim ve Bilim*, 36 (162), 159-167.
- Sarı, M. (2018). Development of a Teacher Scale to Measure Presence and Frequency of Students' Resistance Behaviors. *Universal Journal of Educational Research*, 6(2), 226-234.
- Scherer, R. F., Wiebe, F. A., Luther, D. C., & Adams, J. S. (1988). Dimensionality of coping: Factor stability using the ways of coping questionnaire. *Psychological Reports*, 62(3), 763-770.
- Seidel, S. B. & Tanner, K. D. (2013). “What if students revolt?”—Considering Student Resistance: Origins, Options, and Opportunities for Investigation. *CBE—Life Sciences Education*, 12, 586–595.
- Sever, D. (2018). University Students' Resistance Behaviors: Sample of Anadolu University. *Turkish Online Journal of Qualitative Inquiry*, 9(2).
- Stevens, J. P. (2009). *Applied Multivariate Statistics for the Social Sciences* (5th ed.). New York: Routledge, Taylor & Francis Group
- Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar [Structural equation modeling: Basic concepts and applications]. *Türk Psikoloji Yazıları*. 3 (6). 49-74.
- Şahin, M. G., & Boztunç-Öztürk, N. (2018). Eğitim alanında ölçek geliştirme süreci: Bir içerik analizi çalışması [Scale development process in educational field: A content analysis research]. *Kastamonu Üniversitesi Kastamonu Eğitim Dergisi*, 26 (1), 191-199.
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics*. Allyn & Bacon A Pearson Education Company: Boston.
- Tavşancıl, E. (2014). Tutumların ölçülmesi ve SPSS ile veri analizi [Measurement of attitudes and data analysis with SPSS]. Ankara, Turkey: Nobel.
- Tezbaşaran, A.A. (1996). Likert tipi ölçek geliştirme kılavuzu [Guide for Likert scale development]. Ankara, Türk Psikoloji Derneği Yayınları
- Yüksel, S. (2004). Eğitim fakültesi öğrencilerinin öğretme-öğrenme süreçlerine yönelik direnç davranışları [Resistance behaviors of educational faculty students regarding teaching-learning processes]. *Türk Eğitim Bilimleri Dergisi*, 2 (3), 341-354. Retrieved from <http://dergipark.gov.tr/tebd/issue/26127/275217>
- Zhang, Q., Zhang, J. & Castelluccio, A-A. (2011). A Cross-Cultural Investigation of Student Resistance in College Classrooms: The Effects of Teacher Misbehaviors and Credibility, *Communication Quarterly*, 59 (4), 450-464, DOI: 10.1080/01463373.2011.597287



Student Responses to Written Corrective Feedback on Multiple Draft Essays in an EFL Context

Vasfiye GEÇKİN*^a

Article Info

DOI: 10.14686/buefad.685527

Article History:

Received: 06.02.2020

Accepted: 02.07.2020

Published: 05.10.2020

Keywords:

EFL,

Multiple drafts,

Student reactions,

Written corrective feedback.

Article Type: Research Article

Abstract

This study discusses tertiary level student beliefs and reactions to written corrective feedback to multiple draft essays in an EFL setting where the students were in a process-based writing program for two semesters. As the study design, a structured survey approach was adopted. The variable tested was the effect of foreign language proficiency on student beliefs and reactions. Through convenience sampling, a total of 208 students from four different levels of foreign language proficiency took part in the study. The results showed that all proficiency groups believed in the necessity of written corrective feedback to their multiple draft essays. Yet, higher proficiency groups read more and paid a lot more attention to the teacher feedback when compared to the lower proficiency groups and all the groups asked for more written corrective feedback on grammar, lexis and structure. Lower level proficiency groups paid more attention to preliminary draft corrections. All the groups preferred to be given oral metalinguistic explanations on their multiple drafts to indirect feedback tiered through symbols. The advanced group rated their essay writing skills in a second language as *good* and the other groups rated themselves as adequate. The study offers implications for tertiary level academic writing instructors.

Yabancı Dil Olarak İngilizce Öğretilen Ortamda Çok Taslaklı Kompozisyonlara Verilen Yazılı Düzeltici Geribildirim Öğrenci Tepkileri

Makale Bilgisi

DOI: 10.14686/buefad.685527

Makale Geçmişi:

Geliş: 06.02.2020

Kabul: 02.07.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Yabancı dil olarak İngilizce,

Çoklu taslak,

Öğrenci reaksiyonu,

Yazılı düzeltici geribildirim.

Makale Türü: Araştırma

Makalesi

Öz

Bu çalışma, yabancı dil olarak İngilizce öğretilen bir ortamda hazırlık okulu öğrencilerinin çoklu taslak içeren kompozisyonlarına aldıkları yazılı düzeltici geribildirimine dair inanışlarını ve reaksiyonlarını tartışmaktadır. Test edilen değişken öğrencilerin yabancı dil yeterlilik düzeylerinin inanışlarına ve reaksiyonlarına etkisidir. Çalışma deseni olarak yapılandırılmış anket yaklaşımı kullanılmıştır. Seçkisiz örneklem yöntemiyle dört farklı dil seviyesinden toplamda 208 öğrenci çalışmada yer almıştır. Sonuçlar, tüm seviye gruplarındaki öğrencilerin yazılı düzeltici geribildirim gerekliliğine inandıkları yönündedir. Fakat ileri seviye grupları, daha düşük düzey dil gruplarına göre, öğretmen dönütlerine daha çok dikkat etmektedirler. Tüm gruplar dilbilgisi, kelime bilgisi ve de yapısal dönüte daha fazla değer verdiklerini belirtmişlerdir. Alt düzey dil grupları ilk müsveddelerdeki düzeltmelere daha çok dikkat etmektedirler. Tüm gruplar, çoklu taslaklarına sözel üstdilsel açıklamaları içeren direkt dönütü, sembol kullanılarak verilen dolaylı dönüte yeğlemişlerdir. İleri seviye grupları ikinci dilde kompozisyon yazma yeterliliklerini *iyi* olarak değerlendirirken, diğer gruplar kendilerini yeterli olarak değerlendirmişlerdir. Bu çalışma akademik yazma dersi veren hazırlık okulu öğretmenlerine öneriler sunmaktadır.

*Corresponding Author: vgeckin@gmail.com

^a Asst. Prof. Dr., Izmir Democracy University, Izmir/Turkey, <http://orcid.org/0000-0001-8532-8627>

Introduction

Most college instructors dedicate hours to giving feedback on any piece of student writing including essays written in a second language (L2). Yet, instructors and students express disagreement as to the form, amount and attention given to written corrective feedback (WCF) (Diab, 2005). For instance, although 45% of the teachers believe that every student mistake needs to be corrected, more than 90% of the students believe that every mistake they make requires correction (Amrhein & Nassaji, 2010). Students strongly believe that having good knowledge of grammar is an essential component of academic writing skills (Balanga et al., 2016) and favor feedback on grammar use, structure and content the most (Irvin, 2017). Instructors do their best to give WCF on every draft the student sketches; however, students are reported to pay more attention to the feedback given to their preliminary drafts rather than the subsequent ones (Ferris, 1995).

In order to improve learner uptake in L2 writing, some instructors favor direct feedback, by correcting and rewriting the erroneous parts regardless of whether the student has problems with grammar, content or organization. Others give indirect feedback by following the symbols and codes dictated by the head of the academic unit. Some writing instructors may refrain from giving indirect forms of WCF especially to low level proficiency groups who may have problems understanding what correction is required and how it is made (Ferris, 2004; 2011). Although the contribution of direct feedback is reported to be restricted to the improvement of certain grammatical structures that low proficiency groups struggle to master (Sheen 2007), it is known to reduce confusion in comprehending and resolving the error codes, especially in cases of complex errors (Bitchener & Knoch, 2010; Van Beuningen et al., 2008). Still, direct feedback helps to quickly recognize and overcome errors in L2 writing (Chandler, 2003).

Previous research on the role of foreign language proficiency on student beliefs and preferences about WCF in L2 is far from being conclusive. The level of learners' foreign language proficiency is suggested to determine the kind of feedback instructors use (e.g., Park, 2011; 2013; Van Beuningen, 2010). After a pre-test-post-test comparison, Eslami (2014) states that lower level proficiency groups benefit more from indirect feedback. Learners from different levels of proficiency agree on the benefit of direct feedback (Nemati et al., 2017). More specifically, direct feedback is proven to improve L2 writing skills of the advanced groups (Göksoy & Nazlı, 2017; Salimi & Ahmadpour, 2015) as well as the learners with lower levels of proficiency (Ferris & Hedgcock, 2013). In the long run, direct feedback is said to help learners grasp the knowledge of grammar and lexis (Hyland & Hyland, 2006). On the other hand, it has been found that the level of proficiency does not play a role in the effectiveness of direct or indirect feedback (Budianto et al., 2017). Similarly, the use of indirect feedback in the form of codes or just underlining the erroneous parts is reported to make no significant difference in improving accuracy in L2 writing in the sense that both feedback forms work equally well (Ferris & Roberts, 2001; Robb et al., 1986). However, indirect feedback such as underlining grammatical errors and scaffolding students on those can result in improved accuracy (Amirghassemi et al., 2013; Rahimi & Asadi, 2014) which may not last over time including the next writing assignment (Rouhiand & Samiei, 2010). To wrap up, a certain bias in the design of the studies regarding student WCF preferences has led researchers to test the effectiveness of direct feedback on lower level proficiency groups (Bitchener & Knoch, 2008; 2009) and the effectiveness of indirect feedback on students with higher levels of language proficiency (Bitchener et al., 2005; Bitchener & Knoch, 2010). That is why, the finding that less proficient language learners benefit from direct feedback whereas higher proficiency learners benefit from indirect feedback is quite common (e.g., Park et al., 2016).

In addition to the contradictory findings in the effectiveness of direct and indirect feedback, researchers in the field do not seem to have reached a consensus on the most effective feedback providing agent. First, it has been found that teacher feedback helps reduce errors of grammar and improve the writing quality (Purnawarman, 2011). Second, self-correction of errors after receiving indirect feedback is believed to improve student accuracy (Ferris & Hedgcock, 2005). Third, feedback from trained peers is highly valued since it is reported to improve student revisions and the quality of the L2 writing (Berg, 1999; Eksi, 2012; Harmer, 2004). Students acknowledge the advantages rather than the disadvantages of peer correction (Van Zundert et al., 2010; Yüce & Aksu-Ataç, 2019). Especially high proficiency groups are better able to self-correct their mistakes pointed out through indirect forms of feedback (Park et al., 2016). Despite the trust in trained peer feedback, most students still prefer to incorporate more of the teacher feedback than feedback from peers in their written drafts (Miao et al., 2006).

In the midst of this unsettled discussion on student beliefs and preferences in L2 writing, let aside the role language proficiency plays, the main aim of this study is to explore the role of foreign language proficiency in student beliefs and reactions to the WCF on their multiple draft essays. Despite abundant research findings in the field, the role of foreign language proficiency on student beliefs and reactions remains inconclusive and there is certainly a need to explore the phenomenon with a focus on varying levels of foreign language proficiency to offer implications for tertiary level academic writing instructors. The specific research questions addressed are:

- (i) Does foreign language proficiency determine
 - a. student preference to have their each and every mistake corrected?
 - b. the preference and comprehension of the language of WCF?
 - c. how much of the returned essays from the instructors is read?
 - d. student beliefs about instructor comments and corrections on multiple draft essays?
 - e. how much attention is paid to WCF on multiple draft essays?
 - f. the kind of WCF students benefit from?
 - g. student beliefs about the content of WCF?
 - h. the preferred feedback providing agent?
 - i. students' self- evaluation of proficiency in (non) academic writing skills in L2 English?

The outline of the study is as follows: First, the methodology of the study is presented, next the results pertaining to each research question are reported and finally the paper is concluded with a discussion of the main findings in the light of the recent literature.

Method

Research Design

The design adopted for this study is a structured survey approach, a purely quantitative one. The aim was to discover what learners thought on the basis of the quantity of responses.

Population and Sample

The participants were recruited through convenience sampling and participation to the study was on voluntary basis. A total of 208 students studying at Boğaziçi University School of Foreign Languages in Turkey were recruited for the study in the 2019 spring semester. As a result of the nationwide university placement test, these students were placed in the faculty of business and administrative sciences (n=29), the faculty of arts and sciences (n= 63), the faculty of engineering (n=44), the faculty of education (n=57) and the faculty of applied disciplines (n=15). An equal number of students from four different proficiency levels responded to the given questionnaire. The beginner group (half males, half females) was the oldest with a mean age of 19.12 (SD=.758), followed by the pre-intermediate, intermediate and the advanced students (see Table 1). The mean age the beginner group reported to be fluent in writing in the L2 was 10.92 (SD=2.094). The reported mean age of fluency in L2 writing for the pre-intermediate (20 females, 32 males) and the intermediate group (21 females, 31 males) was the same. The advanced group (27 females, 25 males) had a mean age of 18.85 (SD=.724) and the mean age they reported to have developed fluency in writing in English as an L2 was 11 (SD=2.990).

Table 1. Demographics of the Participants

Proficiency Level	n	Sex		Age			Fluency in L2 writing		
		female	male	\bar{X}	SD	Range	\bar{X}	SD	Range
Beginner	52	26	26	19.12	.758	18-21	10.92	2.094	7-18
Pre-intermediate	52	20	32	18.98	1.146	18-25	10.29	1.840	6-16
Intermediate	52	21	31	18.85	.849	18-22	10.29	1.840	6-16
Advanced	52	27	25	18.85	.724	18-20	11	2.990	6-18
Total	208	94	114	18.95	.886		10.63	2.251	

ANOVA analyses revealed that these groups were not statistically different in terms of their chronological age ($F(3) = 1.10, p = .35$), or their reported age for fluency in L2 writing ($F(3) = 1.57, p = .20$). The participants took the survey at the end of the second semester after completing an intensive program offering instruction in academic listening, reading, writing and speaking skills in L2 English. As a part of the program, every student was required to keep a portfolio demonstrating showcase of their development in L2 writing. The components of the showcase portfolio included certain writing tasks ranging from expository and descriptive writing to writing argumentative essays and research proposals. In order to prove proficiency in L2 writing and start their undergraduate courses at this English-medium university, the students have to receive a score of 60 from the writing component of the institutional language proficiency test (BUEPT), a score of 22 out of 30 from the TOEFL (IBT) writing part or a score of 6.5 from the writing part of IELTS (academic).

Data Collection Tools

The participants were given a language background questionnaire which was followed by a student reactions and beliefs survey on WCF to multiple draft essays. The instrument was adapted from Ferris (1995) and Lee (2008). The responses to the survey were presented on a five-point Likert scale where 1 meant *never, none of it or poor* and 5 meant *always, all of it or excellent*. The survey questions were in line with the addressed research questions. The validity of the survey was established through 3 expert opinions and the results supported a good internal consistency of the overall scale scores ($\alpha = .88$).

The survey initially asked students to rate whether every mistake they made deserved correction, and whether they preferred feedback in English and how much of it they comprehended. Next, it dealt with student beliefs, attention and reactions to the WCF given to multiple draft essays. It specifically investigated how much of the instructor feedback, which included grammar use (i.e. tense, preposition), structure (i.e. sentence fragments, coherence, organization), content (i.e. feedback relating to support, details and ideas), lexis (i.e. incorrect word choice and collocations) and general comments (i.e. words of praise and encouragement) the students read and paid attention to.

The form of the WCF given to the essays was also explored. It ranged from direct to indirect feedback. Direct feedback was comprised of direct written correction of the mistakes and oral conversations between the student and the teacher. The teacher-student oral metalinguistic feedback exchange was included in the survey since this one-on-one feedback form was a commonly practiced form of feedback employed by both the writing centre and writing class instructors across proficiency groups in this preparatory school. Indirect feedback, on the other hand, constituted of feedback given through underlining (e.g. It believen that...), using codes (e.g. It is believen^{SP} that...), symbols (e.g. It is believen* that...) and categories (e.g. It is believen that... [V]). In this system of indirect feedback, the symbol * signalled that there was a problem with the fragment, [V] indicated that the problem had to do with the category VERB and the code SP showed that the spelling of the word had to be revised.

The survey also dealt with how beneficial students viewed the content of the feedback. They were asked to rate the benefit they derived from instructor corrections, comments and grading and a combination of these three. The students were then asked to rate what WCF providing agent they trusted the most; namely, the classroom instructors, peers, writing centre instructors and students themselves. Finally, they were asked to evaluate their general and academic writing skills in L2 English.

Data Collection

Necessary ethics clearance was obtained from Boğaziçi University Institutional Review Board for Research with Human Subjects (no: 2019/15). Data collection took place in the 15th week of the second semester after the students of all proficiency levels had been exposed to a process-based writing approach for two academic terms. Data collection took place during the class hour with the help of the instructors who were given a training on data collection. Participation to the study was on voluntary basis. It took around 15 minutes for each participant to respond to the survey.

Data Analysis

Both descriptive and referential statistics were reported. A series of one-way analyses was conducted for each item on the survey and post hoc Bonferroni adjustments were made to explore within and between group differences by using SPSS version 25 to analyse reactions to and beliefs about WCF on multiple draft essays.

Limitations

This study comes with some limitations. A larger sample of students across different public and private universities could be recruited. Instructor responses and reactions about WCF to multiple draft essays can also be added in further work. Undergraduate students taking critical reading and academic writing courses could be included for future studies for a fair comparison. Data from (semi-) structured interviews and think-aloud protocols can be integrated in future studies, too.

Findings

Descriptive and referential statistics on beliefs regarding each research question were reported separately.

I want my teacher to correct every mistake I make in my essays

As given in Table 2, students across proficiency groups believed in the necessity of feedback and they reported the need to receive WCF to every mistake they could make most of the time.

Table 2. Descriptive Statistics for Frequency of WCF

Proficiency Level	n	\bar{X}	SD	Level*
Beginner	52	3.90	.934	4
Pre-intermediate	52	4.06	1.074	4
Intermediate	52	3.81	1.205	4
Advanced	52	3.85	1.109	4
Total	208	3.90	1.081	4

*5= *always*, 4= *usually*, 3= *sometimes*, 2= *occasionally*, 1= *never*

Although the pre-intermediate group craved for WCF, the difference between groups was not statistically significant ($F(3.204) = .534, p = .660$).

Language of Feedback

Not surprisingly, students with higher levels of foreign language proficiency preferred to be given WCF in English at a higher rate than students with lower proficiency levels (see Table 3). That is, the intermediate and the advanced groups always wanted to be given WCF in English and the beginner and the pre-intermediate group thought WCF could usually be given in English.

Table 3. Descriptive Statistics for Student Comprehension and Preference for Feedback in L2

Proficiency Level	n	Preference			Comprehension		
		\bar{X}	SD	Level	\bar{X}	SD	Level*
Beginner	52	4.12	.900	4	2.60	.685	3
Pre-intermediate	52	4.27	.819	4	3.23	.528	3
Intermediate	52	4.65	.556	5	3.73	.505	4
Advanced	52	4.65	.683	5	3.73	.269	4
Total	208	4.42	.783	4	3.32	.611	3

*5= *always*, 4= *usually*, 3= *sometimes*, 2= *occasionally*, 1= *never*

The comprehension of WCF given in English was also subject to language proficiency. To investigate the differences within and between groups, ANOVA analyses were conducted as summarized in Table 4.

Table 4. ANOVA Results for the Student Comprehension and Preference for Feedback in L2

	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Preference	Between groups	11.692	3	3.897	6.909	.000***	Beginner<intermediate
	Within groups	115.077	204	.564			
	Total	126.769	207				
Comprehension	Between groups	22.362	3	7.454	27.733	.000***	Beginner<intermediate
	Within groups	54.827	204	.269			
	Total	77.188	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

As the table above indicated, the advanced and the intermediate groups preferred feedback in English more often than the beginner group ($p = .002$) and the students with higher proficiency levels comprehended feedback in English much better than the beginner group ($p < .001$).

How much of each essay do you read over when your instructor returns it to you?

The responses given to this question ranged from *all of it* to *none of it*. As shown in Table 5, all the proficiency groups read most of the feedback given to their first drafts. As for the final drafts, low level proficiency groups stated that they read only some of the feedback given to their final drafts, whereas high level proficiency groups treated the final drafts more attentively.

Table 5. Descriptive Statistics for Student Attention given to WCF in Multiple Drafts

Proficiency Level	Preliminary drafts			Level	Final draft		Level*
	n	\bar{X}	SD		\bar{X}	SD	
Beginner	52	3.46	1.23	4	2.60	1.28	3
Pre-intermediate	52	3.92	1.25	4	3.23	1.35	3
Intermediate	52	4.29	.96	4	3.73	1.31	4
Advanced	52	4.31	1.05	4	3.73	1.34	4
Total	208	4.00	1.17	4	3.32	1.39	3

*5= *all of it*, 4= *most of it*, 3= *some of it*, 2= *a little of it*, 1= *none of it*

Table 6 presented differences in student attention paid to WCF between groups. The beginner group differed significantly from the intermediate and advanced groups in that they paid less attention to the WCF they received to their preliminary drafts ($p = .001$). No meaningful difference existed as to how learners across groups treated their final drafts.

Table 6. ANOVA Results for the Student Attention given to WCF in Multiple Drafts by Level of Proficiency

	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Preliminary drafts	Between groups	24.630	3	8.210	6.433	.000***	Beginner<intermediate Beginner<advanced
	Within groups	260.365	204	1.276			
	Total	284.995	207				
Final drafts	Between groups	45.207	3	.135	.234	.872	
	Within groups	358.212	204	.574			
	Total	403.418	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

Student beliefs on instructor comments and corrections on essays

Table 7 summarized what the students believed WCF from instructors should include. Students of all levels demanded detailed feedback across categories especially to their earlier drafts. The advanced and the intermediate groups asked for grammar correction even in their final drafts. The pre-intermediate group believed that their time and effort dedicated to the preliminary drafts needed to be appreciated more than the other groups.

Table 7. Descriptive Statistics for Student Beliefs on WCF to Multiple Drafts

		Preliminary drafts				Final drafts			
		n	\bar{X}	SD	Level	n	\bar{X}	SD	Level*
Structure	Beginner	52	4.50	.83	5	52	4.37	.82	4
	Pre-intermediate	52	4.56	.64	5	52	4.06	1.02	4
	Intermediate	52	4.52	.75	5	52	4.33	.96	4
	Advanced	52	4.62	.80	5	52	4.37	.99	4
	Total	208	4.55	.75	5	208	4.28	.95	4
Content	Beginner	52	4.13	.93	4	52	4.10	1.10	4
	Pre-intermediate	52	4.12	.92	4	52	3.63	1.08	4
	Intermediate	52	4.27	.87	4	52	4.00	1.10	4
	Advanced	52	4.37	.89	4	52	4.06	1.11	4
	Total	208	4.22	.90	4	208	3.95	1.11	4
Grammar	Beginner	52	4.83	.43	5	52	4.40	.98	4
	Pre-intermediate	52	4.60	.66	5	52	4.27	.93	4
	Intermediate	52	4.77	.61	5	52	4.48	.96	5
	Advanced	52	4.73	.69	5	52	4.48	.96	5
	Total	208	4.73	.61	5	208	4.41	.95	4
Lexical	Beginner	52	4.40	.82	4	52	4.10	1.19	4
	Pre-intermediate	52	4.48	.78	5	52	4.08	1.04	4
	Intermediate	52	4.56	.90	5	52	4.38	1.14	4
	Advanced	52	4.62	.77	5	52	4.42	.93	4
	Total	208	4.51	.82	5	208	4.25	1.08	4
General	Beginner	52	4.21	.99	4	52	4.15	1.32	4
	Pre-intermediate	52	4.52	.85	5	52	3.94	1.27	4
	Intermediate	52	4.44	.75	4	52	4.29	.89	4
	Advanced	52	4.29	.98	4	52	4.02	1.06	4
	Total	208	4.37	.90	4	208	4.10	1.15	4

*5= always, 4= usually, 3= sometimes, 2= occasionally, 1= never

As dictated in Table 8, the differences between groups were not statistically meaningful when student WCF beliefs regarding the first and the final drafts were considered.

Table 8. Differences in Student Beliefs on WCF to Multiple Drafts

Preliminary drafts	Resource of Variance	Sum of Squares	df	Means of Squares	F	p	Significant Difference
Structure	Between groups	.404	3	.135	.234	.872	
	Within groups	117.115	204	.574			
	Total	117.519	207				
Content	Between groups	2.173	3	.724	.892	.446	
	Within groups	165.654	204	.812			
	Total	167.827	207				
Grammar	Between groups	1.500	3	.500	1.352	.259	
	Within groups	75.423	204	.370			
	Total	76.923	207				
Lexical	Between groups	1.322	3	.441	.658	.579	
	Within groups	136.635	204	.670			
	Total	137.957	207				
General	Between groups	3.077	3	1.03	1.267	.287	
	Within groups	165.154	204	.810			
	Total	168.231	207				
Final Drafts	Resource of Variance	Sum of Squares	df	Means of Squares	F	p	Significant Difference
Structure	Between groups	3.442	3	1.147	1.270	.286	
	Within groups	184.385	204	.904			
	Total	187.827	207				
Content	Between groups	7.014	3	2.338	1.928	.126	
	Within groups	247.404	204	1.213			
	Total	254.418	207				
Grammar	Between groups	1.553	3	.518	.566	.638	
	Within groups	186.712	204	.915			
	Total	188.264	207				
Lexical	Between groups	5.284	3	1.761	1.502	.215	
	Within groups	239.212	204	1.173			
	Total	244.495	207				
General	Between groups	3.630	3	1.210	.917	.434	
	Within groups	269.250	204	1.320			
	Total	273.880	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

Student attention to WCF on essays

This set of results was concerned with how much attention students paid to the WCF that they received. As given in Table 9, for the preliminary drafts, the advanced group reported to pay a lot more attention to structural, grammatical and lexical corrective feedback. As for the final drafts, nearly all the groups reported that they paid attention to the corrective feedback of all dimensions; yet, the beginner and the intermediate group valued grammatical corrections given to their final drafts more than the other groups did.

Table 9. Descriptive Statistics for Student Attention to WCF in Multiple Drafts

		Preliminary drafts			Final drafts			
		n	\bar{X}	SD	Level	\bar{X}	SD	Level*
Structure	Beginner	52	4.29	.133	4	4.44	.998	4
	Pre-intermediate	52	4.27	.129	4	4.10	.975	4
	Intermediate	52	4.37	.135	4	4.25	.988	4
	Advanced	52	4.62	.117	5	4.33	1.08	4
	Total	208	4.38	.065	4	4.28	1.01	4
Content	Beginner	52	4.29	.133	4	4.29	1.01	4
	Pre-intermediate	52	4.10	.143	4	3.73	1.17	4
	Intermediate	52	4.27	.140	4	4.17	.985	4
	Advanced	52	4.37	.132	4	4.04	1.19	4
	Total	208	4.25	.068	4	4.06	1.10	4
Grammar	Beginner	52	4.67	.081	5	4.58	.75	5
	Pre-intermediate	52	4.62	.103	5	4.42	.87	4
	Intermediate	52	4.63	.099	5	4.50	.83	5
	Advanced	52	4.67	.102	5	4.37	1.03	4
	Total	208	4.65	.048	5	4.47	.87	5
Lexical	Beginner	52	4.17	.139	4	4.33	1.04	4
	Pre-intermediate	52	4.56	.093	5	4.33	.83	4
	Intermediate	52	4.46	.133	5	4.37	1.03	4
	Advanced	52	4.73	.103	5	4.40	1.03	4
	Total	208	4.48	.061	5	4.36	.982	4
General	Beginner	52	4.23	.152	4	4.19	1.25	4
	Pre-intermediate	52	4.19	.145	4	3.85	1.26	4
	Intermediate	52	4.48	.089	5	4.44	.75	4
	Advanced	52	4.33	.155	4	3.98	1.31	4
	Total	208	4.31	.069	4	4.12	1.18	4

*5= always, 4= usually, 3= sometimes, 2= occasionally, 1= never

In terms of the general feedback such as praises and appreciation, the intermediate group, among other groups, paid more attention to whether their efforts in writing the preliminary drafts were appreciated by the writing instructor (see Table 10). The results showed that the four proficiency groups did not significantly differ from each other in terms of the attention they paid to WCF with the exception of one group. That is, the beginner group differed significantly from the other groups in terms of the attention they paid to the lexical feedback given to their preliminary drafts ($p=.006$).

Table 10. Differences in Student Attention to WCF in Multiple Drafts

Preliminary drafts	Resource of Variance	Sum of Squares	df	Means of Squares	F	p	Significant Difference
Structure	Between groups	3.962	3	1.321	1.537	.206	
	Within groups	175.269	204	.859			
	Total	179.231	207				
Content	Between groups	2.014	3	.671	.089	.966	
	Within groups	199.481	204	.978			
	Total	201.495	207				

Grammar	Between groups	.130	3	.043	1.352	.259	
	Within groups	99.250	204	.487			
	Total	99.380	207				
Lexical	Between groups	8.500	3	2.833	3.868	.010**	Beginner<advanced
	Within groups	149.423	204	.732			
	Total	157.923	207				
General	Between groups	2.577	3	.859	.869	.458	
	Within groups	201.731	204	.989			
	Total	204.308	207				
Final Drafts	Resource of Variance	Sum of Squares	df	Means of Squares	F	p	Significant Difference
Structure	Between groups	3.288	3	1.096	1.072	.362	
	Within groups	208.538	204	1.022			
	Total	211.827	207				
Content	Between groups	7.038	3	3.013	2.516	.059	
	Within groups	244.269	204	1.197			
	Total	253.308	207				
Grammar	Between groups	1.322	3	.441	.575	.632	
	Within groups	156.442	204	.767			
	Total	157.764	207				
Lexical	Between groups	.212	3	.071	.072	.975	
	Within groups	199.4622	204	.978			
	Total	199.673	207				
General	Between groups	10.577	3	3.526	2.600	.053*	Intermediate>pre-intermediate
	Within groups	276.654	204	1.356			
	Total	287.231	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

The intermediate group was nearing significance from the pre-intermediate group in terms of the general comments such as appraisals that they would like to receive from the instructor ($p = .058$).

Student beliefs on the benefits of the type of correction given to essays

The results in this group included student preferences for WCF with a focus on the benefit they derived from a specific form of WCF. Tables 11 and 12 summarized student preferences for direct and indirect forms of WCF. Direct feedback was mostly favoured by the advanced group. And all the groups believed that listening to the explanations the instructors offered about the mistakes in their essays and receiving direct correction helped them

more than the other forms of feedback in the route to acquire academic writing skills in L2 English. The beginner group favoured categorized feedback the most.

Table 11. Descriptive Statistics for Student Preferences on Corrective Feedback Types

		n	\bar{X}	SD	Level*
Direct feedback: Direct correction	Beginner	52	3.40	1.361	3
	Pre-intermediate	52	4.25	.813	4
	Intermediate	52	4.02	1.213	4
	Advanced	52	4.63	.687	5
	Total	208	4.08	1.139	4
Indirect feedback: Underlining	Beginner	52	4.23	.983	4
	Pre-intermediate	52	3.44	1.259	3
	Intermediate	52	4.12	.983	4
	Advanced	52	3.92	1.026	4
	Total	208	3.93	1.103	4
Indirect Feedback: Use of symbols	Beginner	52	3.27	1.087	3
	Pre-intermediate	52	2.73	1.300	3
	Intermediate	52	3.29	1.273	3
	Advanced	52	3.33	1.167	3
	Total	208	3.15	1.226	3
Indirect Categorized Feedback: Use of codes	Beginner	52	3.94	1.074	4
	Pre-intermediate	52	3.38	1.223	3
	Intermediate	52	3.88	1.215	4
	Advanced	52	3.38	1.286	3
	Total	208	3.65	1.223	4
Direct oral metalinguistic feedback	Beginner	52	4.60	.693	5
	Pre-intermediate	52	4.54	.779	5
	Intermediate	52	4.25	1.027	4
	Advanced	52	4.71	.667	5
	Total	208	4.52	.816	5

*5= *always*, 4= *usually*, 3= *sometimes*, 2= *occasionally*, 1= *never*

As presented in the table below, direct feedback was the least favoured form of feedback for the beginner learners when compared to the pre-intermediate ($p<.001$), intermediate ($p=.020$) and the advanced learners ($p<.001$). Underlining as a form of indirect feedback was the least desired one for the pre-intermediate learners who differed from the beginner group significantly ($p=.001$).

Table 12. ANOVA Results for Student Preferences on Corrective Feedback Types

	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Direct feedback: Direct correction	Between groups	41.462	3	13.821	12.403	.000***	Beginner<pre-intermediate
	Within groups	227.308	204	1.114			Beginner<intermediate
	Total	268.769	207				Beginner<advanced
Indirect feedback: Underlining	Between groups	18.861	3	6.287	5.503	.001***	Pre-intermediate< beginner
	Within groups	233.058	204	1.142			
	Total	251.918	207				
Indirect Feedback: Use of symbols	Between groups	12.500	3	4.167	2.847	.039*	Pre-intermediate <advanced
	Within groups	298.577	204	1.464			
	Total	277.880	207				
Indirect Categorized Feedback: Use of codes	Between groups	14.630	3	4.877	3.375	.019**	Beginner>pre-intermediate
	Within groups	294.750	204	1.445			Beginner>advanced
	Total	309.380	207				
Direct oral metalinguistic feedback	Between groups	6.014	3	2.005	3.102	.028*	Intermediate<advanced
	Within groups	131.865	204	.646			
	Total	137.880	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

As for the use of symbols, the pre-intermediate group differed from the advanced group in that they did not think that the use of symbols helped them improve the necessary academic writing skills ($p = .001$). The beginner group preferred to be given categorized feedback as opposed to the preferences of the pre-intermediate and the advanced group ($p = .025$). The last form of direct feedback which included a metalinguistic discussion on the essay was the most favoured form of feedback across all the proficiency groups. Interestingly, the intermediate group did not ask for that specific form of feedback all the time and this was one aspect that they differed from the advanced group significantly ($p = .023$).

Student beliefs about the content of WCF

Tables 13 and 14 presented student beliefs about what needed to be included in the WCF. Groups of all levels of language proficiency agreed that receiving only grades and only corrections did not contribute much to their learning process. The advanced group, on the other hand, believed that comments alone could usually act as a useful form of feedback. Overall, all the groups agreed that being given a combination of a score, corrections and comments served for their benefit most of the time and that would be the most helpful strategy to be followed by the instructors.

Table 13. Descriptive Statistics for Student Beliefs in the content of WCF

		n	\bar{X}	SD	Level*
Grades	Beginner	52	1.65	.861	2
	Pre-intermediate	52	1.96	1.120	2
	Intermediate	52	2.21	1.091	2
	Advanced	52	1.83	.834	2
	Total	208	1.91	.999	2
Corrections	Beginner	52	2.87	1.048	3
	Pre-intermediate	52	3.08	1.045	3
	Intermediate	52	3.15	.998	3
	Advanced	52	3.19	.951	3
	Total	208	3.07	1.012	3
Comments	Beginner	52	2.77	1.059	3
	Pre-intermediate	52	2.81	.930	3
	Intermediate	52	3.42	.893	3
	Advanced	52	3.46	.999	4
	Total	208	3.12	1.020	3
Comments+ corrections	Beginner	52	3.73	.843	4
	Pre-intermediate	52	3.98	.896	4
	Intermediate	52	4.56	.574	5
	Advanced	52	4.63	.525	5
	Total	208	3.65	.818	4
Comments+ corrections+ grades	Beginner	52	4.35	.861	4
	Pre-intermediate	52	4.21	.977	4
	Intermediate	52	4.58	.605	5
	Advanced	52	4.69	.466	5
	Total	208	4.52	.773	5

*5= always, 4= usually, 3= sometimes, 2= occasionally, 1= never

As given in Table 14, even though none of the groups favoured being given a score only, the beginner group differed from the intermediate group in that the beginners believed that such a strategy would not contribute much to recovery from errors ($p=.026$). The advanced group favoured instructor comments on its own more than the beginner ($p=.002$) and the pre-intermediate group ($p=.004$) did. All the groups thought that it was sometimes beneficial to receive only corrections from the instructor.

Table 14. ANOVA Results for Student Beliefs in the Content of WCF

	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Grades	Between groups	8.635	3	2.878	2.968	.033**	Beginner<intermediate
	Within groups	197.808	204	.970			
	Total	206.442	207				
Corrections	Between groups	3.322	3	1.107	1.083	.357	
	Within groups	208.596	204	1.023			
	Total	211.918	207				
Comments	Between groups	22.308	3	7.436	7.863	.000***	Beginner<advanced
	Within groups	192.923	204	.946			Pre-intermediate <advanced
	Total	215.231	207				
Comments +corrections	Between groups	30.284	3	10.095	19.051	.000***	Beginner<intermediate Beginner<advanced Pre-intermediate <intermediate
	Within groups	108.096	204	.530			Pre-intermediate <advanced
	Total	138.380	207				
Comments +corrections +grades	Between groups	7.399	3	2.466	4.329	.006**	Pre-intermediate <advanced
	Within groups	116.212	204	.570			
	Total	123.611	207				

* $p < .05$, ** $p < .01$, *** $p < .001$

When it comes to a combination of feedback content, compared to the students with lower levels of language proficiency, the high-level proficiency groups, namely the intermediate and the advanced groups, held the opinion that comments and corrections always helped them ($p < .001$). In addition, the advanced learners trusted the effectiveness of a combination of feedback forms more than the pre-intermediate group ($p = .008$).

Student beliefs on the feedback providing agent

Tables 15 and 16 reported descriptive and referential statistics on the beliefs about the trustworthiness of the feedback providing agents including the classroom instructor, peers, writing centre instructors and students

themselves. Student trust in the feedback received from the classroom instructor stood out among feedback received from the other agents.

Table 15. Descriptive Statistics

Proficiency Level	Instructors			Peers			Writing centre instructors			Students themselves		
	\bar{X}	SD	Level	\bar{X}	SD	Level	\bar{X}	SD	Level	\bar{X}	SD	Level*
Beginner	4.40	.774	4	3.17	1.15	3	2.10	1.537	2	2.67	.139	3
Pre-intermediate	4.33	.810	4	3.02	1.229	3	1.21	.696	1	2.46	.136	3
Intermediate	4.73	.564	5	2.58	1.073	3	1.42	1.073	1	3.04	.148	3
Advanced	4.73	.528	5	2.65	1.163	3	1.37	.991	1	3.25	.142	3
Total	4.55	.700	5	2.86	1.165	3	1.52	1.159	2	2.86	.073	3

*5= always, 4= usually, 3= sometimes, 2= occasionally, 1= never

Trust in the feedback providing agent was shaped by the level of proficiency (see Table 16). Instructor feedback was definitely a lot more favoured feedback type for the advanced and intermediate learners than the pre-intermediate learners ($p=.017$).

Table 16. ANOVA Results for Student Beliefs on the Feedback Providing Agents

	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Instructors	Between groups	7.096	3	2.365	5.110	.002**	Pre-intermediate <advanced Pre-intermediate <intermediate
	Within groups	94.423	204	.463			
	Total	101.519	207				
Peers	Between groups	12.890	3	4.297	3.270	.022**	Intermediate<beginner
	Within groups	266.762	204	1.314			
	Total	279.652	207				
Writing centre instructors	Between groups	23.938	3	7.979	6.410	.000***	Beginner>pre-intermediate Beginner>intermediate Beginner>advanced
	Within groups	253.942	204	1.245			
	Total	277.880	207				
Students themselves	Between groups	19.677	3	6.559	6.341	.000***	Beginner<advanced Pre-intermediate <advanced
	Within groups	209.975	204	1.034			
	Total	229.652	207				

* $p<.05$, ** $p<.01$, *** $p<.001$

Peer feedback, on the other hand, was not that much preferred by any of the groups. Still the beginner group trusted feedback from classmates more than the intermediate group ($p=.052$). Feedback received from the writing centre instructors was not much favoured across groups. The beginner group held the opinion that they benefited from the feedback given at the writing centre more than the pre-intermediate ($p<.001$), intermediate ($p=.014$) and the advanced group ($p=.006$). Not surprisingly, advanced students believed that they could correct their mistakes on their own when compared to the beginner ($p=.025$), and the pre-intermediate group ($p=.001$).

Student self-evaluations in L2 Writing

After having been exposed to a process-based writing approach for two semesters, language proficiency was a determining factor in students' self-evaluations of their general and academic writing skills in L2 English (see Table 17). All the proficiency groups rated their general and academic writing skills as *adequate* except for the advanced students who rated their general and academic writing skills as *good*.

Table 17. Descriptive Statistics for Student Self-Evaluation in L2 Writing

Proficiency Level	Writing in L2 English			Writing essays in L2 English			
	n	\bar{X}	SD	Level	\bar{X}	SD	Level*
Beginner	52	3.27	.888	3	3.08	1.40	3
Pre-intermediate	52	2.77	1.148	3	2.62	1.35	3
Intermediate	52	3.31	.875	3	3.04	.106	3
Advanced	52	3.78	.637	4	3.56	.089	4
Total	208	3.28	.969	3	3.07	.064	3

*5= excellent, 4= good, 3= adequate, 2= fair, 1= poor

Bonferroni adjusted corrections revealed significant differences in students' self-evaluations of their L2 (non) academic writing skills (see Table 18). The pre-intermediate group believed that they were poorer L2 writers in general than the beginner ($p=.032$), intermediate ($p=.016$) and the advanced students ($p<.001$). The intermediate group did not trust their writing skills as much as the advanced group did ($p=.044$).

Table 18. Differences in Student Self-Evaluation in L2 Writing

Writing in L2 English	Source of variance	Sum of squares	df	Mean of squares	F	p	Significant difference
Writing in L2 English	Between groups	27.053	3	9.018	11.002	.000***	Pre-intermediate
	Within groups	167.212	204	.820			<intermediate
	Total	194.264	207				Pre-intermediate<advanced
Writing Essays in L2 English	Between groups	23.168	3	7.723	10.451	.000***	Advanced>beginner
	Within groups	150.750	204	.739			Advanced>
	Total	173.918	207				pre-intermediate
							Advanced>intermediate
							Beginner>
							pre-intermediate

* $p<.05$, ** $p<.01$, *** $p<.001$

A similar pattern of difference existed in students' perception of proficiency in L2 academic writing. The pre-intermediate group rated themselves more poorly than the advanced ($p<.001$) and the beginner group ($p=.040$) when it came to be possessing the necessary L2 writing skills to survive in the world of academia. Advanced students rated themselves academically better equipped than the beginner ($p=.29$), pre-intermediate ($p<.001$) and the intermediate students ($p=.014$).

Discussion

This study investigated the role of foreign language proficiency in student beliefs and preferences on multiple draft essays with respect to the following issues: (i) whether students asked for a thorough correction, (ii) the language of feedback, (iii) how much of the feedback students read (iv) beliefs on the kind of instructor comments and corrections (v) the amount of attention students paid to the WCF, (vi) the preferred form and (vii) the content of the WCF as well as (viii) the desired feedback providing agent and (ix) self-evaluation of the (non) academic writing skills in L2 English.

Along with the other findings in the literature (e.g., Amrhein & Nassaji, 2010; Kavaliauskienė et al., 2012), students of all levels of proficiency preferred to receive corrections to every mistake they made. The reason behind this inclination could be the belief that every mistake they make and every correction they receive would give them a chance to learn. That is, they might have the opinion that the more feedback they receive, the more self-sufficient they would feel in writing in L2 English. With respect to the preference and comprehension of the language of feedback, the higher proficiency groups, namely, the advanced and the intermediate learners, always preferred feedback in English than the learners with lower levels of proficiency, namely, the beginner and the pre-intermediate learners. Feedback in English was more comprehensible for the advanced and the intermediate groups than the beginner and the pre-intermediate groups. This showed that higher level proficiency groups trusted their command of English and the more they understood the feedback, the more willing and able they would be in engaging in the correction process (Price et al., 2010, p. 279).

Upon receiving their essays, the pre-intermediate and the beginner group read most of the feedback given to their preliminary drafts and only some of the feedback given to their final drafts. This finding is in line with the other studies in the literature (e.g., Ferris, 1995; Ferris & Roberts, 2001) stating that students read most of the feedback given to the earlier drafts whereas they read only some of the feedback given to the subsequent drafts. The level of language proficiency seemed to be a determining factor on how much of the WCF students read in the first and final drafts of their essays. It is also worth mentioning that the high-level proficiency groups differed from the low-level ones in that they read most of the feedback given to their earlier and subsequent drafts whereas the low-level proficiency groups read only the feedback given to their first drafts more attentively.

The prevailing opinion across groups was that the instructors were responsible for giving detailed feedback on lexis, grammar, and structure both to their preliminary and final drafts. The advanced students constituted the most demanding group of all. The reason why the advanced and the intermediate groups asked for grammar correction even in their final drafts could be related to their preference for a grammar-based approach and their fear of making grammar mistakes at a high level of proficiency (Ferris, 1995). Contrary to what one would expect, it was not the beginner, but the pre-intermediate group that wanted to be appreciated more for their efforts in the process of writing.

Despite expecting a lot from the instructor, students of all levels reported not to pay as much attention as they were expected to do to the WCF from the instructor. Advanced learners specifically looked out for structural, grammatical and lexical feedback in their preliminary drafts all the time. This trend continued for the subsequent drafts which the learners attended less. The trend for paying more attention to the earlier drafts than the final drafts was what was exactly reported by Ferris (1995). In this study, learners across levels always worried more about the difficulties with grammar than problems in the other areas. This finding is also compatible with the previous research (e.g., Balanga et al., 2016) suggesting that students strongly believed that having a solid knowledge in grammar immensely contributed to their academic writing skills.

Recall that in the field, learners with lower language proficiency levels were reported to benefit more from direct feedback, whereas learners with higher levels of language proficiency were reported to benefit more from indirect feedback. This is because beginner level learners who are less proficient in the language worry about learning what is acceptable in the L2 (Bruton, 2009), whereas advanced learners, with a higher proficiency level, are more into getting guidance on cognitive problem-solving skills (Tocelli-Beller & Swain, 2005). In this study, a reverse picture emerged. The high proficiency learners appreciated direct correction more than the beginners. Especially, the advanced group always asked for direct feedback including one-on-one metalinguistic oral feedback and direct correction. The reason for the reversed pattern could be related to what different proficiency groups understand from the direct feedback they receive from the instructors. For example, the beginner group may believe that indirect correction can contribute to their comprehension and correction of grammatical errors

more than direct correction of such errors. Advanced learners, on the other hand, may prefer direct correction to their grammatical errors which may be viewed as the slips of the pen most of the time. They would rather spare time for negotiation of meaning and content than grammatical error fixation. Getting direct feedback in the form of corrections and metalinguistic explanations are two reportedly most beneficial strategies for L2 learners in the literature, too (Diab, 2005; Diab, 2015). Bitchener and Knoch (2010) also agrees that metalinguistic feedback increases learner uptake though it can be potentially challenging especially in large classrooms. This study also lends support to the work by Göksoy and Nazlı (2017) who states that direct feedback contributes to the L2 writing skills of advanced learners. Overall, the findings in this study contradict with the previous work (Budianto, et al., 2017) claiming that language proficiency does not determine the effectiveness of the feedback. In addition, the findings of this study do not fully support Chandler (2003) who reports that the use of indirect forms of feedback such as underlining will help advanced learners improve their writing skills.

Students across different levels of proficiency believed that receiving a score, along with instructor comments and corrections contributed to their academic writing skills in L2. This finding is also in line with Lee (2008) in that different from the beginner and the pre-intermediate students, the advanced and intermediate students felt that a combination of comments, corrections and assigned scores would contribute to the development of their academic writing skills.

As the most effective feedback providing agents, all the groups trusted their instructors, peers and finally themselves as the main feedback providing agents especially when their mistakes were pointed out. This is in line with previous findings in the field (Eksi, 2012; Ferris & Hedgcock 2013; Purnawarman, 2011). The learners in this study were not of the opinion that teachers are unhelpful and damaging since according to Truscott (1996), teachers may be inconsistent and sometimes inaccurate in providing feedback. As the final component, student self-evaluations of their efficacy in L2 (non) academic writing was far from being excellent. This could be related to the detailed feedback they got throughout the process and the constructed belief that writing is a never-ending process.

Implications

This study offers certain implications for university instructors who teach academic writing skills. The instructors should not ignore the student plea to get detailed feedback on any kind of error they might make. First, instructors working with low proficiency L2 learners have to train these learners and raise their awareness in terms of how to treat the WCF provided to them. That is, the lower proficiency groups should be reminded that they have to read and pay attention to all the feedback given to their multiple draft essays. Second, instructors need to dedicate time and effort to train students to become trustworthy peer correctors so that they could act as teacher assistants to mentor the slow learners especially. Finally, the role of metalinguistic feedback cannot be ignored even when the class sizes are large. Students can be given oral metalinguistic explanations about their academic writing progress in small groups regularly if the class sizes are large.

Acknowledgments

I would like to thank Gönül Tuğba Akdağ, Çağdaş Kalafat, Seçil Baran, Melike Yılmaz Baştuğ, Bekir Ateş, David Albachten, Ian Fitzgerald, Yeşim Erdoğan, Özlem Tuna, Gökçe Kuruçay Aydın, Anna Maria Ivan, Feyza Çelikleş, Joslynn Merkel, Elifcan Ata Kıl and Neil Warrington for help in data collection and of course Boğaziçi University School of Foreign Languages students who volunteered to take part in the study. I would like to extend my gratitude to the anonymous reviewers for their comments and suggestions in the earlier versions of this paper.

Statement of Publication Ethics

Ethics clearance committee: TC Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (SBINAREK)

Ethics clearance decision date: 08.04.2019

Ethics evaluation document number: 2019/15

The research has no unethical problem and research and publication ethics have been observed.

Researchers' Contribution Rate

I acknowledged the help of my colleagues in the data collection process. I am responsible for every other phase of the study.

Conflict of Interest

This study has no conflict of interest.

References

- Amirghassemi, A., Azabdaftari, B., & Saeidi, M. (2013). The effect of scaffolded vs. non-scaffolded written corrective feedback on EFL learners' written accuracy. *World Applied Sciences Journal*, 22(2), 256-263.
- Amrhein, H. R., & Nassaji, H. (2010). Written corrective feedback: what do students and teachers prefer and why? *Canadian Journal of Applied Linguistics*, 13, 95-127.
- Balanga, R.A., Fidel, I.B., Gumapac, M.V.G.P., Ho, H.T., Tullo, R. M. C., Villaraza, P.M.L., & Vizconde, C. J. (2016). Student beliefs towards written corrective feedback: The case of Filipina high school students. *Journal of English Language Teaching*, 6(3), 22-38.
- Berg, C. E. (1999). The effects of trained peer response on ESL students' revision types and writing quality. *Journal of Second Language Writing*, 8(3), 215-241.
- Bitchener, J., Young, S., & Cameron, D. (2005). The effect of different types of corrective feedback on ESL student writing. *Journal of Second Language Writing*, 14(3), 191-205.
- Bitchener, J., & Knoch, U. (2008). The value of written corrective feedback for migrant and international students. *Language Teaching Research*, 12(3), 409-431.
- Bitchener, J., & Knoch, U. (2009). The relative effectiveness of different types of direct written corrective feedback. *System*, 37(2), 322-329.
- Bitchener, J., & Knoch, U. (2010). Raising the linguistic accuracy level of advanced L2 writers with written corrective feedback. *Journal of Second Language Writing*, 19, 207-217.
- Bruton, A. (2009). Improving accuracy is not the only reason for writing, and even if it were... *System*, 37, 600-613.
- Budianto, S., Mukminatien, N., & Latief, M.A. (2017). The superiority of written corrective feedback outcome on EFL writing at different proficiency levels. *International Journal of English and Education*, 6(3), 40-53.
- Chandler, J. (2003). The efficacy of various kinds of error feedback for improvement in the accuracy and fluency of L2 student writing. *Journal of Second Language Writing*, 12(3), 267- 296.
- Diab, N. M. (2015). Effectiveness of written corrective feedback: Does type of error and type of correction matter? *Assessing Writing*, 24, 16-34.
- Diab, R. (2005). Teachers' and Students' Beliefs About Responding to ESL Writing: A Case Study. *TESL Canada Journal*, 23(1), 28- 43.
- Eksi, G. Y. (2012). Peer review versus teacher feedback in process writing: How effective? *International Journal of Applied Educational Studies*, 13(1), 33-48.
- Eslami, E. (2014). The effects of direct and indirect corrective feedback techniques on EFL students' writings. *Procedia-Social and Behavioral Sciences*, 98, 445-452.
- Ferris, D. (1995). Student reactions to teacher response in multiple-draft composition classrooms. *TESOL Quarterly*, 29, 33-53.
- Ferris, D. (2004). The 'grammar correction' debate in L2 writing: Where are we, and where do we go from here? (And what do we do in the meantime..?). *Journal of Second Language Writing*, 13(1), 49-62.
- Ferris, D. (2011). *Treatment of error in second language student writing*. University of Michigan Press.
- Ferris, D., & Hedgecock, J. S. (2005). *Teaching ESL composition: Purpose, process and practice*. Erlbaum Associates.
- Ferris, D., & Hedgecock, J. S. (2013). *Teaching L2 composition: Purpose, process and practice (3rd ed.)*. Routledge.
- Ferris, D., & Roberts, B. (2001). Error feedback in L2 writing classes: How explicit does it need to be? *Journal of Second Language Writing*, 10, 161-184.
- Göksoy, A.S., & Nazlı, Ö.P. (2017). The effect of direct and indirect written corrective feedback on students' writing. *International Journal of Leadership Training*, 1(1), 16-25.
- IBM Corp. (2017). IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.
- Harmer, J. (2004). *How to teach English: An introduction to the practice of English language*. Longman.
- Hyland, K., & Hyland, F. (2006). *Feedback in second language writing: Contexts and issues*. Cambridge University Press.
- Irvin, B. (2017). Written corrective feedback: Student preferences and teacher feedback practices. *IAFOR Journal of Language Learning*, 3(2), 35-58.
- Kavaliauskienė, G., & Anusienė, L. (2012). A case study: Learner attitudes towards the correction of mistakes. *Social Technologies*, 2(1), 88-101.

- Lee, I. (2008). Student reactions to teacher feedback in two Hong Kong secondary classrooms. *Journal of Second Language Writing, 17*(3), 144-164.
- Miao, Y., Badger, R., & Zhen, Y. (2006). A comparative study of peer and teacher feedback in a Chinese EFL writing class. *Journal of Second Language Writing, 15*(3), 179-200
- Nemati, M., Alavi, S. M., Mohebbi, H., & Masjedlou A. P. (2017). Speaking on behalf of the voiceless learners: Written corrective feedback for English language learners in Iran. *Issues in Educational Research, 27*(4), 822-841.
- Park, E.S. (2011). Learner-generated noticing of written L2 input: What do they notice and why? *Language Learning, 61*, 146-186.
- Park, E.S. (2013). Learner-generated noticing behavior by novice learners: Tracing the effects of learners' L1 on their emerging L2. *Applied Linguistics, 34*, 74-98.
- Park, E.S., Song, S., & Shin Y. K. (2016). To what extent do learners benefit from indirect written corrective feedback? A study targeting learners of different proficiency and heritage language status. *Language Teaching Research, 29*(6), 678-699.
- Price, M., Handley, K., Millar, J., & O'Donovan, B. (2010). Feedback: all that effort, but what is the effect? *Assessment & Evaluation in Higher Education, 35*(3), 277-289.
- Purnawarman, P. (2011). *Impacts of different types of teacher corrective feedback in reducing grammatical errors on ESL/EFL students' writing*. Doctoral dissertation, Virginia Tech, VA, USA.
- Rahimi, M., & Asadi, E. (2014). Effect of different types of written corrective feedback on accuracy and overall quality of L2 learners' writing. *European Journal of Academic Essays, 1*(6), 1-7.
- Robb, T., Ross, S., & Shortreed, I. (1986). Salience of feedback on error and its effect on EFL writing quality. *TESOL Quarterly, 20*(1), 83-96.
- Rouhi A., & Samiei, M. (2010). The Effects of Focused and Unfocused Indirect Feedback on Accuracy in EFL Writing. *The Social Sciences, 5*, 481-485.
- Salimi, A., & Ahmadpour, M. (2015). The effect of direct vs. indirect written corrective feedback on L2 learners' written accuracy in EFL context. *International Journal of English Language and Literature Studies, 4*(1), 10-19.
- Sheen, Y. (2007). The effect of focused written corrective feedback and language aptitude on ESL learners' acquisition of articles. *TESOL Quarterly, 41*, 255-283.
- Tocelli-Beller, A., & Swain, M. (2005). Reformulation: The cognitive conflict and L2 learning it generates. *International Journal of Applied Linguistics, 15*, 5-28.
- Truscott, J. (1996). The case against grammar correction in L2 writing classes. *Language Learning, 46*, 327-369.
- Van Beuningen, C. (2010). Corrective feedback in L2 writing: Theoretical perspectives, empirical insights, and future directions. *International Journal of English Studies, 10*, 1-27.
- Van Beuningen, C., De Jong, N., & Kuiken, F. (2008). The effect of direct and indirect corrective feedback on L2 learners' written accuracy. *ITL International Journal of Applied Linguistics, 156*, 279-296.
- Van Zundert, M., Sluijsmans, D., & Van Merriënboer, J. (2010). Effective peer assessment processes: Research findings and future directions. *Learning and Instruction, 20*, 270-279.
- Yüce, E., & Aksu Ataç, B. (2019). Peer editing as a way of developing ELT students' writing skills: An action research. *Journal of Language and Linguistic Studies, 15*(4), 1226-1235.



An Investigation on Instructional Emotions of English Language Teaching Students

Ayfer Su-Bergil*^a

Article Info

DOI: 10.14686/buefad.691395

Article History:

Received: 19.02.2020

Accepted: 23.09.2020

Published: 05.10.2020

Keywords:

English Language Teaching,
Emotions,
Instructional Emotions.

Article Type:

Research Article

Abstract

The aim of this study is to examine the instructional emotions of English Language Teaching Department students studying at Amasya University in Turkey. In this context, the sample of the study was composed of the 3rd and 4th year students who were studying in the 2018-2019 academic year. Quantitative research methods were used during the data collection and data analysis processes. "Achievement Emotions Questionnaire-Teachers/AEQ-T" Scale and consisting of 27 items and 6 dimensions named as Sense of Anxiety, Sense of Pride, Sense of Pleasure, Sense of Anger, Sense of Hope, Sense of Frustration was used as data collection instrument. The results obtained from the study presented that there were differences among the prospective English Language Teachers' opinions regarding their emotional states which should be implemented and provided basis for the further studies of English Language Teacher Education.

İngiliz Dili Eğitimi Öğrencilerinin Öğretim Duygularına Yönelik Bir Araştırma

Makale Bilgisi

DOI: 10.14686/buefad.691395

Makale Geçmişi:

Geliş: 19.02.2020

Kabul: 23.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

İngilizce Öğretimi,
Duygular,
Öğretimsel Duygular.

Makale Türü:

Araştırma Makalesi

Öz

Bu çalışmanın amacı, Amasya Üniversitesinde öğrenim görmekte olan İngilizce Öğretmenliği Bölümü öğrencilerinin öğretim duygularını incelemektir. Bu bağlamda araştırmanın örneklemini 2018-2019 eğitim-öğretim yılında öğrenim gören 3. ve 4. sınıf öğrencileri oluşturmaktadır. Veri toplama ve analizi sürecinde nicel araştırma yöntemleri kullanılmıştır "Kaygı Duygusu, Gurur Duygusu, Zevk Duygusu, Öfke Duygusu, Umut Duygusu, Hayal kırıklığı duygusu" olmak üzere toplamda 6 boyut ve 27 maddeden oluşan "Duygu Durumları Ölçeği-Öğretmenler / AEQ-T" bu çalışmada veri toplama aracı olarak kullanılmıştır. Araştırmadan elde edilen sonuçlar, İngilizce Öğretmen adaylarının, İngilizce öğretmeni yetiştirmeye yönelik gelecek çalışmalarda uygulanması ve temel oluşturması gereken duygusal durumları ile ilgili görüşleri arasında farklılıklar olduğunu göstermiştir.

*Corresponding Author: ayfer_su@yahoo.com

^a Asst. Prof. Dr., Amasya University Faculty of Education, Amasya/TURKEY <http://orcid.org/0000-0002-9277-2862>

Introduction

Affective factors such as attitude, manner, mood, feeling, and emotion are accepted among the most important factors in foreign language learning and teaching. In addition to them, the concepts of motivation, self-confidence, and autonomy are some kinds of reflective affective factors suggesting and providing for the researchers to make meticulous examination on them. In many studies, aforementioned affective factors placed as a scope of content, and they are believed having crucial roles in language teaching and learning process, because they have functions of improving the quality of teaching the teachers perform and cultivating the learning process of the learners (Ni, 2012).

The concepts of affect and emotion overlap with each other and have essential place in language teaching process (Arnold & Brown, 1999). Especially in psychology, emotions are accepted as one of the fundamental components of affect besides feeling and mood (Forgas, 2001). The belief that foreign language learners have natural inclinations to experience different kinds of emotions during the complex process of language learning agrees with the acknowledgement that emotions lie behind the motivation to learn a foreign language (Dörnyei, 2005; Bown & White, 2010). However, the studies including emotions do not share a salient place in English language teaching field. Furthermore, these limited studies deal with the emotions that the English language learners feel in their learning process instead of investigating how the teachers and/or the student teachers feel when they teach English to their learners. In this aspect, the concept of emotions and their role in language learning have recently begun to be noticed by the researchers working on individual differences (MacIntyre, Gregersen & Mercer, 2016). Thus, there has been a more concrete emphasis on different emotions emerging in real classrooms, particularly for decades (Dewaele, 2005, 2010; MacIntyre, 2002). There has been a tremendous increase in the studies including affective studies in which positive emotions are experienced in classroom settings. Therefore, positive psychology gives rise to positive emotions-focused studies as a primary source of its researches (Seligman & Csíkszentmihályi, 2000).

The literature contains great amounts of studies dealing with the emotions which are connected with academic achievement or issues (Pekrun & Linnenbrink-Garcia, 2014; Schutz & Pekrun, 2007). The same subject has gained attention in language-related and applied linguistics areas recently (Dewaele & MacIntyre, 2014, 2016); however, the studies which aim to focus on many emotions the students, the student teachers or the teachers experience and how they use these emotions in their language learning or teaching contexts seem very limited (Shirvan & Talebzadeh, 2018).

Thus, it would be appropriate to start with giving the definition of emotions. It is difficult to perceive and understand the emotions scientifically, such as many other concepts in psychology in which emotions play an indispensable role. Nevertheless, if the people around us were asked whether they knew the meaning of emotions or not, without hesitating most of them would give a definite answer “yes”, and express that they of course know the answer and they can easily explain them by samples. Does it mean that they could give a comprehensive definition of the emotions? It is hard for people to define the emotions in spite of their explanations overlapping with them. There has been still some controversy over the definition of emotions even in psychology, because reaching at an accepted definition that is also scientific and common for everyone has not been an easy attempt. In order to find out the clear definition of emotions Izard (2010), asked 34 distinguished scientists about how they define the emotion as a term or concept. In that study, although there had been some agreements on the structures and roles of emotions, he could not manage to arrive at a complete scientific definition of emotion(s). In this aspect, all the definitions reflected the disagreement that the emotions had multi-componential nature, and many of them “gave a definition of emotion that recognized (a) neural circuits and neurobiological processes, (b) phenomenal experience or feeling, and (c) perceptual-cognitive processes as aspects of emotion” (p. 368). Therefore, “Multifaceted responses to events that we see as challenges or opportunities in our inner or outer world, events that are important to our goals” (Keltner, Oatley, & Jenkins, 2014, p. 27) is finally accepted as the definition of emotions in this study. Besides definitional problems, emotions also pose problems of classification and another important question concerns the functions of emotions.

Although emotions that take place great importance and roles in behaviors of individuals in institutions have been ignored for a long time, recent scientific researches reached the agreement on that they can no longer be neglected (Akçay & Çoruk, 2012; Burić et al., 2017; Cross & Hong, 2009; Hong et al., 2016). Since emotions are regarded as one of the significant variables of “human life, internal life, daily life and business life” (as cited in

Dilekçi & Nartgün, 2019, p. 56). However, emotions received little attention by the educational institutions, policy makers and practitioners, and researches dealing with scientific developments in education so far (Hargreaves, 2000). When the working conditions and environments of teachers are taken into consideration, it is seen that educational institutions differ from other institutions in that teaching practices are directly and indirectly related to the productivity of individuals who receive and take education for several reasons. Nartgün and Dilekçi (2016) lined up these reasons such as “self-sufficient, successful, adaptability to social life, sensitive and ultimately happiness. Parallel to aforementioned information, the review of literature mentions two frameworks as positive and negative emotions accepted as basic and general in observing the emotions of teachers performing the teaching activities and practices. However, the recent studies underline the importance of dimensions of emotions (as cited in Keller, Frenzel, Goetz, Pekrun & Hensley, 2014b). Thus, this current study has vital importance in displaying a sample among the studies that include the dimensions of emotions rather than positive or negative frameworks.

Based on the general definitions of emotion, in this study the instructional emotions are taken into consideration specifically. Thus, instructional emotions refer to the emotional experiences of teachers related to the practices they have during their act of teaching. Though the importance of instructional emotions, emotions have been accepted as irrational and foolish for a long time (as cited in Dilekçi & Nartgün, 2019, p. 58-59). As known, because the teachers are in relation with different and many individuals when they perform their job, they experience several emotions in the atmosphere of institutions. Also, in the institutional atmosphere, their performances during the teaching activities are shaped by many different emotions (Sutton, 2007). In fact, the emotional experiences that address the instructional emotions of teachers, are shaped by the teachers’ interaction with individuals around them and the environment itself rather than individually or independently (Dilekçi & Nartgün, 2019). As Prosen et al. (2014) states the instructional emotions may be affected by different sources such as “the learning processes of students, the behaviors they exhibited in these processes, their achievements and the disciplinary problems”. Furthermore, the emotional tendencies of teachers are determined by positive or negative experiences they have during their teaching activities and performances (Frenzel et al., 2009b). In this aspect, there are many studies indicating the importance of the relation between emotions and the teachers’ interaction with the students (Becker et al., 2014; Frenzel et al., 2009a; Golby, 1996; Hargreaves, 1998, 2000, 2001; Intrator, 2006; Meyer & Turner, 2006), which are importance signs of creating more powerful classroom atmosphere and environment.

Based on the notion “all learning is a powerful combination of cognition and emotion” (Oxford, 2015, p. 371), and emotions’ also serving a social role in that they lead to and help people to communicate with each other, develop the interaction, and assist people in building, retaining, and clearing up the relations (Manstead, 1991), this study aims to examine the instructional emotions of an English Language Teaching (ELT) department at a public university in Turkey. Accordingly, the research questions of the study as follows:

- What emotions do ELT students experience in their teaching process?
- Do the emotions of ELT students differ significantly in terms of the gender, and year they study at the university?
- Are there any differences among the emotions that ELT students experience in terms of their own school preference (the stage in the Ministry of National Education where they would like to be in-service) to teach English?

Due to the emotions’ fundamental role and their expressive association with cognition, emotions, which also shape the behaviors of the individuals both in private and in professional life, affect the decisions making mechanism and take great importance for individuals, organizations or institutions. Despite this, it is quite remarkable that the studies dealing with emotions have largely been neglected in the context of education so far. This is the reason that the current study takes place as vital importance in detecting the demands of a huge teacher education system in terms of ELT students who have teaching experiences to some extent.

Method

Research Design

This study was designed in a survey model, which can be used as a quantitative method by offering the participants standardized questionnaires, scales or structured questions. By this way, survey model provides the researchers with qualitative and quantitative information. Moreover, the survey model has the advantage of reporting the opinions and perspectives of the participants, which will help to illustrate the misunderstandings of specific issues and break the barriers to make the change or development possible (Karasar, 2006; Creswell, 2014). The following part of the study continues with the details of demographic information about the participants, data collection, and data analysis.

Participants

65 English as a Foreign Language (EFL) 3rd (f=33, 50.8%) and 4th (f=32, 49.2%) class students, ranging in age from 20-24 (3rd grade) and 21-24 (4th grade), and studying in an ELT department at a public university in Turkey participated in this study in the Spring Semester of 2018-2019 academic year voluntarily. Due to the limited number of the participants, all of the students were included in the study. In this aspect, purposeful and convenient sampling which are among the non-probability sampling methods relying on the perception of the researchers when selecting and who to request to take part in the study, were followed as the representative sample types in this study (Etikan, Musa, & Alkassim 2016).

Data Collection Tools

Despite the several instruments aiming to measure the different aspects of teachers' emotions such as Teacher Emotional Labour Strategy Scale (TELSS) by Yin (2012), Emotion Regulation Ability (ERA) Scale by Brackett, Palomera, Mosja-Kaja, Reyes, & Salovey (2010), Emotional Intelligence Scale (EIS) by Chan (2006), the Achievement Emotions Questionnaire – Teachers (AEQ-T) is the only instrument that focuses on determining the various emotions the teachers experience during their teaching practices in the classrooms. Initially, Achievement Emotions Questionnaire-Teachers/AEQ-T composing of *enjoyment*, *anger*, and *anxiety* emotions was developed by Frenzel and her colleagues (2010). Afterwards, the scale was adapted involving the dimensions of *anxiety*, *pride*, *enjoyment*, and *anger* by Hong et al. (2016). However, the last updated and adapted version of the scale was accomplished by adding *hope* and *frustration* dimensions of emotions by Dilekçi and Sezgin-Nartgün (2019) in order to provide a revised scale regarding the Turkish culture and apply some descriptive analysis.

In this study, the adapted version of the scale to Turkish culture including additional dimensions of hope and frustration emotions (Dilekçi, 2018; Dilekçi, & Sezgin-Nartgün, 2019) was used as data collection instrument. Hence, Achievement Emotions Questionnaire-Teachers/AEQ-T” scale consisting of 27 items and 6 dimensions named as: “Sense of Anxiety”/ 4 items, “Sense of Pride”/ 4 items, “Sense of Pleasure”/4 items, “Sense of Anger”/ 3 items, “Sense of Hope”/ 7 items, “Sense of Frustration”/ 5 items, provide basis for the gathered data of this target study. As the original version of the scale suggested, the adapted version was applied by offering a 4-point Likert-type scale ranging from: 1= “Totally disagree”, 2= “Disagree”, 3= “Agree”, 4= “Totally agree”. The adapted Turkish version of the scale was utilized in the study. Since the language adaptation of the scale was completed with 6 English teachers as experts, their recommendations were taken into account by reviewing the scale before reaching at Turkish version. Moreover, the linguistic equivalence of the scale via back-translation method was found as highly related because it was found as ($r=.849, p<.01$) which means that the English and Turkish versions of the scale seem very parallel to each other. For this reason, the participants are given the chance of filling the scale in Turkish which will increase the reflection of their sincere opinions better than another language. Reliability of the scale according to Cronbach Alpha is seen as demonstrating the required reliability perfectly since the sections of the scale enjoy the reliability at $>.70$ level and presented in the following table.

Table 1. Cronbach's Alpha Levels of Dimensions of the Scale

Dimensions	Number of Items	Item Numbers	Cronbach's Alpha
Sense of Anxiety	4	1, 2, 3, 4	.74
Sense of Pride	4	5, 6, 7, 8	.77
Sense of Pleasure	4	9, 10, 11, 12	.85
Sense of Anger	3	13, 14, 15	.73
Sense of Hope	7	16, 17, 18, 19, 20, 21, 22	.83
Sense of Frustration	5	23, 24, 25, 26, 27	.79

As shown in Table 1, the reliability levels of the dimensions are lined up as Sense of Anger/3 items with .73, Sense of Anxiety/4 items with .74, Sense of Pride/4 items with .77, Sense of Frustration/5 items with .79, Sense of Hope/7 items with .83, and Sense of Pleasure/4 items with .85, which respond to the expected reliability level for the scales used in the social sciences in that they can be accepted as applicable.

Data Collection

Firstly, the collected data, founding basis for the current study, was supported and sampled by the voluntary participation of the students. In addition, the reason for the selection of the 3rd and 4th grade students to the study group is to think that they have more knowledge about the area they are studying in these class levels. The adapted version, which includes "Sense of Hope" and "Sense of Frustration dimensions" (Dilekçi, 2018), developed by Hong et al. (2016) with 4 dimensions constitute source for the data collection procedure of the study. The scale was applied to the participants after they experienced micro-teaching practices related to their language teaching courses in the faculty of education. By the way, the participants' own insights of micro-teaching practices were accepted as a strong precondition for data collection. The scale was applied by the researcher face to face with participants in order to clarify detailed information for the questions in it.

Data Analysis

SPSS 20.00 the package program for social sciences was used in the data analysis process of this study. The collected data was coded, and statistical procedures were applied to the gathered data via this program. Due to the limited number of the participants, parametric and non-parametric methods were applied to the gathered data in the inter-group statistical parts of the research regarding $n > 30$, $n < 30$. Hence, since the distribution of data for the total sample of 65 participants (32 and 33 of whom were 3rd and 4th graders) was calculated as normal, parametric methods of one sample t-test and independent samples t-tests were applied to reach findings addressing the significant differences of the emotions the student teachers experience. However, one of the non-parametric methods of Kruskal Wallis H Test was laid on in order to find out how the participants' instructional emotions differ in terms of their school preferences because the distribution of data referring to this calculation does not satisfy the normality level.

Findings

In this part of the study, the findings associated with the emotions type of ELT students, the difference of the emotions they experience regarding their genders, grades, and school preference they would like to be in-service are presented.

Table 2. One Sample T-Test Results for What Kind of Emotions ELT Students Experience in Their Teaching Process

Emotions	N	Mean	Std. Dev.	t	df	p
Anxiety	65	1.91	.54	28.55	64	.000
Pride	65	3.18	.53	48.71		.000
Pleasure	65	3.35	.63	42.88		.000
Anger	65	1.77	.62	23.09		.000
Hope	65	3.37	.45	60.05		.000
Frustration	65	1.95	.56	27.91		.000

Table 2 displays one sample t-test results for what kind of emotions ELT students experience in their teaching process. According to the findings, each dimensions of the scale differs from the other dimensions significantly. Notwithstanding, 3.18, 3.35 and 3.37 mean values of positive emotions of pride, pleasure and hope, in addition to 1.91 and 1.95 mean values of negative emotions of anxiety and frustration are parallel to each other statistically, $t(64) = 48.71, 42.88, 60.05, 28.55, 27.91, p < .01$.

Table 3. Independent Samples T-Test Results for the Differences ELT Students Experience in Terms of Their Gender

Emotions	Gender	N	Mean	Std. Deviation	t	df	p
Anxiety	Female	46	1.84	.53	1.67	63	.100
	Male	19	2.08	.54			
Pride	Female	46	3.27	.50	2.13		.037
	Male	19	2.97	.54			
Pleasure	Female	46	3.57	.48	5.36		.000
	Male	19	2.80	.63			
Anger	Female	46	1.62	.53	3.35		.001
	Male	19	2.14	.68			
Hope	Female	46	3.51	.40	4.22		.000
	Male	19	3.05	.40			
Frustration	Female	46	1.83	.52	-2.78		.007

Male 19 2.24 .59

Table 3 illustrates the independent samples t-test results for the differences ELT students experience in terms of their gender. When the numbers of the participants are considered at first sight, it may seem that the non-parametric alternative for this statistic should be applied to the gathered data. However, the number of the females and males had influence on the researcher to use the parametric statistics despite the disadvantages it might have in the discussion of these findings. Apart from the emotion of anxiety of which mean values for females and males range in 1.84, 2.08; $t(63)= 1.67$, $p>.05$., the emotions of pride, pleasure, anger, hope, and frustration reveal significant differences in terms of the female and male participants with the mean values of 3.27, 2.97; 3.57, 2.80; 1.62, 2.14; 3.51, 3.05; 1.83, 2.24; $t(63)= 2.13$, 5.36, 3.35, 4.22, -2.78, $p<.05$.

Table 4. Independent Samples T-Test Results for the Differences ELT Students Experience in Terms of Their Grades

Emotions	Grade	N	Mean	Std. Deviation	t	df	p
Anxiety	3 rd	33	2.05	.52	2.28	63	.026
	4 th	32	1.76	.53			
Pride	3 rd	33	3.04	.56	2.36		.021
	4 th	32	3.34	.46			
Pleasure	3 rd	33	3.14	.64	2.76		.007
	4 th	32	3.55	.55			
Anger	3 rd	33	1.92	.67	2.04		.046
	4 th	32	1.61	.52			
Hope	3 rd	33	3.29	.48	1.61		.113
	4 th	32	3.46	.41			
Frustration	3 rd	33	2.01	.59	844.00		.402
	4 th	32	1.89	.54			

Table 4 describes independent samples t-test results for the differences ELT students experience in terms of their grades. The emotions of hope and frustration with the mean values of 3.29, 3.46; 2.01, 1.89 for the 3rd and 4th grades $t(63)= 1.61$, 844.00, $p>.05$., have the exception of showing no significant difference. Nevertheless, the emotions of anxiety, pride, pleasure, and anger with the mean values of 2.05, 1.76; 3.04, 3.34; 3.14, 3.55; 1.92, 1.61 for the 3rd and 4th grades satisfy the significant differences, $t(63)=2.28$, 2.36, 2.76, 2.04, $p<.05$.

Table 5. Kruskal Wallis H Test Results for the Differences ELT Students Experience in Terms of Their School Preference

Emotions	School preference	N	Mean Rank	df	p
Anxiety	Pre-school	2	28.25	5	.142
	Primary	26	38.02		
	Secondary	19	27.37		
	High school	8	22.94		
	College/Faculty	8	42.50		
	None	2	28.25		
	Total	65			
Pride	Pre-school	2	42.00		.261
	Primary	26	31.31		
	Secondary	19	39.89		
	High school	8	31.31		
	College/Faculty	8	21.38		
	None	2	33.75		
	Total	65			
Pleasure	Pre-school	2	49.25		.013
	Primary	26	34.46		
	Secondary	19	37.37		
	High school	8	38.00		
	College/Faculty	8	15.00		
	None	2	8.25		
	Total	65			
Anger	Pre-school	2	7.50		.018
	Primary	26	26.31		
	Secondary	19	38.18		
	High school	8	33.75		
	College/Faculty	8	47.75		
	None	2	34.25		
	Total	65			
Hope	Pre-school	2	61.50		.084
	Primary	26	35.65		
	Secondary	19	33.74		
	High school	8	31.19		
	College/Faculty	8	21.00		
	None	2	18.25		
	Total	65			
Frustration	Pre-school	2	8.75		.412
	Primary	26	35.77		
	Secondary	19	32.26		
	High school	8	27.38		
	College/Faculty	8	36.25		
	None	2	37.75		
	Total	65			

Kruskal Wallis H test was preferred in order to find out the differences ELT students experience in terms of their school preference. Since the number of the participants for each school preference of pre-school, primary, secondary, high school, college/faculty, and none of them options range under 30, the non-parametric statistics of

Kruskal Wallis H test was utilized as the equivalent of one-way ANOVA parametric statistics. Accordingly, the emotions of anxiety, pride, hope, and frustration do not meet the significant difference because of .142, .261, .084, .412 $p > .05$. However, the emotions of pleasure and anger with .013, .018 $p < .05$ significance levels, declare meaningful difference of the participants' school preference on these emotions. In this aspect, the mean ranks of the emotion of pleasure almost range from pre-school (the highest) to none of them (lowest) options though the mean ranks of the anger emotion almost range from pre-school (the lowest) to none of them (the highest) options.

Discussion and Conclusion

The present study sets out to explore the type of emotions ELT students experience in connection with their teaching practices during their faculty education. The results of this study unearthed that the emotions related studies or researches can be used to reflect the needs of prospective EFL teachers' after or during their teacher education process concerning the emotional state of teaching. In accordance with the gender variable it was addressed that the male ELT students have tendency in experiencing and feeling emotions such as anxiety, anger, and frustration more than the male students who show inclination to positive emotions of pride, pleasure, and hope during their teaching practices. This supports the findings presented by Demetriou, Wilson and Winterbottom (2009) in that they declared female and male teachers take hold of teaching in different ways. In other words, their small sample study supports the finding of male and female teachers sense the emotions of teaching in that female teachers use diverse strategies to struggle with the difficulties they meet in their practices than the males. Moreover, this could be "collaborated by the results, which revealed that men felt more controlled generally by the system, and that women attributed more effort and importance to teaching than men did" (p. 461). Therefore, the real educational reforms, changes, and developments require giving importance to the concept of emotions in terms of student teachers and in-service teachers. The better understanding of emotions or emotional states of student teachers or/and teachers may result in effective and prospective teaching and learning situations (Frenzel et al., 2016). In other words, the quality of teaching is interrelated with the emotional state of teachers, which affect the quality of learning as well (Šarić, 2015). Because, they direct the whole teaching and learning process, the interaction between the teacher and student, and finally the classroom setting.

Moreover, primarily quantitative approach to explore the variety and frequency of learners' feelings was chosen. In data analysis, a deductive approach was embraced, and the findings were interpreted via the data within Pekrun's (2014) framework of academic emotions. Pekrun's framework focuses on contemporary and leading theories of "achievement emotions" nominated as *control-value theory* (Pekrun, 2006) and defines achievement emotions as *emotions tied directly to achievement activities or achievement outcomes* (p. 317), which validates the reason of basing on the framework in this current study. Hence, positive and negative feelings were associated with the taxonomy of achievement emotions suggested by this framework. In agreement with the findings, the students of ELT department experience both positive and negative feelings in different degrees linked to the parameters such as gender, grade, and teaching preferences. Hence, the different techniques that will also furnish them with studying habits, may have the effects of decreasing and overcoming the negative feelings such as stress they experience in language education contexts (Yüce, 2019).

Regarding the overall emotions, it is seen that the mean values of pride, pleasure, and hope are higher than the anxiety, anger, and frustration emotions which is promising for the language teachers of the future in terms of their positive inclination to teaching profession. This study also showed that the female students' mean values of the positive emotions of pride, pleasure, and hope are higher than the male ones while the situation is vice versa for the negative emotions of anxiety, anger, and frustration for the male students. On this basis, it can be concluded that the initial teacher training and micro teaching practices carry positive stance towards developing the autonomy both for student teachers and the learners they are responsible for, which will enhance and feed the qualifications of learning and teaching situations (Balçıklı, 2010). On the other hand, situational factors that can be "attributed to the dimensions of direct inputs (e.g., teaching styles), environmental factors (e.g., school composition and resources), and policy levers (e.g., curriculum and recruitment) as proposed by the OECD" (cited in Ng & Bull, 2018, p. 339) should be taken into account in that they have significant influences on the emotions the teachers or the student teachers practice in their teaching roles and deciding on the strategies they need to apply during the

teaching activities. Thus, regarding the situational factors in terms of instructional emotions could pave the way for further researches as well.

In terms of the participants' grades, this study reveals that the 3rd grade students' mean values are higher in the negative emotions of anxiety, anger, and frustration even though the mean values of the 4th grade students are higher in the positive emotions of pride, pleasure, and hope which indicates the importance of the practice in teaching as the more they practice, the more positive insights they would have about their instructions/teaching. This is parallel with what Little (1995, p.180) points out in that "a first-hand experience" facilitates the student teachers' earlier teaching practices and by this way they can be equipped with strategies for better teaching experiences.

Regarding the teaching preferences of the students, it is determined that mean ranks of the teaching levels range from pre-school to none in positive emotion of pleasure; however, the contrary range (from none/college to pre-school) takes place for the negative emotion of anger, which underlines the importance of taking into consideration the emotional state of individuals in vocational placement or planning. In addition to putting emphasis on the curriculum knowledge and the teaching skills of student teachers, they should be regarded with their emotional welfare because the variably placement of the teachers may result in negative emotions or burn out feelings in time, which will also shape some aspects of their teaching and teacher roles in a way that they may put barriers to progress professionally (Hayes, 2003).

Consequently, this study unearthed and reinforce the idea that emotions play a significant role for the designation and placement of ELT students' before/during/after their teacher education process. Thus, emotions of teacher candidates should be regarded in teacher education programs nationwide, which will also direct the teaching preferences of the candidates appropriate to their personal desires and inclination of which gains are observable in future not only for themselves but also for the other stakeholders such as the learners.

This study can be replicated with different universities or countries with a larger sample or population including also a control group to generalize the findings. Furthermore, the reliability of the scale for the prospective teachers may be the scope of another study, since the scale can be accepted more reliable and valid for the teachers who are actually performing their professions at schools or in their daily lives. These points could be inspiring for the other researchers and elicit practical results for the prospective EFL teachers in the further studies.

Limitations

The limitations that affect the interpretation and the discussions of the findings related to the current study are presented as follows. Following this, the suggestions for the further studies and researchers are given.

1. The sample of the study consists of two groups of English Language Teaching students who have teaching experiences and studying at a state university in Turkey.
2. The "Achievement Emotions Questionnaire-Teachers/AEQ-T" scale consisting of 27 items is given to the participants once a while in their native language. (It may be given for several times.)
3. 6 dimensions of (Sense of Anxiety/4 items, Sense of Pride/4 items, Sense of Pleasure/4 items, Sense of Anger/3 items, Sense of Hope/7 items, Sense of Frustration/5 items) are under the scope of this research.
4. In order to get statistical data, the adapted version of the scale designed as a 4-point Likert-type format (From *Totally disagree* to *Totally agree*) was taken into consideration.

Acknowledgments

I would like to express my special thanks of gratitude to Selçuk University- Konya/TURKEY that I had chance to present the partial findings of this study in the Third International ULEAD Conference on Research in Applied Linguistics, 11th ULEAD International Congress in 24-26 October, 2019. Moreover, I wish to express my sincere thanks to Amasya University and Scientific Research Commission of Amasya University in Turkey that provided opportunity to fulfill this research via a Scientific Research Project numbered as SEB-BAP 19-0204.

References

- Akçay, C., & Çoruk, A. (2012). Çalışma yaşamında duygular ve yönetimi: Kavramsal bir inceleme. *Eğitimde Politika Analizi*, 1 (1), 3-25.
- Arnold, J., & Brown, D. H. (1999). A map of the terrain. In J. Arnold (Ed.), *Affect in language learning* (pp. 1-24). Cambridge: Cambridge University Press.
- Balçıkanlı, C. (2010). Learner autonomy in language learning: Student teachers' beliefs. *Australian Journal of Teacher Education*, 35(1), 90-103. <http://dx.doi.org/10.14221/ajte.2010v35n1.8>
- Burić, I., Slišković, A., & Macuka, I. (2017). A mixed-method approach to the assessment of teachers' emotions: Development and validation of the teacher emotion questionnaire. *Educational Psychology*, 38 (3), 1-25. <http://dx.doi.org/10.1080/01443410.2017.1382682>.
- Becker, E. S., Goetz, T., Morger, V., & Ranellucci, J. (2014). The importance of teachers' emotions and instructional behavior for their students' emotions - An experience sampling analysis. *Teaching and Teacher Education*, 43, 15-26. <http://dx.doi.org/10.1016/j.tate.2014.05.002>.
- Brackett, M. A., Palomera, R., Mojsa-Kaja, J., Reyes, M., & Salovey, P. (2010). Emotion-regulation ability, burnout, and job satisfaction among British secondary school teachers. *Psychology in the Schools*, 47(4), 406-417. <https://doi.org/10.1002/pits.20478>
- Bown, J., & White, C. J. (2010). Affect in a self-regulatory framework for language learning. *System*, 38(3), 432-443. <https://doi.org/10.1016/j.system.2010.03.016>
- Chan, D. W. (2006). Emotional intelligence and components of burnout among Chinese secondary school teachers in Hong Kong. *Teaching and Teacher Education*, 22, 1042-1054. <https://doi.org/10.1016/j.tate.2006.04.005>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative and mixed methods approaches*. Sage, Los Angeles.
- Cross, D. I., & Hong, J. Y. (2009). Beliefs and professional identity: Critical constructs in examining the impact of reform on the emotional experiences of teachers. In P. A. Schutz, & M. Zembylas (Eds.), *Advances in teacher emotion research: The impact on teachers' lives* (273-296).
- Demetriou, H., Wilson E., & Winterbottom, M. (2009). The role of emotion in teaching: are there differences between male and female newly qualified teachers' approaches to teaching?, *Educational Studies*, 35(4), 449-473. <https://doi.org/10.1080/03055690902876552>
- Dewaele, J. M. (2005). Investigating the psychological and emotional dimensions in instructed language learning: Obstacles and possibilities. *Modern Language Journal*, 89(3), 367-380. <https://doi.org/10.1111/j.1540-4781.2005.00311.x>
- Dewaele, J. M. (2010). *Emotions in multiple languages*. Basingstoke, UK: Palgrave Macmillan.
- Dewaele, J. M., & MacIntyre, P. D. (2014). The two faces of Janus? Anxiety and enjoyment in the foreign language classroom. *Studies in Second Language Learning and Teaching*, 4(2), 237-274. <https://doi.org/10.14746/ssllt.2014.4.2.5>
- Dewaele, J. M., & MacIntyre, P. D. (2016). Foreign language enjoyment and foreign language classroom anxiety: The right and left feet of FL learning? In P. MacIntyre, T. Gregersen, & S. Mercer (Eds.), *Positive psychology in SLA* (pp. 215-236). Bristol, UK: Multilingual Matters.
- Dewaele, J. M., Witney, J., Saito, K., & Dewaele, L. (2017). Foreign language enjoyment and anxiety in the FL classroom: The effect of teacher and learner variables. *Language Teaching Research*, 22(6), 676-697. <https://doi.org/10.1177/1362168817692161>
- Dilekçi, Ü. (2018). *Instructional emotions of teachers and their perceived adaptive performances* [Doctoral dissertation, Bolu Abant İzzet Baysal University]. The Institute of Educational Sciences, Bolu, Turkey.

- Dilekçi, Ü., & Sezgin-Nartgün, Ş. (2019). Adaptation of teachers' instructional emotions scale to Turkish culture and revision and descriptive analysis of the scale. *Kuram ve Uygulamada Eğitim Yönetimi*, 25(1), 51-118. <https://doi.org/10.14527/kuey.2019.002>.
- Dörnyei, Z. (2005). *The psychology of the language learner: Individual differences in second language acquisition*. Mahwah, NJ: Lawrence Erlbaum.
- Etikan, I., Musa S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, (5)1, 1-4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Forgas, J. P. (2001). *Handbook of affect and social cognition*. London: Erlbaum.
- Fredrickson, B. L. (2003). The value of positive emotions. *American Scientist*, 91(4), 330-335.
- Frenzel, A. C., Goetz, T., Lüdtke, O., Pekrun, R., & Sutton, R. E. (2009a). Emotional transmission in the classroom: Exploring the relationship between teacher and student enjoyment. *Journal of Educational Psychology*, 101, 705-716. <http://dx.doi.org/10.1037/a0014695>.
- Frenzel, A. C., Goetz, T., Stephens, E. J., & Jacob, B. (2009b). Antecedents and effects of teachers' emotional experiences: An integrated perspective and empirical test. In P. A. Schutz & M. Zembylas (Eds.), *Advances in teacher emotion research: The impact on teachers' lives*. New York, NY: Springer. http://dx.doi.org/10.1007/978-1-4419-0564-2_7.
- Frenzel, A. C., Pekrun, R., & Goetz, T. (2010). *Achievement emotions questionnaire for teachers (AEQ-teacher) -User's manual*. University of Munich: Department of Psychology.
- Frenzel, A. C., Pekrun, R., Goetz, T., Daniels, L. M., Durksen, T. L., Becker-Kurz, B., & Klassen, R. M. (2016). Measuring teachers' enjoyment, anger, and anxiety: The teacher emotions scales (TES). *Contemporary Educational Psychology*, 46, 148-163. <https://doi.org/10.1016/j.cedpsych.2016.05.003>
- Frijda, N. H. (1993). Moods, emotion episodes and emotions. In J. M. Haviland & M. Lewis (Eds.), *Handbook of emotions* (2nd ed., pp. 381-403). New York, NY: Guilford Press.
- Golby, M. (1996). Teachers' emotions: An illustrated discussion. *Cambridge Journal of Education*, 26(3), 423-434.
- Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education*, 14(8), 835-854.
- Hargreaves, A. (2000). Mixed emotions: Teachers' perceptions of their interactions with students. *Teaching and Teacher Education*, 16(8), 811-826.
- Hargreaves, A. (2001). Emotional geographies of teaching. *Teachers College Record*, 103(6), 1056-1080.
- Hong, J., Nie, Y., Benjamin, H., Monobe, G., Ruan, J., You, S. ve Kambara, H. (2016). Revising and validating achievement emotions questionnaire – teachers (AEQT). *International Journal of Educational Psychology*, 5(1), 80-107. <https://doi.org/10.17583/ijep.2016.1395>
- Hong, J., Heddy, B., Ruan, J., You, S., Kambara, H., Nie, Y., & Monobe, G. (2016). Revising and validating achievement emotions questionnaire – teachers (AEQ-T). *International Journal of Educational Psychology*, 5 (1), 80-107. <https://doi.org/10.17583/ijep.2016.1395>.
- Hayes, D. (2003). Emotional preparation for teaching: A case study about trainee teachers in England. *Teacher Development*, 7(2), 153-172. <https://doi.org/10.1080/13664530300200196>
- Horwitz, E. K., Horwitz, M. B., & Cope, J. A. (1991). Foreign language classroom anxiety. In E. K. Horwitz & D. J. Young (Eds.), *Language anxiety: From theory and research to classroom implications* (pp. 27-36). Englewood Cliffs, NJ: Prentice Hall.
- Intrator, S. M. (2006). Beginning Teachers and the Emotional Drama of the Classroom. *Journal of Teacher Education*, 57(3), 232-239. <https://doi.org/10.1177/0022487105285890>
- Izard, C. E. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psychological Science*, 2(3), 260-280. <https://doi.org/10.1111/j.1745-6916.2007.00044.x>
- Izard, C. E. (2010). The many meanings/aspects of emotion: Definitions, functions, activation, and regulation. *Emotion Review*, 2(4), 363-370. <https://doi.org/10.1177/1754073910374661>
- Karasar, N. (2006). *Bilimsel araştırma yöntemi*. Ankara: Nobel yayın Dağıtım.

- Keller, M. M., Frenzel, A. C., Goetz, T., Pekrun, R., & Hensley, L. (2014). Exploring teacher emotions. In P. W. Richardson, S. A. Karabenick, and H. M. G. Watt (Eds.), *Teacher motivation: Theory and practice*. 69-82. New York: Routledge.
- Keltner, D., Oatley, K., & Jenkins, J. M. (2014). *Understanding emotions* (3rd ed.). Hoboken, NJ: John Wiley and Sons.
- Larsen, R., & Fredrickson, B. (1999). Measurement issues in emotion research. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: Foundations of hedonic psychology* (pp. 40-60). New York, NY: Russell Sage Foundation.
- Little, D. (1995). Learning as dialogue: The dependence of learner autonomy on teacher autonomy. *System*, 23(2), 175-182. [https://doi.org/10.1016/0346-251X\(95\)00006-6](https://doi.org/10.1016/0346-251X(95)00006-6)
- MacIntyre, P. D. (2002). Motivation, anxiety and emotion in second language acquisition. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 45-68). Amsterdam, Netherlands: John Benjamins.
- Meyer, D. K., & Turner, J. C. (2006). Re-conceptualizing emotion and motivation to learn in classroom contexts. *Educational Psychology Review*, 18 (4), 377-390. <http://dx.doi.org/10.1007/s10648-006-9032-1>.
- Nartgün, Ş. S., & Dilekçi, Ü. (2016). Eğitimi destekleme ve yetiştirme kurslarına ilişkin öğrenci ve öğretmen görüşleri. *Kuram ve Uygulamada Eğitim Yönetimi*, 22(4), 537-564. <http://dx.doi.org/10.14527/kuey.2016.021>.
- Ng, S.C., Bull, R. (2018). Facilitating Social Emotional Learning in Kindergarten Classrooms: Situational Factors and Teachers' Strategies. *IJEC*, 50, 335-352. <https://doi.org/10.1007/s13158-018-0225-9>
- Ni, H. (2012). The effects of affective factors in SLA and pedagogical implications. *Theory and Practice in Language Studies*, 2(7), 1508-1513. <https://doi.org/10.4304/tpls.2.7.1508-1513>
- Oxford, R. L. (2015). Emotion as the amplifier and the primary motive: Some theories of emotion with relevance to language learning. *Studies in Second Language Learning and Teaching*, 5(3), 371-393. <https://doi.org/10.14746/ssllt.2015.5.3.2>
- Pekrun, R., Götz, T., Titz, W., & Perry, R. P. (2002a). Positive emotions in education. In E. Frydenberg (Ed.), *Beyond coping: Meeting goals, visions, and challenges* (pp. 149-173). New York, NY: Oxford University Press.
- Pekrun, R., Götz, T., Titz, W., & Perry, R. P. (2002b). Academic emotions in students' self-regulated learning and achievement: A program of quantitative and qualitative research. *Educational Psychologist*, 37, 91-106. https://doi.org/10.1207/S15326985EP3702_4
- Pekrun, R., Goetz, T., & Perry, R. P. (2005). Achievement emotions questionnaire (AEQ): User's manual (Unpublished manuscript). University of Munich, Munich.
- Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educ Psychol Rev*, 18, 315-341. <https://doi.org/10.1007/s10648-006-9029-9>
- Pekrun, R., & Linnenbrink-Garcia, L. (Eds.). (2014). *International handbook of emotions in education*. New York, NY: Francis & Taylor/Routledge.
- Pekrun, R. (2014). *Emotions and learning* (Educational Practices Series, Vol. 24). International Academy of Education (IAE) and International Bureau of Education (IBE) of the United Nations Educational, Scientific and Cultural Organization (UNESCO), Geneva, Switzerland.
- Pishghadam, R., Zabetipour, M., & Aminzadeh, A. (2016). Examining emotions in English language learning classes: A case of EFL emotions. *Issues in Educational Research*, 26(3), 508-527.
- Prosen, S., Smrtnik Vitulić, H., & Poljšak Škraban, O. (2014). Teachers' emotional expression in the classroom. *Haceteppe Üniversitesi Eğitim Fakültesi Dergisi*, 29(1), 226-237.
- Šarić, M. (2015). Teachers' emotions: A research review from a psychological perspective. *Journal of Contemporary Educational Studies*, 4, 10-26.

- Shirvan, M. E., & Talebzadeh, N. (2018). Foreign language anxiety and enjoyment in an imagined community. *Eurasian Journal of Applied Linguistics*, 4(2), 109-133. <https://doi.org/10.32601/ejal.464043>
- Sutton, R. E., & Wheatley, K. F. (2003). Teachers' emotions and teaching: A review of the literature and directions for future research. *Educational Psychology Review*, 15 (4), 327-358.
- Yin, H. (2012). Adaptation and validation of the teacher emotional labour strategy scale in China. *Educational Psychology: An International Journal of Experimental Educational Psychology*, 32(4), 451-465. <https://doi.org/10.1080/01443410.2012.674488>
- Yüce, E. (2019). Self-regulated learning perceptions of foreign language learners: A cross-sectional study. *Novitas-ROYAL (Research on Youth and Language)*, 13(1), 36-46.



The Effect of 5E Learning Cycle and Multiple Intelligence Approach on 9th Grade Students' Achievement, Attitude, and Motivation toward Chemistry on Unit of Chemical Properties

Mustafa TÜYSÜZ*^a, Ömer GEBAN^b

Article Info

DOI: 10.14686/buefad.724352

Article History:

Received: 21.04.2020

Accepted: 28.08.2020

Published: 05.10.2020

Keywords:

Chemistry education,
Attitude,
Motivation.

Article Type: Research Article

Abstract

This research was aimed to investigate the effectiveness of the based 5E learning cycle model (LCM) and Gardner's multiple intelligence theory instructions (MIT) on students' achievement, retention level on the unit of chemical properties concepts, their attitude towards chemistry, and constructs of motivation to learn chemistry when compared with traditional instruction method (TIM). A total number of 151 ninth graders (69 male and 82 female) participated in the study. The research design was non-equivalent control group design as a type of quasi-experimental design. The chemical properties achievement test, attitude scale toward chemistry, and chemistry motivation questionnaire were applied to all groups before and after the application process. The descriptive and inferential statistics analysis was conducted to analyze the data of this investigation. The findings of the study depicted that the 5E LCM and MIT were positively effective than TIM regarding students' achievement and retention level on unit of chemical properties concepts and their attitude toward chemistry and some constructs of motivation to learn chemistry. However, there were no differences between groups about mean of students' self-efficacy and anxiety. Results and implications of the study were discussed.

5E Öğrenme Döngüsü ve Çoklu Zekâ Kuramının 9. Sınıf Öğrencilerinin Kimyasal Özellikler Ünitesi Üzerindeki Başarılarına, Kimya Dersine Olan Tutumlarına ve Motivasyonlarına Etkisi

Makale Bilgisi

DOI: 10.14686/buefad.724352

Makale Geçmişi:

Geliş: 21.04.2020

Kabul: 28.08.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Kimya eğitimi,
Tutum,
Motivasyon.

Makale Türü: Araştırma
Makalesi

Öz

Bu çalışmanın amacı 5E öğrenme döngüsü modeli ve çoklu zekâ kuramını temelli öğretimlerin öğrencilerin kimyasal özellikler ünitesinin kavramları üzerindeki başarılarına, hatırlama düzeylerine, kimya dersine karşı tutumlarına ve kimya öğrenmeye yönelik motivasyon bileşenlerine etkisini geleneksel öğretim metodu ile karşılaştırmalı olarak araştırmaktır. Araştırma 151 (69 erkek, 82 kız) dokuzuncu sınıf öğrencisi ile yürütülmüştür. Araştırmada eşit olmayan kontrol gruplu yarı deneysel desen kullanılmıştır. Çalışmada veri toplama araçları olarak, uygulama öncesi ve sonrasında öğrencilere kimyasal özellikler başarı testi, kimyaya yönelik tutum ölçeği ve kimya motivasyon ölçeği uygulanmıştır. Tanımlayıcı ve çıkarımsal istatistiksel analiz ile araştırmanın verileri çözümlenmiştir. Araştırmanın sonuçları, 5E öğrenme döngüsü ve çoklu zekâ teoremi temelli öğretimin öğrencilerin kimyasal özellikler ünitesi kavramları üzerine başarılarına, hatırlama düzeylerine, kendilerinin kimyaya olan tutum ve kimyayı öğrenmeye yönelik bazı motivasyon bileşenlerini bakımından geleneksel öğretim metoduna kıyasla daha etkili olduğunu göstermiştir. Öğrencilerin kaygı ve öz-yeterlilik ortalamaları bakımından ise gruplar arasında herhangi bir farklılık yoktur. Çalışmanın bulguları ve önerileri tartışılmıştır.

*Corresponding Author: mustafa.tysz@yandex.com

^a Asst. Prof. Dr, Van Yuzuncu Yil University, Van/Turkey, <https://orcid.org/0000-0003-1277-6669>

^b Prof. Dr, Middle East Technical University, Ankara/Turkey, <https://orcid.org/0000-0002-9433-0056>

Introduction

Educators in the field of science have been trying hard to make students learn the basic science concepts properly and integrate this newly adopted knowledge to their daily life for solving problems. Despite a lot of work done for this purpose, the concept understanding level of students has not yet been in the preferred level by the educators (OECD, 2007). The reason for this situation is that teachers use mostly teacher-centered teaching methods in their classrooms (Akkus, Kadayıfci, Atasoy, & Geban, 2003; De Jong & Taber, 2007; Mascolo, 2009). Despite the innovative approaches to teaching programs, teachers still use traditional teaching methods in their classes (Demirkan & Saracoglu, 2016; Govender, 2015; Tascı & Soylu, 2015). In the TIM, students passively listen to all course and then the teachers want them to memorize all the knowledge they just taught (Bybee & Landes, 1990). There is not a dialectic interaction during the lessons, in other words teacher-students and student-student interactions for meaningful learning have not been occurred during lessons. In addition, during the lesson students' different needs for proper learning are not taken into consideration. Hence, this would cause the students not to be able to understand the concepts properly. The TIM characteristics mention above are valid for nearly all science classes. Thus, the students cannot get the necessary education about the submicroscopic nature of science which would lead up to improperly constructed mental schemes (Chittleborough, Treagust, & Mocerino, 2002; Mahdi, 2014). In the literature, there were many researches showing that the students had many misconceptions about the basic science concepts. One of them was the concepts of physical and chemical changes (Atasoy, Genc, Kadayıfci, & Akkus, 2007; Basheer, Kortam, Zahran, Hofestein & Hugerat, 2018; Hanson, Twumasi, Aryeetey, Sam & Adukpo, 2016). The matters' transformations and interactions were explained with the term of "physical and chemical changes". Students should learn these concepts scientifically correct since this concept would make basis for the other chemical concepts on their mental schemes. On the other hand, it is crucial for students to construct scientifically proper mental schemes to prevent he misconceptions and misunderstandings of the concepts (Ekiz-Kiran, Kutucu, Tarkin-Çelikkiran, & Tuysuz, 2018; Jansoon, Coll & Somsook, 2009; Lehmann, 1996). Also, when students learn these concepts in a meaningful way then they could use this newly adapted knowledge in their daily life for taking plausible decisions to solve the problems or making plausible preferences among the options. It is also thought that students' attitudes and motivations towards chemistry would increase when the basic concepts of chemistry are learned in a meaningful way. Thus, it is necessary to choose alternative constructivist methods considering students' special needs when teaching science/chemistry.

There are many approaches according to students' special characteristics and needs to improve their success and attitudes in literature. "5E Learning Cycle Model" (5E LCM) could be given as an example. The National Science Foundation firstly adapted this model to education in elementary education level in 1960's (Karplus & Their, 1967). The former version of the learning cycle model consisted of only three stages which were "exploration", "concept introduction", and "concept application". Then, this model was expanded to five stages as "engagement, exploration, explanation, elaboration, and evaluation" (Bybee et al., 2006). According to Trowbridge, Bybee, and Powell (2000), students are given a daily life problem in the engagement phase and this problem makes disequilibrium in their mental schemes. By this way, students' interest in the subject is drawn. In the exploration stage, a situation is given to students to make them construct a hypothesis, make predictions, test their predictions with observations, justify evidences for their hypothesis and claims, and access all their findings. In this way, they could find a chance to see whether their previous knowledge is scientifically true or not. On the other hand, the students could realize their misconceptions, misunderstandings of the concepts by this way if there are any. The teacher's role in this process is being a guide. The teacher does not give the true answers to the students; he or she only prompts students with scientifically proper questions to make them construct the true answers by themselves. For the explanation stage, the teacher and the students dialectically interact to make the newly learned concepts clear. Moreover, the teacher and the students interpret the student experiences about the concepts. The science concepts' definitions are not made by the teacher, they are constructed together. In the elaboration stage, the students are given chance to apply their newly adopted knowledge to newly demonstrated daily life problems. The students make the given daily life problems' borders clear then make predictions according to their new experiences and then construct conclusions coherent with their newly adopted knowledge in small group discussions. In other words, an inquiry process for this stage could be conducted. Finally, in the evaluation stage different evaluation techniques such as small group discussions or constructing concepts grids or creating upper-cognitive concept maps could be referred to make it clear for students to have a proper mental scheme or to be able to utilize the new knowledge for further daily life problems. The 5E LCM was studied by so many researchers, on various topics, on various teaching domains to determine the effect of the model on students'

success, attitude, motivation etc. In the literature, researchers found that the 5E LCM supported the students' success and correct understanding of science concepts (Akar, 2005; Bektas, 2011; Bybee, 1997; Campbell, 2006; Ceylan & Geban, 2009; Cetin-Dindar, 2012; Ekici, 2007; Lawson, 1988; Pabuccu & Geban, 2015; Trowbridge, Bybee, & Powell, 2000; Qarareh, 2012; Supasorn, 2015), the level of retention of science concepts (Ajaja & Eravwoke, 2012; Sunar, 2013), the logical thinking (Ekici, 2007), the scientifically proper mental model construction (Supasorn, 2015), the science process skills (Akar, 2005; Ceylan & Geban, 2009; Kılavuz, 2005; Sadi & Cakiroglu, 2010; Schlenker, Blanke, & Mecca, 2007). The 5E LCM also improves students' attitudes towards science (Akar, 2005., Bybee, et. al., 2006; Kılavuz, 2005; Lin, et al., 2017; Sunar, 2013) and motivation to learn science (Cetin-Dindar & Geban, 2017; Cigdemoglu, 2012). Moreover, in literature the acid-base concept was investigated too on the basis of 5E LCM (Akar, 2005; Aggul-Yalcin & Bayrakceken, 2010; Çetin-Dindar, 2012; Kılavuz, 2005; Pabuccu & Geban, 2015). Other researchers studied the state of matter, solubility (Ceylan & Geban, 2009), redox reactions, electrochemistry (Ekici, 2007; Supasorn, 2015), the state of matter, gas expansion, immiscible liquids and density, molecular geometry, gas laws (Kurey, 1991), the particulate nature of matter (Bektas, 2011), chemical reaction rate (Supasorn & Promarak, 2014), chemical reactions and energy (Cigdemoglu, 2012) topics in chemistry. Therefore, it was seen that 5E LCM was likely to achieve the science education goals. Although there is some evidence for the effect of 5E LCM on students' cognitive development in chemistry education, much more investigations are needed to see the contribution of 5E LCM to students' levels. Especially, the researchers should take 5E LCM's effect on affective variables such as motivation into consideration yet there is not so much empirical evidence regarding it. Thus, this research would contribute to the literature.

Another constructivist instructional method was the Multiple Intelligence Theory (MIT) which was offered by Howard Gardner in 1983. Gardner have recently determined a description of intelligence being different from the traditional ones. So, intelligence was identified as "the ability to solve problems that are of consequence in a particular cultural setting" (Gardner, 1993, p.15). Furthermore, according to Gardner (1999), there are at least eight types of intelligence in difference rates in everyone. Gardner's Eight Intelligence Types are defined as:

- *Linguistic intelligence.* On the basis of oral and written language, being able to analyze information and create products.
- *Mathematical intelligence.* Ability for building equations, thinking practically for solving alternative problems and being able to think upper-cognitive for abstract problems.
- *Spatial intelligence.* Ability to memorize large-scale spatial images.
- *Musical Intelligence.* Ability to compose different musicals in a specific way.
- *Naturalist Intelligence.* Ability to make own definitions and categorizations for plants, animals, and whatever in nature.
- *Bodily Intelligence.* Ability to use one's own body to make plausible decisions or solve daily life problems.
- *Interpersonal Intelligence.* Ability to understand other people's motions.
- *Intrapersonal Intelligence.* Ability to understand one's own motions (Christodoulou, Seider, & Gardner, 2011, pp. 485-503)."

There are different regions in brain for different types of intelligence. Different types of intelligence could either work together or separately in brain. However, a person's logical or musical intelligence could be dominant while the other intelligence types are not. Even though a person may have various intellectual power or weakness, the mind could be improved through effective and proper education. Although the students have specific intelligence types, so specific learning needs, lots of teachers take only the verbal and mathematical intelligence into consideration while organizing the teaching domains (Levin & Nolan, 2007). So, students' specific skills are being ignored too. This situation could affect students negatively by preventing their real potential intelligence improvements which would make them not to challenge with daily problems. Thanks to this theory, students could learn the science concepts based on their specific intelligence types.

Investigations on MIT in different educational domains were studied to make it clear whether there was an important advantage of the theory to conduct science education or not (Azar, Presley & Balkaya, 2003; Baragona, 2009; Bellflower, 2008; Campbell & Campbell, 1999; Douglas, Burton, & Reese-Durham, 2008; Kayıran &

Iflazoğlu, 2007; Lindvall, 1995; O'Connell, 2009; Shearer, 2004; Wares, 2013). These investigations indicated that the educational environments based on MIT had much more advantages in terms of students' achievement than the educational environments based on TIM. The investigators stated that the students' retention level of science concepts could be enhanced when educational environments were constructed on the basis of MIT philosophy (Akamca, 2003; Azar, Presley, & Balkaya, 2006; Can, Altun, & Harmandar, 2011; Koksal & Yel, 2007; Ozdemir, Guneyisu, & Tekkaya, 2006). Moreover, some studies showed that education based on multiple intelligence had a positive effect on students' attitudes towards science (Balim, 2006; Goodnough, 2001; Kayıran & Iflazoğlu, 2007) although some studies found that MIT did not make a meaningful difference in student attitudes when compared with TIM (Akamca, 2003; Gurcay, 2003; Ozdemir, 2002; Tasezen, 2005; Ucak, Bag, & Usak, 2006). Moreover, MIT might be integrated into science lessons to improve students' motivation as well (Campbell, 1991). According to the evidence obtained from the literature, although there were findings indicating that multiple intelligences based applications positively affect students' achievement in science subjects, chemistry education researchers should conduct much more studies to demonstrate the effect of multiple intelligence theory practices on students' cognitive skills. In particular, researchers should focus on the effectiveness of MIT for students' motivation to learn chemistry.

Other factors which could affect the students' learning of science are the emotional dimensions which receive less attention than the cognitive dimensions (Cetin-Dindar & Geban, 2012; Morgan, 2006; Nieswandt, 2007). Emotional dimension is defined as "the emotional side of human behaviour" (Brown, 1994, p. 135). Also, the emotional variables are mainly based on attitude and motivation factors. The motivation is the one of the primary emotional factors (Akbas & Kan, 2006). Motivation is described as "a process for the willingness of an activity to sustain" (Pintrich & Shunk, 2002, p.5). Researches on the theme of learning motivation showed that when students were motivated, they focused on the learning of the targeted science concepts (Cetin-Dindar & Geban, 2017; Sanfeliz & Stalzer, 2003). However, in some studies it was showed that students could have insufficient success when they had insufficient learning motivation (Arroyo, Rhoad, & Drew, 1999; Atta & Jami, 2012). Moreover, the attitude towards science is another emotional dimension to affect students' science learning (Velloo, Perumalb, & Vikneswarya, 2013). Osborne, Simon, and Colli (2003) made a description for attitude as "feelings, beliefs, and values held about science and the impact of the science on society" (p. 1050). Thus, students' learning of science concepts has a crucial role in improving students' attitude and motivation towards science. For this aim, this study would give basic information regarding to the effectiveness of 5E LC model and Gardner's MIT on students' success and their retention level, attitude towards chemistry, and motivation to learn chemistry when compared with TIM in the unit of chemical properties concepts on ninth grade high school students.

The Main Problem

The basic problem of this study is: "What are the effects of 5E LCM and MIT on ninth grade students' achievement and their retention level, attitude towards chemistry, and motivation to learn chemistry when compared with TIM in the unit of chemical properties in public Anatolian high schools in Kecioren District of Ankara?"

The Sub-problems

The Sub-problem-1.

Is there a significant mean difference among the 5E LCM, MIT, and TIM on students' achievement in the unit of chemical properties when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (Self-Efficacy (SE), Anxiety (ANX), Goal Orientation (GO), Intrinsic motivation (IM) and Self-Determination (SD)) scores are controlled as covariates?

The Sub-problem-2.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' retention level in unit of chemical properties concepts when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problem-3.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' attitudes toward chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problem-4.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' intrinsic motivation construct of motivation for learning chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problems-5.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' goal orientation construct of motivation for learning chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problems-6.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' self-determination construct of motivation for learning chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problems-7:

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' self-efficacy construct of motivation for learning chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

The Sub-problems-8.

Is there a significant mean difference among 5E LCM, MIT, and TIM on students' anxiety construct of motivation for learning chemistry when students' pre-existing knowledge of chemical properties concepts, attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores are controlled as covariates?

Methodology

The methodology of this research, the sample, the study design, the data collection tools, teaching processes for each group, and the data analysis methods, was presented in this part.

Research Design

The research design of the investigation was the non-equivalent control group design as a type of quasi-experimental design. It was selected because "the quasi-experimental design does not include the use of random assignment of participants to treatments groups" (Fraenkel & Wallen, 2009, p. 271). The research design of the study was shown in Table-1. There were three different types of instructional methods as being 5E LCM and Gardner's MIT and TIM in this study. The 5E LCM was intended to one of the experimental groups (5EG) and the MIT was applied to another experimental group (MIG). Also, TIM was applied to the control group (TIG).

Table 1. Research Design of the Study

Groups	Pre-test	Treatment	Post-test	Retention
5EG	CPAT ASTC CMQ	5E	CPAT ASTC CMQ	CPAT
MIG	CPAT ASTC CMQ	MIT	CPAT ASTC CMQ	CPAT
TIG	CPAT ASTC CMQ	TI	CPAT ASTC CMQ	CPAT

Note: 5EG: 5E learning cycle model group (experimental group-1); MIG: Multiple intelligence group (experimental group-2); TIG: Traditional instructional group (control group); CPAT: The Chemical Properties Achievement Test; CMQ: The Chemistry Motivation Questionnaire; ASTC: The Attitude Scale toward Chemistry

Before the application process, the groups could not be randomly selected because the classrooms had already formed before the educational year. The investigator and the instructor decided that each group would receive training on different days of week to prevent the students from informing each other about the trainings given in the group. Hence, the groups could be selected randomly for different instructions.

Population and Sample Group

The main population must be accessible; therefore, all ninth-grade students studying at high schools in Keciören were selected as the main population because this district was a crowded part of Ankara. There were two reasons for choosing Keciören. One of the reasons was that Keciören is a similar place to Turkey populations due to migration from different places. Therefore, the findings of the investigation might be generalized to the target population. 17 Anatolian High Schools are located in this region (Ministry of National Education, 2014). Thus, one of the schools was selected conveniently for the sample of the pilot and the main study since it was very difficult to reach all schools in the region. In the study, Anatolian High School name was used instead of the school's original name due to ethical rules. There were eight-ninth grade classes at this school, six of them were taught by women and two of them by men instructors. A woman instructor accepted to take part in the study; so, teacher factor might be eliminated for internal validity too. Also, 151 ninth-grade students voluntarily attended to the study as the sample of this study being educated in three different classes in the same public secondary school in Kecioren region. Demographic characteristics of the participants were as follows:

The participants' ages were 14-15. The participants were 69 male and 82 female ninth grade students. Their socioeconomic status was moderate. The number of students in each group was 23 boys and 24 girls for the 5EG (experimental group-1), 23 boys and 27 girls for the MIG (experimental group-2), and 23 boys and 31 girls for the TIG (control group). In addition, firstly a pilot study was conducted in the same school with all tenth-grade students to test the data collection tools. The sample of the pilot study consisted of 73 boys and 91 girls tenth-grade students from the same school.

All students were told about ethics. It was made clear to students that the names and the school's name were not given in the study instead codes would be used. Attendants were told to have every right to withdraw from the research whenever they would like. Moreover, it was stated that the tests used in the study would not be included in their course evaluation. In addition, the teacher, the students, and their parents filled a consent form.

Data Collection Tools

“Chemical Properties Achievement Test (pre, post, and ret), “Attitude Scale toward Chemistry”, and “Chemistry Motivation Questionnaire” were utilized as data collection tools in this study.

Pre-unit of Chemical Properties Achievement Test. The “Chemical Properties Achievement Test (Pre-CPAT)” was utilized to participants before the application process to determine their pre-information on the unit of the chemical properties and also to possible differences between the groups at the beginning of the application if there were any. Pre-CPAT was constructed on the basis of eighth grade science and technology teaching program by

the investigator because participants have not yet learned new concepts in the new unit such as polymerization or hydrolysis. Testing effect was controlled too. The test consisted of 20 multiple-choice items, each question with five choices. For Pre-CPAT, the right answers were coded as “1” and wrong and blank responds were coded as “0”. Hence, the possible maximum score for Pre-CPAT could be as “20”. If participants would take higher scores form the pre-test then this would mean they had sufficient pre-knowledge about the concepts. The items’ concepts were about physical and chemical changes, chemical reaction types, endothermic and exothermic reaction, and chemical properties.

The questions were constructed by using textbooks, exercise books, literature, and the internet as multiple data sources. After the questions and the choices were prepared, a rubric for content validity was also constructed. Test items were evaluated by five experts in education for content validity. Afterwards, two ninth grade students assessed the test for clarity of the questions and the required time which was around 25 minutes. After checking the face validity of the pre-CPAT, the instrument’s last version was prepared. Then all tenth-grade students (91 females and 73 males) from the same school took the test to the reliability of the tool before the investigation. According to the pilot study’s findings, the reliability was 0.64 which was an acceptable value for the reliability. After validity and reliability assessments, the final version of the test was utilized to all students in groups as a pre-test before the application process in the main study. Some sample questions from the Pre-CPAT were given in the Appendix A.

Post-Unit of Chemical Properties Achievement Test. The participants were utilized the Post-CPAT to determine the efficiency of methods on students’ success among the groups at the end of investigation. This tool was consisted of 40 multiple choice items. The correct answers were coded as “1” and the wrong or blank answers were coded as “0”. So, one could get a maximum score as being “40”. The items were about physical and chemical changes, chemical properties, chemical reaction kinds, endothermic and exothermic reactions, and polymerization and hydrolysis. Each question in the Post-CPAT was checked by same five educators for the content validity. After the revision, the Post-CPAT was utilized to the same tenth grade students from the same school as a pilot study. The reliability was found as 0.89. This last version of the test was administered to all participants in all groups as a post-test after the application process. Some sample questions from the Post-CPAT were shown in the Appendix B.

Attitude Scale toward Chemistry. This instrument was improved by Geban, Ertepinar, Yılmaz, Altın, and Sahbaz (1994) and it was applied in this study to determine the students’ attitudes toward chemistry. There were 15 items on a 5-point Likert scale in the tool, ranging from 1 to 5; from disagree to agree. The Cronbach alpha reliability co-efficient was computed as .83 which was very high. The score taken from the tool could be between 15 and 75. The instrument was utilized to all groups as pre and post-test.

Chemistry Motivation Questionnaire (CMQ). The Science Motivation Questionnaire (SMQ) was constructed by Glynn and Koballa (2006) to evaluate students’ motivation to science. In this study, the science motivation questionnaire translated by Cetin-Dindar & Geban (2015) for integrating it into chemistry was used. This tool consisted of five parts as “self-efficacy in learning chemistry with eight items”, “anxiety about chemistry assessment with five items”, “relevance of learning science to personal goals with seven items”, “intrinsically motivated chemistry learning with five items”, and “self-determination for learning chemistry with five items”, respectively. The reliability co-efficient of CMQ (Cronbach’s alpha) was found as 0.902. This data collection tool was given to all groups at the beginning and end of the process.

Data Collection

Treatments. The 5E LCM, MIT, and TIM teaching methods were used in this study. Before the application process the researcher and the teacher agreed on how to conduct the lessons according to different teaching methods through six hours in two weeks. Also, the researcher and the teacher made it clear the teacher role and the students’ roles through 5E LCM model and MIT.

5E Learning Cycle Instruction. Lesson plans on the basis of 5E LCM were constructed. The application process began with the *engagement* stage. In this stage it was so important to make students engage with the topic; thus, it was needed to take their attention into the topic. The teacher began to the lesson with a daily life problematic situation. She asked: “Which of the matters in the photo go through physical change and which of them go through a chemical change. Why?”, “Also, in which picture, have the particular structure of matters changed?” (Some

examples from the pictures: slicing of apple, minced meat, blackened silver). Afterwards, it was made students to criticize their own and each other's thoughts. The teacher did not give the right answers directly, she only prompted the process. The teacher also gave chance to the students to talk about their prior knowledge. *As the exploration phase*, students constructed connections, observations, questions, and examples about the concepts. Students conducted experiment-1 process in laboratory in six groups in which five individuals per group. In this experiment, it was targeted to make students distinguish the differences between physical and chemical changes.

Sample Experiment-1:

Problem: What are the differences among three changes done to sugar?

Equipment: cube sugar, two 100 ml beakers, two mixers, mortar

Process:

1. Put six cube sugars at mortar, pound them into powder, and take notes about your observations.
2. Put six cube sugars in both of the 100 ml beakers. Add 40 ml boiled water to the first beaker. Add 40 ml sulphuric acid to the second beaker. Mix the beakers with mixer.
3. Wait for three minutes then write down your observations.

In this part, the teacher had a role as a guide for encouraging students, listening to students, observing, and providing interactions among participants. Also, teacher enabled students to reach to knowledge by asking questions, instead of giving the answers directly. *In the explanation part*, the experiment findings must be discussed, in detail. Students discussed the given questions above to make it clear the differences between the physical and chemical changes. Finally, the characteristics of physical and chemical changes were revealed together with the students. *In the elaboration part*, with new experiments the students' understanding about the concepts was deepened. Students were again grouped for the experiment-2.

Sample Experiment-2:

Problem: Group the changes of KMnO_4 processes.

Types of Equipment: KMnO_4 , Na_2SO_3 , H_2SO_4 , H_2O , NaHCO_3 , one 100 ml beaker, one mixer

1. Take a bit KMnO_4 with scoop's edge and put it in a beaker, add some H_2O and write down whatever you observed.
2. Then add some Na_2SO_3 to the same beaker with scoop's edge and write down the observations again.
3. And then add 10 ml H_2SO_4 to the same beaker and write your observations.
4. Finally, add Na_2SO_3 to the same beaker again with scoop's edge and take observation notes.

The last step of 5E LCM was *evaluation* step. In this step, the teacher should evaluate students' learning and understanding of all the process. The evaluation step occurred in every stage since the teacher made all students take part in discussions, ask and answer questions. The teacher allowed students to discuss the potential responses to the questions and observed their mental development in their social learning environment, and carefully examined whether their creativities, abilities or conceptual knowledge were improved or not. She also gave open-ended or multiple-choice questions at the end of each step to use a different assessment method. In each step, enough time was given to students to answer the questions. In addition, if the students did not find plausible answers for the questions, the teacher prompted the students with proper hints for these questions. For instance, "Which change exemplifies the firefly's glowing in light? Why?" questions were prompted by the teacher with proper hints instead of directly giving the true answers to make students have meaningful learning experiences. The other lesson plans were designed accordingly.

Gardner's Multiple Intelligence Theory Based Instructions. The unit of chemical properties' targets were integrated into all eight different intelligence types (Tuysuz, 2017). The procedure was shown in Table 2.

Table 2. The procedure used in MIT

<i>Multiple Intelligence Teaching Learning Activities-1</i>							
Linguistic Intelligence	<p>Groups were formed and “<i>Taboo of Chemistry</i>” was played regarding the physical and chemical changes. In the game, a student from a group took a card and told the concept concerning with physical and chemical changes to his or her group mates in a minute. The student told the concept without utilizing a banned word given on the card. Students in the other group checked to see if the narrator spoke the banned word. If the narrator used a banned word, the game went to the other group. With this game, it was aimed to develop students’ linguistic intelligence. An example from the cards was given below.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="background-color: #d9e1f2;">PHASE CHANGE</th> </tr> </thead> <tbody> <tr> <td style="background-color: #d9ead3;">Physical property</td> </tr> <tr> <td style="background-color: #d9ead3;">Melting</td> </tr> <tr> <td style="background-color: #d9ead3;">Freezing</td> </tr> <tr> <td style="background-color: #d9ead3;">Heating</td> </tr> <tr> <td style="background-color: #d9ead3;">Chemical change</td> </tr> </tbody> </table>	PHASE CHANGE	Physical property	Melting	Freezing	Heating	Chemical change
PHASE CHANGE							
Physical property							
Melting							
Freezing							
Heating							
Chemical change							
Naturalist Intelligence	<p>The physical and chemical changes occurred in nature were asked to students. The students conducted a discussion.</p>						
Interpersonal Intelligence	<p>A game connected with physical and chemical changes was performed by the groups. In the game, different physical and chemical changes from daily life were given to groups. The first group which found six physical and six chemical changes truly with their explanations would win the game.</p> <p>Experiments related to physical and chemical changes were conducted. Problem: What are the differences among the three changes made in sugar? Equipment: cube sugar, two 100 mL beakers, two mixers, mortar.</p>						
Mathematical intelligence	<p>In experiments, students proposed hypothesis. Wrote down their observations. Distinguished physical and chemical changes. Classified physical and chemical characteristics. Wrote chemical reactions with the proper constituents and products and also with true stoichiometries. Derived specific equations for chemical reactions.</p>						
Intrapersonal Intelligence	<p>“Suppose you were in the sizes of a matter. What changes could you do? Write a poem.” situation was given to students.</p> <p>Example: I do not deal with matter’s identity, Because I have physical properties, Size, shape, form, appearance, My business is the same for all matters. My particles are not the same when I appear Because I have chemical properties, Radiating, emitting light, changing color are my signs, All matters change identity after meeting with me.</p>						
Spatial Intelligence	<p>Simulations and animations about physical and chemical changes were indicated.</p>						
Musical Intelligence	<p>Physical and chemical changes songs were sung. Participants could present the poem they wrote if they wished.</p>						
Bodily Intelligence	<p>Willing students staged a play based on physical chemical changes’ concepts. The physical and chemical changes’ concepts occurred in the theatre were discussed by the students. So it was targeted to make students use their bodily intelligence. Sample Theater</p>						

H₂O: Anymore, I am so cheerful since the weather is a bit warm nowadays. I was frozen all during the winter. Also, my particles couldn't move so much. I started to get around when spring came. When summer happens, I'll fly into the air with joy.

H₂: I want to move freely as well. This oxygen got a hold of me and did not leave me. Oh, I wish someone would come and save me.

O₂: It's not so easy to tear me apart and move me away from you. I gave up myself to be with you. I became someone else completely. Our connection with you gives life to all humanity.

H₂O: Ok stop fighting, isn't that sugar which is coming? Oh, we will enjoy ourselves thanks to him.

H₂: Oh, maybe I will be saved from oxygen by sugar.

Sugar: Hey guys what's up? I see that you have a heated argument.

H₂: Welcome sweetie, take this oxygen away from me so that I can have some peace.

Sugar: Oh dear I'd love to, but I have no intention of burning today, I need water to cool me.

O₂: Sugar, you too! Oh how quick you were to forget the days we were fueling people, thanks to me, if you don't want me I don't want you either.

The experiment related to physical and chemical changes is conducted
 Problem: Classify the changes in processes with KMnO₄.
 Equipment: KMnO₄, Na₂SO₃, H₂SO₄, H₂O, NaHCO₃, one 100 mL beaker, and one mixer

At the evaluation step, Students prepared portfolios containing all activities. Students' intelligence improvements were observed by this way. The questions were given to students as homework and the instructor would like them to write a report. They also investigated the phenomenon in nature about physical and chemical changes. Song, poem or experimental designs were done by students optionally too.

Traditional Instruction Method. The related concept about the unit was taught to participants in the control group by using traditional instruction method. The book and the teacher were the centre of knowledge. The students in TIG did not do constructivist activities like the other groups. They only listened whatever their teacher told during each of the classes. There were not any teacher-students or students-students dialectic discussion or interaction environments during the lessons. But it could have been happened that the students would talk about the instructions they thought during their breaks when they came face to face. Thus, students in TIG might be affected by this situation positively or negatively. This effect's name is called John Henry effect (Kocakaya, 2010). To minimize this effect, the lessons for all groups were carried out in laboratories. The experimental groups' students did experiments in small groups, but the control groups' students only watched passively the demonstrations carried out by their teachers. During this process, teacher used oral presentations and question-answer technique. After the lessons as being homework multiple choices tests and parts from the lesson books were given to students. Students did their homework till the following lesson. In the following lesson, homework was checked, and the instructor mentioned the correct answers to questions if the participants could not do them or they gave wrong answers.

Data Analysis

The data collection tools were evaluated in terms of descriptive and inferential statistical analysis and then the findings were interpreted. In the descriptive statistics, the mean, median, standard deviation, skewness, and kurtosis were computed to evaluate measures of central tendency and spread. Then inferential statistical analysis was conducted to examine the data and make conclusions. Thus, probability calculations were made if the observed difference between groups was a dependable one or one occurred by chance in the research (Struwig & Stead, 2001). Therefore, the Multivariate Analysis of Covariance (MANCOVA) analysis was used for this study. The purpose of utilizing MANCOVA was to check the impact of the 5E LCM and MIT with the TIM on achievement, participants' attitudes toward chemistry and the motivation to learn chemistry under the control of the effect of all students' pre-test scores as a covariate on the chemical properties' concepts. In addition to these analyses, also the one-way analysis of variance (ANOVA) was made to evaluate suitable covariates. Moreover, the Pearson correlation for Pre-CPAT, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX was controlled to

investigate if there was a significant difference among the groups. Finally, the assumptions of MANCOVA were checked too by this way.

Power Analysis. Being the most accepted value in literature the .05 significance level was used in this study too. Furthermore, the power was set to .80 and the effect size of this current investigation was medium as 0.15 according to the criteria of Cohen, Cohen, West, and Aiken (2003). Before the application process, the ideal sample size was computed by the shown formula below (Cohen et al., 2003, p.181).

$$L = f^2(n - kA - kB - 1)$$

The L value of this study was 9.64 from L tables (Cohen et al. 2003, p.651) based on pre-defined alpha level (.05) and power (.80). The effect size (f^2) for this study was 0.15. Moreover, kA was seven as there were seven covariates in the study which were Pre-CPAT, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX. Also, kB (number of groups-1) was two because there were three groups as 5EG, MIG, and TIG. When these values were put in the formula, the required sample size was calculated as 74. However, 151 students participated in the study and L value was calculated again. Finally, L was calculated to 21.15; thus, power was determined as 0.95 for this study.

Findings

The findings of the study consisted of six sections, were presented as ‘the descriptive statistics’, ‘the inferential statistics’, ‘the results of the unit of the chemical properties achievement test’, ‘the results of attitude scale toward chemistry’, ‘the results of motivation questionnaire, the summary of the results’, and ‘the conclusions’, respectively.

Descriptive Statistics

No missing values in data were found during the treatment of the study. In Table 3, when the differences between the mean scores of the participants’ Pre-CPAT among the groups were compared, it was calculated that the average of the students’ Pre-CPAT for all groups were nearly the same for the prior knowledge, which were 12,89 for the TIG, 12,89 for the 5EG, and 13,50 for the MIG.

Table 3. Descriptive statistics for the Pre-CPAT, Pre-ASTC, and Pre-Motivation constructs (Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX)

	N	M	SD	Skewness	Kurtosis	Min	Max
<u>Pre-CPAT</u>							
TIG	54	12,89	2,336	-0,248	-0,605	8	17
5EG	47	12,96	2,156	-0,459	-0,502	8	16
MIG	50	13,50	2,410	-0,738	-0,295	8	17
Total	151	13,12	2,301	-0,482	-0,467	8	17
<u>Pre-ASTC</u>							
TIG	54	56,72	9,772	0,033	-0,646	36	75
5EG	47	52,30	10,002	-0,394	0,238	26	74
MIG	50	50,94	10,185	-0,354	-0,485	27	71
Total	151	53,32	9,986	-0,238	-0,298	26	75
<u>Pre-IM</u>							
TIG	54	17,87	3,812	-0,073	-0,170	9	25
5EG	47	16,83	3,565	-0,320	0,194	9	24
MIG	50	16,56	3,195	0,208	-0,409	11	24
Total	151	17,09	3,524	-0,062	-0,128	9	25
<u>Pre-GO</u>							
TIG	54	24,07	6,532	-0,305	-0,494	9	35
5EG	47	22,87	5,751	0,203	0,228	8	35
MIG	50	23,06	5,479	-0,318	-0,032	9	35
Total	151	23,33	5,921	-0,140	-0,099	8	35
<u>Pre-SD</u>							

TIG	54	20,06	3,434	-0,691	-0,337	10	25
5EG	47	19,57	2,701	0,115	-0,388	14	25
MIG	50	19,02	3,217	-0,889	1,401	10	25
Total	151	19,55	3,117	-0,488	0,225	10	25
Pre-SE							
TIG	54	29,76	5,330	-0,204	-0,304	16	39
5EG	47	29,83	5,378	-0,009	0,895	15	40
MIG	50	28,48	4,739	-0,379	0,078	17	39
Total	151	29,36	5,149	-0,197	-0,223	15	40
Pre-ANX							
TIG	54	12,39	4,478	0,672	-0,051	5	25
5EG	47	11,55	4,085	0,511	-0,442	5	21
MIG	50	11,96	5,307	0,570	-0,668	5	24
Total	151	11,97	4,623	0,584	-0,387	5	25

Another finding was shown in Table 4, the average of students' Post-CPAT for both 5EG (23,66) and MIG (23,22) were nearly four points higher than TIG (19,52). The average of students' Ret-CPAT for the 5EG (22,02) and MIG (22,46) were roughly six points higher than TIG (16,52).

Table 4. Descriptive statistics for the Post-CPAT, Post-ASTC, Ret-CPAT, and Post-Motivation constructs (Post-IM, Post-GO, Post-SD, Post-SE, and Post-ANX)

	N	M	SD	Skew	Kurt	Min.	Max.
Post-CPAT							
TIG	54	19,30	4,078	-0,163	-0,653	11	28
5EG	47	23,66	4,135	-0,201	-0,537	14	32
MIG	50	23,22	4,234	0,165	-0,308	13	32
Total	151	22,06	4,149	-0,188	-0,499	11	32
Ret-CPAT							
TIG	54	16,52	3,511	0,073	-0,842	10	24
5EG	47	22,02	3,692	-0,334	-0,121	14	29
MIG	50	22,42	4,343	0,180	-0,630	15	32
Total	151	20,32	3,849	-0,027	-0,531	10	32
Post-ASTC							
TIG	54	53,28	11,080	0,290	-0,665	35	75
5EG	47	54,79	8,856	0,034	-0,413	37	75
MIG	50	54,94	9,155	0,157	-0,893	38	75
Total	151	54,34	9,697	0,160	-0,657	35	75
Post-IM							
TIG	54	17,20	4,227	-0,540	0,361	5	25
5EG	47	18,09	3,717	0,094	-0,565	11	25
MIG	50	17,90	4,249	-0,028	-0,926	9	25
Total	151	17,73	4,064	-0,165	-0,377	5	25
Post-GO							
TIG	54	24,93	6,386	-0,144	-0,554	10	38
5EG	47	28,98	5,674	0,030	0,269	15	40
MIG	50	27,32	7,347	-0,417	0,218	11	40
Total	151	27,08	6,469	-0,177	-0,022	10	40
Post-SD							
TIG	54	18,85	4,124	-0,312	-0,668	9	25
5EG	47	19,49	3,085	0,069	-0,712	13	25
MIG	50	19,94	2,972	-0,561	0,396	11	25
Total	151	19,23	3,394	-0,268	-0,328	9	25
Post-SE							

TIG	54	28,61	5,774	0,341	-0,648	19	40
5EG	47	29,19	5,207	0,204	-0,512	19	40
MIG	50	29,48	5,048	-0,090	-0,528	19	39
Total	151	29,09	5,343	0,152	-0,563	19	40
Post-ANX							
TIG	54	12,56	5,057	0,609	-0,270	5	25
5EG	47	12,47	4,408	0,292	-0,649	5	22
MIG	50	13,98	5,212	0,039	-0,743	5	25
Total	151	13,00	4,892		-0,554	5	25

It could be seen at the beginning of this research that the average of students' Pre-ASTC in the TIG was greater than 5EG and MIG because the average of students' Pre-ASTC was 56,72 for the TIG, 52,30 for the 5EG, and 50,94 for the MIG. After the application processes were completed, when the average of groups' Post-ASTC scores were compared, both 5EG (54,79) and MIG (54,94) were higher than TIG (53,28). For the Pre-CMQ constructs, when the differences among the average scores of the Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX were computed for all groups, it was seen that the pre-CMQ constructs' means in the groups were roughly the same to each other at the beginning of the study (see Table 4). Moreover, the average of Post-IM, Post-GO, Post-SD, Post-SE, and Post-ANX were in favour of 5EG and MIG. Notably, the average of Post-GO values for 5EG and MIG were roughly four points higher than TIG. Furthermore, the other constructs of motivation were slightly in favour of 5EG and MIG after the application processes. Therefore, it was needed to check in depth analysis in SPSS whether these differences were statistically significant or not.

Inferential Statistics

This section of the research was given as 'the determination of covariates', 'assumptions of MANCOVA', and 'the results of MANCOVA' respectively.

The Determination of Covariate

In this study, there were eight independent variables, seven of them were continuous (Pre-CPAT, Pre-ASTC, Pre-Intrinsic, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX), and one of them was categorical (Groups). The participants' Post-CPAT, Ret-CPAT Post-ASTC, Post-IM, Post-GO, Post-SD, Post-SE, and Post-ANX scores were the eight continuous dependent variables. According to Tabachnick and Fidell (2007), the appropriate inferential statistics test could be MANCOVA due to the impact of two or more continuous dependent variables from an independent grouping variable while controlling the effect of one or more covariate factors. This analysis was done; thus, the possible covariates should be defined "whether they used as a covariate or not at the beginning of the analysis since the using of well-chosen covariates could help for decreasing the confounding influence of group differences" (Pallant, 2005, p. 264). Tabachnick and Fidell (2007) suggested that suitable covariates should be continuous variables, statistically uncorrelated with each other, and high correlated with at least one dependent variable. Firstly, Pre-CPAT, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX scores were run the one-way ANOVA to investigate if there was a significant difference between the groups. In Table 5, the finding of Levene's test was not shown a significant difference for Pre-CPAT, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX when the alpha value was set at .05. Thus, the error variances for the TIG, 5EG, and MIG were equal.

Table 5. Test of homogeneity of variances for independent variables

	Levene Statistic	df1	df2	Sig.
Pre-CPAT	0,287	2	148	,751
Pre-ASTC	0,072	2	148	,931
Pre-IM	0,529	2	148	,591
Pre-GO	1,424	2	148	,244
Pre-SD	0,860	2	148	,425
Pre-SE	0,559	2	148	,573
Pre-ANX	2,169	2	148	,118

Secondly, when it was seen in Table 6 to evaluate whether there was a statistically significant mean difference between the groups regarding to independent variables or not, the one-way ANOVA outcomes showed that there was not any statistically significant mean differences among groups regarding to Pre-CPAT (.347), Pre-IM (.140), Pre-GO (.545), Pre-SD (.249), Pre-SE (.341) and Pre-ANX (.667) because all p-values were higher than the significance level of .05. So, the Pre-CPAT, Pre-IM, Pre-GO, Pre-SD, Pre-SE and Pre-ANX variables were not needed to use as covariates according to these findings. However, it was so important to control whether there was a correlation between these independent variables and dependent variables or not.

Table 6. Results of one-way ANOVA for independent variables

		Sum of Squares	df	Mean Square	F	Sig.(p)
Pre-CPAT	Between Groups	11,338	2	5,669	1,065	,347
	Within Groups	787,748	148	5,323		
	Total	799,086	150			
Pre-ASTC	Between Groups	955,537	2	477,768	4,795	,010
	Within Groups	14745,483	148	99,632		
	Total	15701,020	150			
Pre-IM	Between Groups	50,035	2	25,018	1,996	,140
	Within Groups	1855,051	148	12,534		
	Total	1905,086	150			
Pre-GO	Between Groups	43,209	2	21,605	,609	,545
	Within Groups	5247,758	148	35,458		
	Total	5290,967	150			
Pre-SD	Between Groups	27,850	2	13,925	1,405	,249
	Within Groups	1467.303	148	9,914		
	Total	1495,152	150			
Pre-SE	Between Groups	57,700	2	28,850	1,085	,341
	Within Groups	3936,989	148	26,601		
	Total	3994,689	150			
Pre-ANX	Between Groups	17,603	2	8,802	,406	,667
	Within Groups	3210,370	148	21,692		
	Total	3227,974	150			

According to ANOVA ($F(2,148) = 4,795, p = .010$) result, there was statistically difference between the groups regarding the mean of Pre-ASTC ($p < 0.05$). The post-hoc analysis (the Tukey HSD tests) was also run to see which of the groups' averages were different. Table 7 showed that there was a statistically significant difference between TIG and MIG with the average of Pre-ASTC ($p < 0.05$). Hence, Pre-ASTC was used as a covariate in the main analysis.

Table 7. Post-Hoc Test for Pre-ASTC

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TIG	5EG	4,424	1,991	,071	-,29	9,14
	MIG	5,782*	1,959	,010	1,14	10,42
5EG	TIG	-4,424	1,991	,071	-9,14	,29
	MIG	1,358	2,028	,781	-3,44	6,16
MIG	TIG	-5,782*	1,959	,010	-10,42	-1,14
	5EG	-1,358	2,028	,781	-6,16	3,44

* The mean difference is significant at the .05 level.

Moreover, it was checked whether there was a correlation between the independent variables and dependent variables or not. According to Mayers (2013), "a reasonable relationship between the covariates and the dependent variables should be between $r = .30$ and $r = .90$ " ($p.372$). If the correlation was not in this range, it could not be used as covariates in this analysis. Table 8 showed that a reasonable correlation was among independent variables

and the dependent variables ($r = .30$ and $r = .90$). Thus, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX satisfied as covariates due to the required range. For example, while the correlation among Pre-ASTC and Post-GO, Post-SD was moderate, the correlation among Pre-ASTC and Post-ASTC, Post-IM, Post-SE was high. However, for Pre-CPAT, there was small correlation among dependent and other independent variables.

Table 8. Pearson Correlation among the continues variables

	Pre-CPAT	Pre-ASTC	Pre-IM	Pre-GO	Pre-SD	Pre-SE	Pre-ANX	Post-CPAT	Ret-CPAT	Post-ASCT	Post-IM	Post-GO	Post-SD	Post-SE	Post-ANX
Pre-CPAT	1	.132	.162*	.188*	-.081	.175*	.163*	.262**	.217**	.151	-.033	.096	.033	.096	.094
Pre-ASTC	.132	1	.494**	.453**	.459**	.492**	.346**	.082	.055	.695**	.585**	.497**	.445**	.548**	.262**
Pre-IM	.162*	.494**	1	.420**	.390**	.459**	.255**	.142	.117	.641**	.644**	.496**	.423**	.532**	.239**
Pre-GO	.188*	.453**	.420**	1	.424**	.452**	.163*	.121	.156	.604**	.506**	.662**	.563**	.527**	.162*
Pre-SD	-.081	.459**	.390**	.424**	1	.492**	-.105	.127	.087	.479**	.425**	.479**	.571**	.412**	-.039
Pre-SE	.175*	.492**	.459**	.452**	.492**	1	.208*	.175*	.206*	.568**	.441**	.465**	.515**	.694**	.136
Pre-ANX	.163*	.346**	.255**	.163*	-.105	.208*	1	.048	-.002	.240**	.205*	.028	-.038	.246**	.596**

** . Correlation is significant at the .01 level (2-tailed).

*. Correlation is significant at the .05 level (2-tailed)

Another crucial point was that suitable covariates should not be highly correlated with each other (Pallant, 2005). The correlations between independent variables were either small or moderate (check Table 8). According to these findings, Pre-ASTC, Pre-IM, Pre-GO, Pre-SD, Pre-SE, and Pre-ANX could be utilized as a covariate for the main analysis.

Assumptions of MANCOVA

Assumptions of MANCOVA must be met for performing the analysis. In this part, ‘the level for dependent and independent variables’, ‘the sample size, the independence of observation’, ‘the normality’, ‘the outliers’, ‘the homogeneity of regression’, ‘the multicollinearity, and the singularity’, and ‘the homogeneity of variance-covariance matrices’ were evaluated to continue this analysis, respectively.

Level for both dependent and independent variables. The independent variables must be categorical (with at least two groups) while two or more dependent variable must be interval or ratio (Mayers, 2013). Thus, the Post-CPAT, Ret-CPAT Post-ASTC, Post-IM, Post-GO, Post-SD, Post-SE, and Post-ANX were the eight continuous dependent variables. There was one categorical independent group, which were TIG, 5EG, and MIG. Therefore, this assumption was satisfied.

Sample size. In each cell for dependent variables must have more participants to satisfy the normality and equal variances of this research. The minimum number of students in each cell in the current investigation must be eight. According to MANCOVA output. In this case, there were at least 47 subjects in each cell. Therefore, the required number of students was provided for each cell.

Independence of observation. According to Pallant (2005), each participant or case should be counted only once, and the data from one subject did not affect the data from other. To verify the independence of the observation assumption, the training of the groups was carried out on different days of the week to minimize the interaction. The TIG was instructed on Tuesdays, 5EG on Thursdays, and MIG on Fridays of the week. By this way the interactions among groups tried to be minimized. Moreover, it was hoped that all participants individually answered the questions of instruments. Therefore, the validity assumption was met.

Normality. For univariate analysis, either statistical or graphical methods could be used for evaluating the normality of continuous variables. The skewness and kurtosis were two components of normality. “Skewness gives information on the symmetry of the distribution. Kurtosis shows the distribution is whether too peaked or too flat” (Tabachnick & Fidell, 2007 p. 79). Theoretically, scores of skewness and kurtosis should be zero (Tabachnick & Fidell, 2007). However, Field (2009) stated that it could be accepted as a normal distribution when the values of skewness and kurtosis in the range of -2 and +2. As evident from Table 3-4, all skewness and kurtosis values for both dependent and independent variables might be accepted as normally distributed because the ranging of all values were between -1 and +1. Thus, the univariate normality was met for the present study. Next, Box’s test of equality of covariance matrices was evaluated for controlling the multivariate normality. As could be seen in Table 9, the significance values in the Box test for this study ($p = .092$) was larger than the alpha level for this study (.05). Therefore, this assumption was satisfied.

Table 9. Box's Test of Equality of Covariance Matrices

Box's M	95,741
F	1,227
df1	72
df2	59595,009
Sig.	,092

Outliers. Outliers were another important assumption for this research. Thus, both univariate and multivariate outliers must be found at the beginning of the investigation. For the univariate outliers, “it is considered that there are cases (one or more) with exemplifying extreme value on one variable” (Tabachnick & Fidell, 2007, p.73). It was seen in Figure 3 that there were entirely ten extreme data points on the independent variables in the groups, which were five of them on the Pre-SD (number of case-51 in the TIG and number of cases-106,130,135, and 150 in the MIG), two of them on the Pre-SE (number of cases-72 and 81), and two of them on the Pre-GO (number of case-72 in the 5EG, number of case-106 in the MIG) and one of them on the Pre-ASTC (number of case-55). It was also revealed that there were four extreme points in the post-tests scores, which were one extreme data points (54) on the Post-IM in the TIG, one outlier (31) on the Post-ANX, one extreme data points (95) on the Post-GO in the 5EG, and one outlier (106) on the Post-SD in the MIG, respectively.

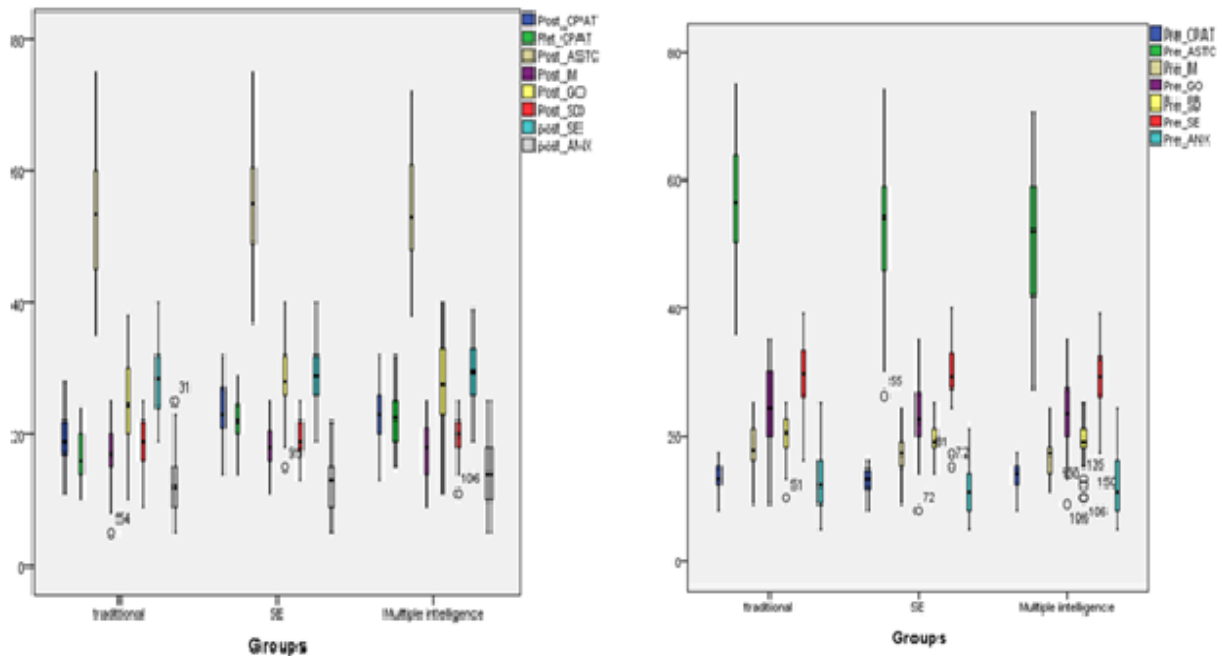


Figure 3. The extreme cases of the independent variables and dependent variables in the groups.

On the basis of these findings, it was crucial to investigate if those outliers significantly affect the average. Thus, “one method is that all of the continuous variables data is transformed to standardize scores (z-scores), and then if the z-scores are higher than +3.29 or lower than -3.29, these cases are the potential outliers” (Tabachnick & Fidell, 2007, p. 73). When looked in Table 10, extreme z-scores were not found because all min. and max standardized z-scores for the variables were between -3.29 and +3.29. Thus, it could be accepted that there were not any extreme univariate outliers in the data.

Table 10. Pre and post-tests min. and max z scores values

	TIG		5EG		MIG	
	Min.	Max.	Min.	Max.	Min.	Max.
Pre-CPAT	-2,22	1,68	-2,22	1,25	-2,22	1,68
Pre-ASTC	-1,70	2,11	-1,90	2,01	-2,58	1,72
Pre-IM	-2,28	2,21	-2,28	1,93	-1,72	1,93
Pre-GO	-2,42	1,96	-2,59	1,96	-2,42	1,96
Pre-SD	-3,03	1,72	-1,76	1,72	-2,42	1,77
Pre-SE	-2,59	1,87	-2,78	2,06	-2,40	1,87
Pre-ANX	-1,51	2,81	-1,51	1,94	-1,51	2,59
Post-CPAT	-2,39	1,32	-1,74	2,19	-1,96	2,19
Ret-CPAT	-2,16	0,81	-1,31	1,87	-1,10	2,50
Post-ASTC	-1,98	2,12	-1,77	2,12	-1,66	1,81
Post-IM	-3,12	1,79	-1,65	1,79	-2,14	1,79
Post-GO	-2,54	1,65	-1,79	1,95	-2,39	1,95
Post-SD	-2,99	1,61	-1,84	1,61	-2,42	1,61
Post-SE	-1,89	2,05	-1,89	2,05	-1,89	1,86
Post-ANX	-1,62	2,43	-1,62	1,82	-1,62	1,82

Moreover, it was needed to find Mahalanobis distance to check the multivariate outliers in the data. Mahalanobis distance calculates “the distance of a particular case from the centroid of the remaining cases, where is the centroid is the point created by means of all the variables” (Tabachnick & Fidell, 2007, p. 74). For this assumption to be provided, Mahalanobis distance value was computed if any data points had an unusual pattern of scores across the eight dependent variables in the data. It was seen that the Mahalanobis distance maximum value was 34,771 in Table 11. This value was necessary to contrast a critical value to evaluate if there were one or more multivariate outlier/s by checking the chi-square table with the number of the dependent variables with the degrees of freedom (df) and the alpha value was set .001 (Tabachnick & Fidell 2007; Pallant, 2005).

Table 11. Residuals Statistics^a

	Min.	Max.	Mean	SD	N
Predicted Value	,99	3,19	1,97	,468	151
Std. Predicted Value	-2,100	2,595	,000	1,000	151
Standard Error of Predicted Value	,079	,345	,167	,044	151
Adjusted Predicted Value	,99	3,24	1,97	,470	151
Residual	-1,172	1,486	,000	,688	151
Std. Residual	-1,657	2,102	,000	,973	151
Stud. Residual	-1,683	2,153	,000	1,002	151
Deleted Residual	-1,230	1,560	-,001	,730	151
Stud. Deleted Residual	-1,694	2,182	,001	1,006	151
Mahal. Distance	,863	34,771	7,947	5,137	151
Cook's Distance	,000	,055	,007	,009	151
Centered Leverage Value	,006	,232	,053	,034	151

a. Dependent Variable: Groups

When the chi-square table was checked for the eight dependent variables, the critical value for this investigation was maximum value 26,12 (Warner, 2012). Thus, Mahalanobis distance maximum value (34,771) for this study was bigger than the critical chi-square value (for df= 8, 26.12). This value was showed that there was at least one of multivariate outliers in this analysis. The simplest way to detect the outlier/s was arranged from largest to smallest MAH_1. It was appeared that the scores of two cases (ID=106 with a score of 34,770 and ID=128 with a score of 30,196) were greater than the critical value in Table 12. Therefore, it was decided to leave this person in the data analysis because the approximately same result was obtained when these extreme outliers were excluded from the analysis. These extreme participants were also appeared to be sampled from the target population (Tabachnick & Fidell, 2007). Finally, this assumption was satisfied.

Table 12. The cases were listed in order from largest to smallest MAH_1

Mahal. Distance_1	Case Number	Statistic
1	106	34,770
2	128	30,196
3	105	26,091
4	48	22,614
5	51	21,149
6	46	21,017
7	143	18,017
8	43	17,597
9	54	17,595
10	62	15,758

Homogeneity of Variance. This assumption was checked by using Box's M Test to see the equality of variances of this research. The significance values for the Box's M Test ($p = .092$) were higher than .05 in Table 10. Thus, the covariance matrices were found equal to each other for the study. Levene's Test could also be used to assess if the variances of each dependent variable score were similar for each group or not, separately. It was estimated that the variances were equal across groups as the null hypothesis in the Levene's Test. According to Levene's test outcomes, the Post-CPAT, Ret-CPAT, Post-IM, Post-GO, Post-SE, and Post-ANX values were greater than .05 in Table 13. However, the Post-ASTC and Post-SD values were less than alpha level (.05). Hence, the assumption of homogeneity of variances was not met for Post-ASTC and Post-SD values. This finding might lead to enhance the chance of a Type-I for the investigation. According to Tabachnick and Fidell (2007), the violations of homogeneity of variances should be satisfied by setting a more stringent alpha level rather than the conventional .05 level to decrease Type-I error. Therefore, the Bonferroni correction should be set the significance cut-off at alpha/number for separate analyses to identify significance level for the follow-up ANCOVA analysis. At this point, the determined alpha level of .05 was divided by the number of analysis. In this case, there were eight dependent variables to examine in the study; therefore, it was considered the study results significantly only if the probability value was less than .0063.

Table 13. Levene's Test of Equality of Error Variances

	F	df1	df2	Sig.
Post-CPAT	0,214	2	148	,808
Ret-CPAT	1,781	2	148	,172
Post-ASTC	5,451	2	148	,005
Post-IM	0,110	2	148	,896
Post-GO	0,564	2	148	,570
Post-SD	9,310	2	148	,000
Post-SE	0,127	2	148	,880
Post-ANX	1,072	2	148	,345

Multicollinearity and Singularity. Before MANCOVA analysis multicollinearity and singularity assumptions must be checked too. Firstly, it was separately utilized the Pre-CMQ constructs as dependent variables to control singularity assumption. Afterwards, it was named the multicollinearity in the data when the input variables would be very high correlated with each other, which was greater than .90 (Tabachnick & Fidell, 2007). Linear regression analysis was used for this. In Table 14, it could be seen that multicollinearity assumption was satisfied because there was a correlation less than .90 between dependent variables for this study.

Table 14. Pearson Correlation among the dependent variables

	Post-CPAT	Ret-CPAT	Post-ASTC	Post-IM	Post-GO	Post-SD	Post-SE	Post-ANX
Post-CPAT	1	,789**	,232**	,182*	,259**	,175*	,141	,137
Ret-CPAT	,789**	1	,270**	,238	,304**	,175*	,194*	,119
Post-ASTC	,232**	,270**	1	,689**	,613**	,611**	,708**	,305**
Post-IM	,182*	,238**	,689**	1	,536**	,524**	,584**	,201*
Post-GO	,259**	,304*	,613**	,536**	1	,606**	,614**	,153
Post-SD	,175*	,175*	,611**	,524**	,606**	1	,622**	-,008
Post-SE	,141	,194*	,708**	,584**	,614**	,622**	1	,235**
Post-ANX	,137	,119	,305**	,201**	,153	-,008	,235**	1

** Correlation is significant at the .01 level (2-tailed) * Correlation is significant at the .05 level (2-tailed) .

Homogeneity of Regression. The assumption of homogeneity of regression should be analysed with customizing settings in MANCOVA to control if there was an interaction between covariates and the groups (Pallant, 2005). Afterwards, the significance level of the interactions between terms in the output was checked (See Table 15). All significance values for the interactions were higher than .05. Therefore, there was no significant interaction between covariates and treatment groups and homogeneity of regression assumption was met for the study.

Table 15. A multivariate test of homogeneity of regression for the interaction between the independent variable and covariates.

Effect	Wilks' Lambda Value	F	Hypothesis df	Error df	Sig.
Groups * Pre-ASTC	,842	1,378 ^b	16,000	246,000	,153
Groups * Pre-IM	,920	,652 ^b	16,000	246,000	,839
Groups * Pre-GO	,907	,768 ^b	16,000	246,000	,721
Groups * Pre-SD	,892	,904 ^b	16,000	246,000	,565
Groups * Pre-SE	,835	1,451 ^b	16,000	246,000	,119
Groups * Pre-ANX	,903	,803 ^b	16,000	246,000	,682

Interpretation of the MANCOVA Results

The main problem of this research was to determine the effects of 5E LCM and MIT on students' achievement and on their retention level, on their attitude towards chemistry, and on the motivation to learn chemistry when compared with TIM in unit of chemical properties concepts on ninth grade students. Thus, it was so important to utilize MANCOVA analysis and interpret the SPSS's output to test null Hypothesis-1. The first null Hypothesis, which related to the main problem for this study, was that "There was no statistically significant main effect of 5E LCM, MIT and TIM on the population mean of the collective dependent variables of the ninth grade students' post-test scores of achievement, their retention level, attitude towards chemistry, and construct of motivation to learn chemistry when students' prior attitude, and constructs of motivation (SE, ANX, GO, IM, and SD) scores were controlled as covariates on chemical properties unit". The Multivariate Tests output (Table 16) showed whether there were statistically significant differences among the groups on a linear combination of the dependent variables or not (Pallant, 2005). In the investigation, the Wilks' Lambda, which was the most appropriate multivariate significance tests, was evaluated to report the overall effect of the independent variable on the dependent variables. When the main effect was examined, the Wilks' Lambda value depicted that the combined dependent variables significantly different across 5EG, MIG, and TIG were taken in the Table 16. Thus, the null hypothesis-1 was rejected. Furthermore, partial eta squared (the estimates of the effect size) was .327 which was a large effect size (Cohen, 1988). It meant that this effect size value, which was approximately 32,7% of the multivariate variance of the dependent variables, was clarified by treatments. Moreover, effect size had been set to as a medium effect (.15) for the current study; on the other hand, it was calculated that the computed effect size value (.327) was higher than moderate effect size. Another crucial finding was that the observed power of the test

was equal to 1.00 for the main effect of instruction methods and this value was greater than the determined power (.80) at the beginning of the study. So, the differences among the groups had practical significance.

Table 16. Multivariate test results table

Effect	Wilks' Lambda Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power
Intercept	,736	6,060	8,000	135,000	,000	,264	48,477	1,000
Pre-ASTC	,843	3,150	8,000	135,000	,003	,157	25,203	,960
Pre-IM	,813	3,872	8,000	135,000	,000	,187	30,975	,987
Pre-GO	,775	4,889	8,000	135,000	,000	,225	39,111	,998
Pre-SD	,851	2,951	8,000	135,000	,005	,149	23,605	,945
Pre-SE	,691	7,530	8,000	135,000	,000	,309	60,242	1,000
Pre-ANX	,662	8,631	8,000	135,000	,000	,338	69,049	1,000
Groups	,453	8,210	16,000	270,000	,000	,327	131,355	1,000

Next, 'Tests of Between-Subjects Effects' (Table 17) should be examined to determine how the dependent variables differ for group independent variable when students' prior attitude and constructs of motivation scores were controlled as covariates. If one of them was different, then it would show which group differed these study findings regarding the students' achievement, their retention level, attitude towards chemistry, and construct of motivation to learn chemistry or if they were different in the meanings of the current research findings altogether.

Table 17. Tests of between-subjects effect table

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ⁱ
Corrected Model	Post-CPAT	792,652 ^a	8	99,082	5,982	,000	,252	47,855	,996
	Ret-CPAT	1377,012 ^b	8	172,126	12,459	,000	,412	99,672	1,000
	Post-ASTC	9026,427 ^c	8	1128,303	30,326	,000	,631	242,611	1,000
	Post-IM	1318,203 ^d	8	164,775	19,982	,000	,530	159,854	1,000
	Post-GO	3971,122 ^e	8	496,390	25,746	,000	,592	205,967	1,000
	Post-SD	916,580 ^f	8	114,573	18,281	,000	,507	146,247	1,000
	Post-SE	2395,518 ^g	8	299,440	22,744	,000	,562	181,951	1,000
	Post-ANX	1433,008 ^h	8	179,126	11,463	,000	,392	91,702	1,000
Intercept	Post-CPAT	494,178	1	494,178	29,835	,000	,174	29,835	,996
	Ret-CPAT	416,620	1	416,620	30,156	,000	,175	30,156	,996
	Post-ASTC	55,696	1	55,696	1,497	,223	,010	1,497	,064
	Post-IM	,987	1	,987	,120	,730	,001	,120	,009
	Post-GO	3,459	1	3,459	,179	,673	,001	,179	,011
	Post-SD	47,843	1	47,843	7,634	,006	,051	7,634	,498
	Post-SE	30,138	1	30,138	2,289	,133	,016	2,289	,108
	Post-ANX	28,412	1	28,412	1,818	,180	,013	1,818	,081
Pre-ASTC	Post-CPAT	,358	1	,358	,022	,883	,000	,022	,007
	Ret-CPAT	,917	1	,917	,066	,797	,000	,066	,008
	Post-ASTC	832,094	1	832,094	22,365	,000	,136	22,365	,974
	Post-IM	57,078	1	57,078	6,922	,009	,046	6,922	,446
	Post-GO	54,506	1	54,506	2,827	,095	,020	2,827	,142
	Post-SD	6,792	1	6,792	1,084	,300	,008	1,084	,044
	Post-SE	20,125	1	20,125	1,529	,218	,011	1,529	,065
	Post-ANX	4,469	1	4,469	,286	,594	,002	,286	,014

Pre-IM	Post-CPAT	24,250	1	24,250	1,464	,228	,010	1,464	,062
	Ret-CPAT	9,200	1	9,200	,666	,416	,005	,666	,027
	Post-ASTC	312,919	1	312,919	8,411	,004	,056	8,411	,552
	Post-IM	213,838	1	213,838	25,931	,000	,154	25,931	,989
	Post-GO	41,695	1	41,695	2,163	,144	,015	2,163	,100
	Post-SD	1,528	1	1,528	,244	,622	,002	,244	,013
	Post-SE	23,742	1	23,742	1,803	,181	,013	1,803	,080
	Post-ANX	17,928	1	17,928	1,147	,286	,008	1,147	,047
Pre-GO	Post-CPAT	1,450	1	1,450	,088	,768	,001	,088	,009
	Ret-CPAT	5,149	1	5,149	,373	,543	,003	,373	,017
	Post-ASTC	47,132	1	47,132	1,267	,262	,009	1,267	,053
	Post-IM	,065	1	,065	,008	,929	,000	,008	,007
	Post-GO	618,758	1	618,758	32,093	,000	,184	32,093	,998
	Post-SD	47,379	1	47,379	7,560	,007	,051	7,560	,493
	Post-SE	12,442	1	12,442	,945	,333	,007	,945	,038
	Post-ANX	,223	1	,223	,014	,905	,000	,014	,007
Pre-SD	Post-CPAT	21,173	1	21,173	1,278	,260	,009	1,278	,053
	Ret-CPAT	,031	1	,031	,002	,962	,000	,002	,006
	Post-ASTC	191,899	1	191,899	5,158	,025	,035	5,158	,312
	Post-IM	54,244	1	54,244	6,578	,011	,044	6,578	,420
	Post-GO	76,896	1	76,896	3,988	,048	,027	3,988	,223
	Post-SD	96,608	1	96,608	15,415	,000	,098	15,415	,873
	Post-SE	8,577	1	8,577	,651	,421	,005	,651	,027
	Post-ANX	,000	1	,000	,000	,996	,000	,000	,006
Pre-SE	Post-CPAT	8,275	1	8,275	,500	,481	,004	,500	,021
	Ret-CPAT	45,194	1	45,194	3,271	,073	,023	3,271	,172
	Post-ASTC	62,904	1	62,904	1,691	,196	,012	1,691	,074
	Post-IM	3,498	1	3,498	,424	,516	,003	,424	,019
	Post-GO	1,443	1	1,443	,075	,785	,001	,075	,008
	Post-SD	35,274	1	35,274	5,628	,019	,038	5,628	,348
	Post-SE	540,796	1	540,796	41,076	,000	,224	41,076	1,000
	Post-ANX	7,475	1	7,475	,478	,490	,003	,478	,021
Pre-ANX	Post-CPAT	4,268	1	4,268	,258	,613	,002	,258	,013
	Ret-CPAT	3,433	1	3,433	,248	,619	,002	,248	,013
	Post-ASTC	17,234	1	17,234	,463	,497	,003	,463	,020
	Post-IM	4,745	1	4,745	,575	,449	,004	,575	,024
	Post-GO	45,644	1	45,644	2,367	,126	,016	2,367	,113
	Post-SD	20,950	1	20,950	3,343	,070	,023	3,343	,177
	Post-SE	19,210	1	19,210	1,459	,229	,010	1,459	,062
	Post-ANX	907,010	1	907,010	58,042	,000	,290	58,042	1,000
Groups	Post-CPAT	659,859	2	329,930	19,919	,000	,219	39,838	,999
	Ret-CPAT	1167,236	2	583,618	42,244	,000	,373	84,488	1,000
	Post-ASTC	825,806	2	412,903	11,098	,000	,135	22,196	,942
	Post-IM	141,478	2	70,739	8,578	,000	,108	17,157	,847
	Post-GO	748,332	2	374,166	19,407	,000	,215	38,813	,999
	Post-SD	92,639	2	46,320	7,391	,001	,094	14,781	,770
	Post-SE	127,164	2	63,582	4,829	,009	,064	9,659	,513
	Post-ANX	95,525	2	47,763	3,056	,050	,041	6,113	,284

Error	Post-CPAT	2352,023	142	16,564
	Ret-CPAT	1961,796	142	13,815
	Post-ASTC	5283,162	142	37,205
	Post-IM	1170,975	142	8,246
	Post-GO	2737,818	142	19,280
	Post-SD	889,963	142	6,267
	Post-SE	1869,529	142	13,166
	Post-ANX	2218,992	142	15,627
Total	Post-CPAT	75921,000	151	
	Ret-CPAT	64864,000	151	
	Post-ASTC	459499,000	151	
	Post-IM	49842,000	151	
	Post-GO	116626,000	151	
	Post-SD	58699,000	151	
	Post-SE	131953,000	151	
	Post-ANX	29171,000	151	
Corrected Total	Post-CPAT	3144,675	150	
	Ret-CPAT	3338,808	150	
	Post-ASTC	14309,589	150	
	Post-IM	2489,179	150	
	Post-GO	6708,940	150	
	Post-SD	1806,543	150	
	Post-SE	4265,046	150	
	Post-ANX	3652,000	150	

The findings depicted that six univariate effects for “Group” independent variable were statistically significant. It was found that students’ Post-CPAT ($F(2,142)= 19,919$ $p=.000$, $p<.0063$ with the effect size=0.219), Ret-CPAT ($F(2,142)= 42,244$, $p=.000$, $p<.0063$ with the effect size=0.373), Post-ASTC ($F(2,142)= 11,098$, $p=.000$, $p<.0063$ with the effect size=0.135), Post-IM ($F(2,142)= 8,578$, $p=.000$, $p<.0063$ with the effect size=0.108), Post-GO ($F(2,142)=19,407$, $p=.000$, $p<.0063$ with the effect size=0.215), Post-SD ($F(2,142)=7,391$, $p=.001$, $p<.0063$ with the effect size=0.094) were statistically significant whereas main effect of group on students’ Post-SE ($F(2,142)=4,829$, $p=.009$, $p>.0063$ with the effect size=0.064) and Post-ANX ($F(2,142)=3,056$, $p=.050$, $p>.0063$ with the effect size=0.041) were not found as statistically significant, respectively. Despite the fact that it was mentioned that the 5EG, MIG or TIG differed regarding achievement, retention level, attitude, intrinsic motivation, goal orientation, and self-determination, it was not known which group was different from the other or others. Thus, Bonferroni post-hoc tests were evaluated to find these the difference/s. By this way, the pairwise comparisons were shown in Table 18.

Table 18. Pairwise Comparisons

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
						Lower Bound	Upper Bound
Post-CPAT	TIG	5EG	-4,651*	,834	,000	-6,672	-2,629
		MIG	-4,427*	,831	,000	-6,439	-2,414
	5EG	TIG	4,651*	,834	,000	2,629	6,672
		MIG	,224	,837	1,000	-1,805	2,253
	MIG	TIG	4,427*	,831	,000	2,414	6,439
		5EG	-,224	,837	1,000	-2,253	1,805

Ret-CPAT	TIG	5EG	-5,686*	,762	,000	-7,532	-3,840
		MIG	-6,338*	,759	,000	-8,176	-4,500
	5E	TIG	5,686*	,762	,000	3,840	7,532
		MIG	-,652	,765	1,000	-2,505	1,201
	MIG	TIG	6,338* ^M	,759	,000	4,500	8,176
		5E	,652	,765	1,000	-1,201	2,505
Post-ASTC	TIG	5E	-4,316*	1,251	,002	-7,345	-1,286
		MIG	-5,595*	1,245	,000	-8,611	-2,578
	5E	TIG	4,316*	1,251	,002	1,286	7,345
		MIG	-1,279	1,255	,930	-4,320	1,761
	MIG	TIG	5,595*	1,245	,000	2,578	8,611
		5EG	1,279	1,255	,930	-1,761	4,320
Post-IM	TIG	5EG	-2,022*	,589	,002	-3,448	-,595
		MIG	-2,175*	,586	,001	-3,595	-,755
	5EG	TIG	2,022*	,589	,002	,595	3,448
		MIG	-,154	,591	1,000	-1,585	1,278
	MIG	TIG	2,175*	,586	,001	,755	3,595
		5EG	,154	,591	1,000	-1,278	1,585
Post-GO	TIG	5EG	-5,363*	,900	,000	-7,544	-3,182
		MIG	-4,059*	,896	,000	-6,230	-1,888
	5EG	TIG	5,363*	,900	,000	3,182	7,544
		MIG	1,304	,903	,453	-,885	3,493
	MIG	TIG	4,059*	,896	,000	1,888	6,230
		5EG	-1,304	,903	,453	-3,493	,885
Post-SD	TIG	5E	-1,081	,513	,111	-2,324	,163
		MIG	-1,961*	,511	,001	-3,199	-,723
	5EG	TIG	1,081	,513	,111	-,163	2,324
		MIG	-,880	,515	,269	-2,128	,368
	MIG	TIG	1,961*	,511	,001	,723	3,199
		5EG	,880	,515	,269	-,368	2,128
Post-SE	TIG	5EG	-1,194	,744	,332	-2,996	,608
		MIG	-2,301*	,741	,007	-4,095	-,507
	5EG	TIG	1,194	,744	,332	-,608	2,996
		MIG	-1,107	,747	,421	-2,916	,702
	MIG	TIG	2,301*	,741	,007	,507	4,095
		5EG	1,107	,747	,421	-,702	2,916
Post-ANX	TIG	5EG	-,708	,810	1,000	-2,671	1,255
		MIG	-1,971*	,807	,047	-3,926	-,016
	5EG	TIG	,708	,810	1,000	-1,255	2,671
		MIG	-1,263	,813	,368	-3,233	,708
	MIG	TIG	1,971*	,807	,047	,016	3,926
		5EG	1,263	,813	,368	-,708	3,233

Based on estimated marginal means

*. The mean difference is significant at the .0063 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 18 showed that while there was statistically significant difference between 5EG and TIG ($p < .0063$) and MIG and TIG ($p < .0063$) regarding the mean scores of students' achievement (Post-CPAT) on the unit of chemical properties concepts, there was no statistically significant difference between 5EG and MIG ($p > .0063$). However, it was seen that 5EG's average score seemed slightly higher than MIG's average score (0.224). Similarly, there

were statistically significant difference between 5EG and TIG ($p < .0063$) and MIG and TIG ($p < .0063$) regarding the averages of students' Ret-CPAT, there was no statistically significant difference between 5EG and MIG ($p > .0063$). This outcome supported the previous achievement result; as the average differences between experimental groups and control group was higher than before. On the other hand, according to the outcomes of MANCOVA the average of participants in the 5EG and MIG were greater than those TIG scores regarding Post-CPAT, Ret-CPAT, Post-ASTC, Post-IM, Post-GO, and Post-SD when students' prior attitude and constructs of motivation scores were controlled as covariates. So, these results of the investigation showed that the difference among the groups aroused from the instructional effect and had practical significance. As a different result of the study, there were no differences regarding the average of students' SE and ANX between the groups.

The significant mean differences for students' attitude towards chemistry were observed among the 5EG, MIG, and TIG. There was statistically significant difference between students in the 5EG and TIG ($p < .0063$) and MIG and TIG ($p < .0063$) regarding the average of participants' Post-ASTC, there was no statistically significant difference between 5EG and MIG ($p > .0063$). Although there was not any statistically significant difference between 5EG and MIG, the students in the MIG had more positive attitude towards chemistry than students in the 5EG (Mean differences between 5EG and MIG was 1.224 in favour of MIG). Finally, when the significant mean difference was examined among groups regarding the students' IM, GO, SD, there was statistically significant difference among the 5EG, MIG, and TIG ($p < .0063$) in favour of experimental groups. However, it was inspected that there were no statistically significant mean differences regarding students' SE and ANX ($p > .0063$). For the IM, there was statistically significant difference between students in 5EG and TIG ($p < .0063$) and MIG and TIG ($p < .0063$) regarding the mean scores of participants' Post-IM, there was no statistically significant difference between 5EG and MIG ($p > .0063$). On the other hand, while the difference of mean between 5EG and TIG was 2,022 in favour of 5EG, the difference of mean between MIG and TIG was 2,175 in favour of MIG. Table 15 depicted that there was no statistically significant mean difference between 5EG and MIG. Similarly, it was remarked that there was statistically significant difference between students in the 5EG and TIG ($p < .0063$) and MIG and TIG ($p < .0063$) regarding the average of students' Post-GO, there was not any statistically significant difference between 5EG and MIG ($p > .0063$). On the other hand, while the mean difference between 5EG and TIG was 5,363 in favour of 5EG, the mean difference between MIG and TIG was 4,059 in favour of MIG. However, there was no statistically significant mean difference between 5EG and MIG. Taking the statistical data into account, we could surmise that the mean differences between experimental groups and control group seem high. Moreover, the students in the 5EG had more positive goal orientation as a motivation to learn chemistry than students in the MIG (Mean difference between 5EG and MIG was 1.304 in favour of 5EG) although there was no statistically significant mean difference between 5EG and MIG. To summarize, the results of the analysis that the average of participants' in the 5EG and MIG were greater than the those TIG scores regarding Post-CPAT, Ret-CPAT, Post-ASTC, Post-IM, Post-GO, and Post-SD when students' prior attitude, and constructs of motivation scores were controlled as covariates.

Discussion and Conclusion

This study investigated the effectiveness of 5E LCM and MIT on students' achievement, their retention level, attitude towards chemistry, and motivation to learn chemistry when compared with TIM on ninth grade high school students. According to the Pre-CPAT test scores, the pre-knowledge about the chemistry topic of students in the groups was approximately medium level. In literature, prior knowledge was emphasized as an important factor for students for adapting new knowledge (Sanger & Greenbowe, 1997). Hence, it might be said that students had enough prior knowledge about the chemical properties concepts for 5E LCM and MIT applications. Regarding to the mean scores of students' achievement, there was a statistically significant difference between 5EG and TIG in favour of 5E LCM. In literature this finding was supported with other studies (Abdi, 2014; Arslan, 2014; Bektas, 2011; Bybee, 1997; Campbell, 2006; Cetin-Dindar, 2012; Ceylan & Geban, 2009; Pabuccu, 2008; Qarareh, 2012; Supasorn, 2015; Trowbridge, Bybee, & Powell, 2000). Also, students who instructed based on MIT were much more successful than students from TIM regarding to the mean scores of students' Post-CPAT on the current topic. The literature studies were also parallel with this finding (Asci & Demircioglu, 2002; Balim, 2006; Baragona, 2009; Bellflower, 2008; Campbell & Campbell, 1999; Douglas, Burton, & Reese-Durham, 2008; Gurcay & Ferah, 2017; Lindvall, 1995; Naz, 2019; O'Connell, 2009; Shearer, 2004; Uslu, 2005; Wares, 2013). Another important finding for the study was that there was no statistically significant difference between 5EG and MIG achievement scores. There were no research parallel with this result in the literature so it was thought that this result would contribute to this gap in literature. On the other hand, this result was a predictable one since both 5E LCM and

MIT were constructivist and moderate approaches making students active learners which would give them chance for meaningful learning through the application processes. Similarly, there was statistically significant difference between 5EG and TIG and MIG and TIG regarding to the mean scores of students' retention level on the same unit. In literature, it was stated that students educated based on MIT improved their retention level much more efficiently (Azar, Presley, & Balkaya, 2006; Can, Altun, & Harmandar, 2011; Koksal & Yel, 2007; Ozdemir, Guneyisu, & Tekkaya, 2006). In addition to that students educated based on 5E LCM were also affected positively regarding to their level of retention too (Ajaja & Eravwoke, 2012; Sunar, 2013). Moreover, there was no statistically significant difference between 5EG and MIG. So, it could be dedicated that the participants in the TIG might be negatively affected regarding their achievement on the unit much more than students in the MIG and 5EG between the post-test and retention test. The fact that situations of the physical and chemical changes was a problematic subject could be the reason for this result. The topic is so abstract and also it has so many dilemmas which make students need to study hard on it. Thus, instructional methods have an important effect on chemistry learning. Students who instructed with the 5E LCM and Gardner's MIT were encouraged to examine the information related to chemistry concepts by using resources inside or outside classroom, to make students interpret the information they obtained rather than memorizing it, and to structure their own information by associating this knowledge with everyday events. Moreover, individual differences and prior knowledge had a crucial role in 5E LCM and MIT as in all the other constructivist approaches. So, 5E LCM and MIT gave students chance to experience multiple chemistry learning environments on the basis of experiments, games, animations, theatre, etc. Thanks to these student-centred activities, students had a chance to construct their own hypotheses, make predictions, do experiments, test their hypothesis and predictions by making observations during the experiments, interpret their findings, connect their prior knowledge with their newly adapted one so to make plausible decisions for daily life problems, work collaboratively, discuss in small groups, criticize their own and other's hypotheses, predictions, claims and evidences whereas students participated in control group did not have a chance to experience such activities. Hence, these differences in learning environments could have led to these findings. On the other hand, there was statistically significant difference between 5EG and TIG concerning mean scores of students' attitude towards chemistry. This outcome was parallel with literature (Akar, 2005; Ergin, Kanlı & Unsal, 2008; Sunar, 2013) while it was inconsistent with some of them (Ekici, 2007; Kılavuz, 2005; Pabuccu, 2008). In the literature, some studies found that applications based on the multiple intelligences theory positively affected students' attitudes towards science (Balım, 2006; Bilgin-Koken, 2006; Goodnough, 2001; Kayıran & Iflazoğlu, 2007) although some of them (Akamca, 2003; Asçı, 2003; Gurcay, 2003; Ozdemir, 2002; Sahin, Ongoren & Cokadar, 2010; Tasezen, 2005; Ucak, Bag, & Usak, 2006; Uslu, 2005) stated that MIT did not make any meaningful difference in students' attitudes when compared with TIM.

Finally, there were statistically significantly differences among the 5EG, MIG, and TIG in favour of experimental groups regarding to the students' IM, GO, and SD as constructs of motivation. This result was also parallel with the other studies in the literature (Akkuzu & Akcay, 2010; Cetin-Dindar, 2012; Cigdemoglu, 2012; Krull, Suchomel, & Bechtel, 2015). On the other hand, there was no statistically significant mean difference concerning students' SE and ANX among the groups. In literature, there was a study similar to the present study (Koura & Al-Hebaishi, 2014). Also, there was not any study for examining the effect of MIT on students' goal orientation in the literature. Hence, this study would be expected to fill in the gap in the literature for being basis for further investigations. Another result showed that the statistically mean difference of students' SD had only between MIG and TIG. So, it could be stated that MIG's participants were positively developed regarding to their self-determination to learn chemistry. Some studies in literature indicated the 5E LCM positively affected students' self-efficacy to learn chemistry in the literature (Cetin-Dindar, 2016). As a reason for these findings, ninth grade participants have just not determined one of four tracks which are the Turkish language-mathematics, science, social sciences, and foreign languages. This means that students, who would choose a track of Turkish language-mathematics, foreign languages, or social sciences, might have the low motivation to learn chemistry. As this research was also planned for eight weeks, all motivation components of students for learning might not have enhanced in the same way. If it were continued to teach with 5E LCM and MIT with sufficient time, it would likely enhance the motivation of these students. In conclusion, all these benefits by conducting the 5E LCM and MIT might have been much more apt to achieve the goals of science especially chemistry education.

For further studies, some recommendations could be given as:

- The 5E LCM could also be conducted with different chemistry topics and in different types of schools to be able to make much more common generalization.
- MIT should also be applied with different chemistry topics and in different types of schools.
- A longitudinal study expanded in years could be conducted on to observe the effect of 5E LCM and MIT on each construct of motivation to learn.
- For determining the dominant intelligence types of students and for constructing much more specific MIT teaching domains, cooperation with teachers in different disciplines could be done.
- Intelligence profiles of students should be determined at certain intervals throughout their education and education environments should be created for them.
- In-service and pre-service chemistry teachers' pedagogical knowledge should be investigated being aware of the key elements of education are the teachers.
- It is recommended to conduct researches in which these approaches are integrated into STEM education, which has increased in popularity and included in the curriculum in recent years.

Acknowledge

This study is produced a doctorate thesis which name is "The Effect of 5E Learning Cycle and Multiple Intelligence Approach on 9th Grade Students' Achievement on Unit of Chemical Properties, Attitude, and Motivation toward Chemistry at Middle East Technical University, Faculty of Education, Department of Mathematics and Science Education, Ankara, Turkey.

References

- Abdi, A. (2014). The effect of inquiry-based learning method on students' academic achievement in science course. *Universal Journal of Educational Research*, 2(1), 37-41.
- Aggul, Yalcın, F.A. & Bayrakceken, S. (2010). The effect of 5E learning model on pre- service science teachers' achievement of acids-bases subject. *International Online Journal of Educational Sciences*, 2(2), 508-531.
- Akbas, A. & Kan, A. (2007). Affective factors that influence chemistry achievement (Motivation and Anxiety) and the power of these factors to predict chemistry achievement-II. *Journal of Turkish Science Education*, 4(1), 10-19.
- Akkus, H. Kadayıfçı, H., Atasoy, B., & Geban, O. (2003). Effectiveness of instruction based on constructivist approach on understanding chemical equilibrium concepts. *Research in Science and Technological Education*, 21(2), 209-227.
- Ajaja, O.P. & Eravwoke, U.O. (2012). Effects of 5E learning cycle on student's achievement in biology and chemistry. *Cypriot Journals of Educational Sciences*, 7(3), 244-262.
- Akar, E. (2005). *Asit ve baz kavramlarının anlaşılmasında 5E öğretim modelinin etkisi [Effectiveness of 5E learning cycle model on students' understanding of acid-base concepts]*. Master Thesis, Middle East Technical University, Ankara, Turkey.
- Arroyo, A. A., Rhoad, R., & Drew, P. (1999). Meeting diverse student needs in urban schools: Research-based recommendations for school personnel. *Preventing School Failure: Alternative Education for Children and Youth*, 43(4), 145-153. Doi:10.1080/10459889909604990.
- Ascı, Z. & Demircioğlu, H. (2002, Eylül). Çoklu zekâ teorisine göre geliştirilen ekoloji ünitesinin 9. sınıf öğrencilerinin ekoloji başarısına ve tutumuna olan etkisi [The effect of the ecology unit developed according to multiple intelligence theory on of 9th grade students' success and attitude]. V. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresinde sunulmuştur, Orta Doğu Teknik Üniversitesi, Ankara, Türkiye.
- Atasoy, B., Genç, E., Kadayıfçı, H., & Akkuş, H. (2007). 7. sınıf öğrencilerinin fiziksel ve kimyasal değişmeler konusunu anlamalarında işbirlikli öğrenmenin etkisi [The effect of cooperative learning to grade 7 students' understanding of physical and chemical changes topic]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 32, 12-21.
- Azar, A., Presley, A. I., & Balkaya, Ö. (2003). Çoklu zekâ kuramına dayalı öğretimin başarı, tutum, hatırlama ve bilişsel süreç becerilerine etkisi [Effect of multiple intelligence theory-based instruction on achievement, attitude, retention, and process skills]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 30, 45-54.
- Azar, A., Presley, A. I., & Balkaya, Ö. (2006). Çoklu zekâ kuramı temelli öğretimin öğrencilerin başarı, tutum, hatırlama ve bilişsel süreç becerilerine etkileri [Effect of multiple intelligence theory-based instruction on students' achievement, attitude, retention, and process skills]. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 30, 67-75.
- Balım, A. G. (2006). Fen konularının çoklu zekâ kuramına dayalı öğretiminin öğrencilerin başarılarına ve kalıcılığına etkisi [The effect of teaching science subjects based on multiple intelligence theory on the students' success and permanence]. *Eurasian Journal of Educational Research (EJER)*, 23, 10-19.
- Baragona, M. (2009). *Multiple intelligences and alternative teaching strategies: The effects on student academic achievement, conceptual understanding and attitude*. Doctorate Dissertation, University of Mississippi, Mississippi, USA.
- Basheer, A., Kortam, N., Zahran, N., Hofestein, A., & Hugerat, M. (2018). Misconceptions among middle school students regarding the conservation of mass during combustion. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(7), 3109-3122. doi: 10.29333/ejmste/91664.
- Bektas, O. (2011). *The effect of 5E learning cycle model on tenth grade students' understanding in the particulate nature of matter, epistemological beliefs*. Doctorate Dissertation, Middle East Technical University, Ankara, Turkey.
- Bellflower, J. B. (2008). *A case study on the perceived benefits of Multiple Intelligence instruction: Examining its impact on student learning*. Doctorate Dissertation, Fielding Graduate University, California, USA.

- Bilgin-Koken, E. (2006). *The effect of multiple intelligences-based instruction on ninth grades chemistry achievement and attitudes toward chemistry*. Master Thesis. Middle East Technical University, Ankara, Turkey.
- Brown, A. L. (1994). The advancement of learning. *Educational Researcher*, 23(8), 4-12.
- Bybee, R. W. & Landes, N. M. (1990). Science for life & living: An elementary school science program from the biological sciences curriculum study. *The American Biology Teacher*, 52(2), 92-98.
- Bybee R. W. (1997), *Achieving scientific literacy: from purposes to practices*, Portsmouth, NH, Heinmann Publishing.
- Bybee, R. W., Taylor, J. A., Gardner A., Scotter, P. V., Powell, J. C., Westbrook, A., & Landes, N. (2006). *The BSCS 5E instructional model: Origins, effectiveness and applications*. Colorado Springs: BSCS.
- Campbell, B. (1991). Multiple intelligences in the classroom. *Context Quarterly*, 27, 12-15.
- Campbell, L. & Campbell, B. (1999). *Multiple intelligences and student achievement Success stories from six schools*. Alexandria, VA.: Association for Supervision and Curriculum Development.
- Campbell, M. (2006). *The effects of the 5e learning cycle model on students' understanding of force and motion concepts*. Master's Thesis. University of Central Florida, Florida, USA
- Cetin-Dindar, A. & Geban, O. (2011). Development of a three-tier test to assess high school students' understanding of acids and bases. *Procedia Social and Behavioral Sciences*. 15, 600–604.
- Cetin-Dindar, A. (2012). *The effect of 5E learning cycle model on eleventh grade students' conceptual understanding of acids and bases concepts and motivation to learn chemistry*. Doctorate Dissertation, Middle East Technical University, Ankara, Turkey.
- Cetin-Dindar, A. & Geban, O. (2015). Fen Bilimleri Motivasyon Anketi'nin Türkçeye ve Kimyaya Uyarlanması: Geçerlilik Çalışması. [Adaptation of the science motivation scale into Turkish and chemistry: analysis of validity]. *PEGEM Eğitim ve Öğretim Dergisi*, 5(1), 15-34.
- Cetin-Dindar, A. (2016). Student Motivation in Constructivist Learning Environment. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(2), 233-247. doi: 10.12973/eurasia.2016.1399a
- Cetin-Dindar, A. & Geban, O. (2017). Conceptual understanding of acids and bases concepts and motivation to learn chemistry. *The Journal of Educational Research*, 110(1), 85-97. doi: 10.1080/00220671.2015.1039422
- Cigdemoglu, C. (2012). *Effectiveness of context-based approach through 5E learning cycle model on students' understanding of chemical reactions and energy concepts, and their motivation to learn chemistry*. Doctoral Dissertation, Middle East Technical University, Ankara, Turkey.
- Chittleborough, G., Treagust, D. F., & Mocerino, M. (2002). Constraints to the development of first year university chemistry students' mental models of chemical phenomena. In A. Bunker & G. Swan (Eds.), *Focusing on the student* (pp. 43-50) Perth, WA: Professional Development @ Learning Development Services.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences (2nd ed.)* Hillsdale NJ: Erlbaum.
- De Jong, O. & Taber, K. S. (2007). Teaching and learning the many faces of chemistry. In S. K. Abell & N. G. Lederman (Eds.), *Handbook of research on science education* (pp. 631-652). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Demirkan Ö. & Saracoglu, G. (2016). Anadolu lisesi öğretmenlerinin derslerde kullandıkları öğretim yöntem ve tekniklerine ilişkin görüşleri [Views of Anatolian high school teachers about teaching methods and techniques they use in class]. *The Journal of International Lingual, Social and Educational Sciences*, 2(1), 1-11.
- Douglas, O., Burton, Smith, K., & Reese-Durham, N. (2008). The effects of the multiple intelligence teaching strategy on the academic achievement of eighth grade math students. *Journal of Instructional Psychology*, 35(2), 182-187.
- Duit, R., & Treagust, D. F. (1998). Learning in science- from behaviorism towards social constructivism and beyond. In B. Fraser and K. Tobin (Eds.), *International handbook of science education*, Part 1. (pp. 3-25). Dordrecht, The Netherlands: Kluwer.
- Ekici, F. (2007). *Yapılandırmacı yaklaşıma uygun 5E öğrenme döngüsüne göre hazırlanan ders materyalinin ise 3. sınıf öğrencilerinin yükseltgenme indirgenme tepkimeleri ve elektrokimya konularını anlamalarına etkisi*.

- [The effect of instructional material designed according to 5E learning cycle which is based on constructivist approach on 11th grade students' understanding of redox reactions and electrochemistry]. Master Thesis. Gazi University, Ankara, Turkey.
- Ekiz-Kiran, B., Kutucu, E. S., Tarkin-Celikkiran, A., & Tuysuz, M. (2018). Kimya öğretmen adaylarının kimyasal dengeye ilişkin zihinsel modelleri. [Pre-service chemistry teachers' mental models on chemical equilibrium]. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 15(1), 1081-1115. doi:10.23891/efdyyu.2018.97.
- Ergin, İ., Kanlı, U., & Unsal, Y. (2008). An example for the effect of 5E model on the academic success and attitude levels of students': "Inclined Projectile Motion". *Türk Fen Eğitimi Dergisi (TUFED)*, 5(3), 47-59.
- Fraenkel, J. R. & Wallen, N. E. (2009). *How to design and evaluate research in education (7th ed.)*. New York: Mc Graw-Hill.
- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. NY: Basic Books.
- Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.
- Geban, Ö., Ertepinar, H., Yılmaz, G., Altın, A., & Şahbaz, F. (1994). *Bilgisayar destekli eğitimin öğrencilerin fen bilgisi başarılarına ve fen bilgisi ilgilerine etkisi [The effect of computer assisted education on students' science achievements and science interests]*. I. Ulusal Fen Bilimleri Eğitimi Sempozyumu: Bildiri Özetleri Kitabı, Dokuz Eylül Üniversitesi, İzmir, 1-2.
- Glynn, S. M., & Koballa, T. R. Jr. (2006). Motivation to learn in college science. In J.J. Mintzes & W.H. Leonard (Eds.), *Handbook of college science teaching* (pp. 25–32). Arlington, VA: National Science Teachers Association Press.
- Goodnough, K. (2001). Multiple intelligences theory: a framework for personalizing science curricula. *School Science & Mathematics*, 101(4), 180-193.
- Govender, S. (2015). Students perceptions of teaching methods used at South African higher education institutions. *South African Journal of Higher Education*, 29(3), 23-41. doi: 10.20853/29-3-486.
- Gurcay, D. (2003). *The effect of multiple intelligences-based instruction on students' physics achievement*. Doctorate Dissertation, Middle East Technical University, Ankara, Turkey.
- Gurcay, E., & Ferah, H. O. (2017). The effects of multiple intelligences based instruction on students' physics achievement and attitudes. *Journal of Baltic Science Education*, 16(5), 666-677.
- Hanson, R., Twumasi, A. K., Aryeetey, C., Sam, A., & Adukpó, G. (2016). Secondary school students' conceptual understanding of physical and chemical changes. *Asian Journal of Education and Training*, 2(2), 44-52. doi:10.20448/journal.522/2016.2.2/522.2.44.52.
- Jansoon, N., Coll, R. K., & Somsook, E. (2009). Understanding mental models of dilution in Thai students. *International Journal of Environmental & Science Education*, 4(2), 147-168.
- Karplus, R., & Thier, H. (1967). *A new look at elementary school science*. Chicago: Rand-McNally.
- Kayıran, B. K., & İflazoğlu, A. (2007). Çoklu zekâ kuramı destekli kubaşık öğrenme yönteminin Türkçe dersine ilişkin tutuma ve okuduğunu anlama başarısına etkisi [The effect of the cooperative learning method supported by multiple intelligence theory on the attitude towards Turkish lesson and the success of reading comprehension]. *Eurasian Journal of Educational Research*, 29, 129-141.
- Kılavuz, Y. (2005). *The effects of 5E learning cycle model based on constructivist theory on tenth grade students' understanding of acid-base concepts*. Master Thesis, Middle East Technical University, Ankara Turkey.
- Kocakaya, S. (2011). An educational dilemma: Are educational experiments working? *Educational Research and Reviews*. 6(1), 110-123.
- Koksal, M., & Yel, M. (2007). The effect of multiple intelligences theory-based instruction on attitudes towards the course, academic success, and permanence of teaching on the topic of "Respiratory Systems". *Educational Sciences: Theory & Practice*. 7, 231-239.
- Kurey, M. M. (1991). *The traditional and learning cycle approaches to performance in high school chemistry topics by students tested for Piagetian cognitive development*. Doctorate Dissertation, Temple University, Philadelphia, USA.
- Lawson, A. E. (1988). A better way to teach biology. *The American Biology Teacher*, 50(5), 266-289.

- Lehmann, K. (1996). *Bad Chemistry*. Dept of Chemistry, Princeton University, NJ.
- Levin, J., & Nolan, J. (2007) *Principles of classroom management: A professional decision-making model (5th ed.)*. Boston: Allyn & Bacon.
- Lindvall, R. (1995). *Addressing multiple intelligences and learning styles: Creating active learners*. Doctorate Dissertation, Saint Xavier University, Chicago, USA.
- Lin, J. L., Cheng, M. F., Lin, S. Y., Chang, J. Y., Chang, Y. C., Li, H. W., & Lin. D. M. (2017). The effects of combining inquiry-based teaching with science magic on the learning outcomes of a friction unit. *Journal of Baltic Science Education*, 16(2), 218-227.
- Mayers, A. (2013). *Introduction to statistics and SPSS in Psychology*. Pearson Education Limited
- Morgan, G. (2006). *Images of organizations*. Thousand oaks. Sage Publications, Inc.
- Naz, I. (2019). Effect of multiple intelligences' teaching on academic achievement of high achievers in science at elementary level. *Journal of Science Education*, 1(2), 15-29.
- Nieswandt, M. (2007). Student affect and conceptual understanding in learning chemistry. *Journal of Research in Science Teaching*, 44(7), 908-937. doi: 10.1002/tea.20169.
- O'Connell, K. (2009). *Investigation of Gardner's theory of multiple intelligence interrelate with student engagement and motivation on urban middle school youth*. Doctorate Dissertation, Walden University, Minnesota, USA.
- OECD (2007). *Understanding the brain: The birth of a learning science*, OECD Publishing, Paris. <https://doi.org/10.1787/9789264029132-en>.
- Ongoren, H., & Sahin, A. (2008). Çoklu zekâ kuramı tabanlı öğretimin öğrencilerin fen bilgisi başarılarına etkileri [Effects of multiple intelligence theory based instruction on students' science achievement]. *Pamukkale University Education Faculty Journal*, 1(23), 24-35.
- Osborne, J., Simon, S., & Collins, S. (2003). Attitudes toward science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079.
- Ozdemir, P. (2002). *Çoklu zekâ kuramı tabanlı öğretim yönteminin öğrencilerin canlılar çeşitlidir ünitesini anlamaları üzerine etkisi [The effects of instructional strategies based on the principles of multiple intelligence theory on understanding of "diversity of living things"]*. Master Thesis. Middle East Technical University, Ankara, Turkey.
- Ozdemir, P., Guneyisu, S., & Tekkaya, C. (2006). Enhancing learning through multiple intelligences. *Journal of Biological Education*, 40(2), 74-78.
- Pabuccu, A., & Geban, Ö. (2015). 5E öğrenme döngüsüne göre düzenlenmiş uygulamaların asit-baz konusundaki kavram yanlışlarına etkisi [Effects of 5E learning cycle instruction on misconceptions on acid-base concepts]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 15(1), 191-206.
- Pabuccu, P. (2008). *Improving 11th grade students' understanding of acid-base concepts by using 5E learning cycle model*. Doctorate Dissertation, Middle East Technical University, Ankara, Turkey.
- Pallant, J. (2005). *SPSS survival manual: a step by step guide to data analysis using SPSS for windows (Version 12)*. 2nd ed. Maidenhead: Open University Press.
- Pintrich, P. R. & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications (2nd ed.)*. Upper Saddle River, NJ: Prentice Hall.
- Qarareh, A. O. (2012). The Effect of using the learning cycle method in teaching science on the educational achievement of the sixth graders. *International Journal of Science Education*, 4(2), 123-132.
- Sadi, O., & Cakiroglu, J. (2010). Effects of 5E learning cycle on students' human circulatory system achievement. *Journal of Applied Biological Sciences*, 4(3), 63-67.
- Sahin, A., Ongoren, H., & Cokadar, H. (2010). Çoklu zekâ kuramı tabanlı öğretimin öğrencilerin fen bilgisine yönelik tutumlarına etkisi [Effect of instruction based on multiple intelligences theory on students' attitudes towards science]. *Education Sciences*, 5(2), 431- 445.
- Sanfeliz, M., & Stalzer, M. (2003). Science motivation in the multicultural classroom. *The Science Teacher*, 70(3), 64-66.

- Sanger, M. J., & Greenbowe T. J. (1997). Students' misconceptions in electrochemistry regarding current flow in electrolyte solutions and the salt bridge. *Journal of Chemical Education*, 74(7), 819-823.
- Schlenker, R. M., Blanke, R., & Mecca, P. (2007). Using the 5E learning cycle sequence with carbon dioxide. *Science Activities*, 44(3), 83-93.
- Shearer, B. (2004). Multiple intelligences theory after 20 years. *Teachers college record*, 106, 2-16.
- Sunar, S. (2013). *The effect of context-based instruction integrated with learning cycle model on students' achievement and retention related to states of matter subject*. Doctorate Dissertation, Middle East Technical University, Ankara, Turkey.
- Supasorn, S. (2015). Grade 12 students' conceptual understanding and mental models of galvanic cells before and after learning by using small-scale experiments in conjunction with a model kit. *Chemistry Education Research and Practice*, 16, 393-407.
- Supasorn, S., & Promarak, V. (2014). Implementation of 5E inquiry incorporated with analogy learning approach to enhance conceptual understanding of chemical reaction rate for grade 11 students. *Chemistry Education Research and Practice*, 16, 121-132. doi: 10.1039/C4RP00190G.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*, 5th ed. Boston, MA: Allyn and Bacon.
- Taşçı, G., & Soylu, Y. M. (2015). Sınıf öğretmenlerinin fen öğretim programına yönelik görüşlerinin biyoloji konuları bakımından değerlendirilmesi: Erzincan örneği [Evaluation of classroom teachers' opinions on science curriculum in terms of biology subjects: Erzincan sample]. *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, 17(1), 55-72. doi: 10.17556/jef.16985
- Tasezen, S. S. (2005). *Çoklu zekâ kuramına göre hazırlanan öğretim etkinliklerinin erişiyeye, kavram öğrenmeye ve tutuma etkisi*. [The effects of educational instructions which are planned on the principle of multiple intelligence on achievement, conceptual learning and attitudes]. Master Thesis, Marmara University, İstanbul, Turkey.
- Trowbridge, L. W., Bybee, R. W., & Powell, J. C. (2000). *Teaching secondary school science, upper saddle river*, NJ: Merrill / Prentice Hall.
- Tuysuz, M. (2017). Çoklu zekâ kuramı ve kimya öğretimi uygulamaları [Multiple intelligence theory and chemistry teaching applications], In A. Ayas & M. Sozibilir (Eds.), *Kimya öğretimi: Öğretmen eğitimcileri, öğretmenler ve öğretmen adayları için iyi uygulama örnekleri* (2. Baskı). [Chemistry teaching: good practice examples for teacher educators, teachers and prospective teachers (2nd ed.)] (pp. 531-552). Ankara: Pegem Academy.
- Ucak, E., Bag, H., & Usak, M. (2006). Enhancing learning through multiple intelligences in elementary science education. *Journal of Baltic Science Education*, 2(10), 61-69.
- Uslu, F. (2005). *Çoklu zekâ kuramına dayalı biyoloji öğretimin öğrencilerin başarı ve tutumuna etkisi* [The effect of biology teaching based on multiple intelligence theory on students' success and attitude]. Doctorate Dissertation, Dokuz Eylül University, İzmir, Turkey.
- Wares, A. (2013). An application of the theory of multiple intelligences in mathematics classrooms in the context of origami. *International Journal of Mathematical Education in Science & Technology*, 44(1), 122-131. doi:10.1080/0020739X.2012.662297.

Appendix A

Example of Pre-unit of Chemical Properties Achievement Test Questions

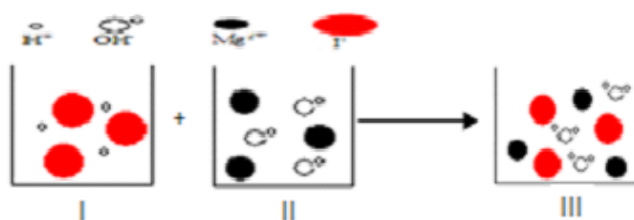
Question-1



The above cups contain hydrogen chloride, potassium hydroxide and hydrogen iodide solutions. It is added X solution into I. beaker, Y solution into II. beaker, and Z solution into III. Beaker. While there is no change in the first beaker, it is observed the changes II. and III. Beakers. Which of the following can be true for X, Y, Z solutions?

- | | X | Y | Z |
|----|-------------------|------------------|-------------------|
| A) | calcium hydroxide | hydrogen nitrate | sodium hydroxide |
| B) | hydrogen nitrate | sodium chloride | hydrogen nitrile |
| C) | sodium hydroxide | hydrogen bromide | sodium chloride |
| D) | hydrogen bromide | hydrogen nitrate | calcium hydroxide |
| E) | sodium chloride | sodium hydroxide | hydrogen bromide |

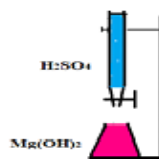
Question-2



A chemistry teacher draws the reaction given above in microscopic level while teaching the subject of chemical reactions, and asks the students to find the properties of that reaction. Which of the following students' answer is wrong?

- The substance given in beaker I is the acid.
- The substance given in beaker II is the base.
- The reaction is a neutralization reaction.
- Symbolizes the formation of salt and water in beaker III.
- The substance given in beaker II turns the blue litmus paper's color to red.

Questions-3



Which of the following equations are shown above acid-base reaction?

- $\text{Mg}(\text{OH})_2 + 2\text{H}_2\text{SO}_4 \rightarrow 2\text{MgSO}_4 + \text{H}_2\text{O}$
- $\text{Mg}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{Mg}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- $\text{H}_2\text{SO}_4 + 2\text{Mg}(\text{OH})_2 \rightarrow 2\text{MgSO}_4 + \text{H}_2\text{O}$
- $2\text{Mg}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + 3\text{H}_2\text{O}$
- $\text{Mg}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + 2\text{H}_2\text{O}$

Figure 1. Examples of Pre-CPAT questions

Appendix B

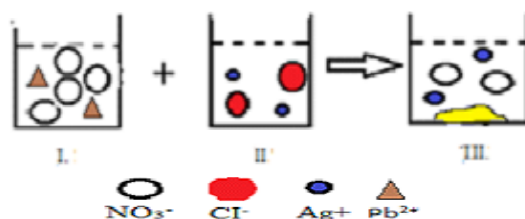
Example of Post-unit of Chemical Properties Achievement Test Questions

Question-1

When $K_2SO_4(aq)$ and $FeBr_3(aq)$ solutions are mixed, it is observed that $Fe_2(SO_4)_3(s)$ precipitate; therefore, what is the equation of this reaction?

- A) $K_2SO_4(aq) + FeBr_3(aq) \longrightarrow Fe_2(SO_4)_3(s) + KBr(aq)$
 B) $K_2SO_4(aq) + 2FeBr_3(aq) \longrightarrow Fe_2(SO_4)_3(s) + 2KBr(aq)$
 C) $3K_2SO_4(aq) + 2FeBr_3(aq) \longrightarrow Fe_2(SO_4)_3(s) + 6KBr(aq)$
 D) $K_2SO_4(aq) + FeBr_3(aq) \longrightarrow Fe_2(SO_4)_3(s)$
 E) $2K_2SO_4(aq) + 2FeBr_3(aq) \longrightarrow Fe_2(SO_4)_3(s) + KBr(aq)$

Question-2



The solution I and Solutions II were mixed into beaker III. As regards the changes in the beaker III

- I. Neutralization is the reaction.
 II. The chemical change occurred.
 III. Silver nitrate dissolved in water.

Which of the above situation(s) is/are correct?

- A) I B) II C) I and II D) II and III E) I, II, III

Question-3



It is observed the appearance of Figure-II by mixing the silver nitrate solution and the lithium iodide solution shown in Figure I. According to this;

- I. Precipitation reaction occurs.
 II. In Figure 2, the solution in the beaker is lithium nitrate.
 III. There is silver iodide in the bottom of the beaker in Figure-2.

Which of the above situation(s) is are correct?

- A) I B) II C) III D) I and III E) I, II, and III

Figure 2. Examples of the Post-CPAT



The Use of Flipped Classroom Model in Teaching Profession Knowledge Course: Its Effects on Attitudes and Self-Efficacy Beliefs

Murat Debbag^{*a}, Sevilay Yıldız^b

Article Info

DOI: 10.14686/buefad.725291

Article History:

Received: 22.04.2020

Accepted: 25.09.2020

Published: 05.10.2020

Keywords:

Flipped classroom,
Teacher education,
Blended learning.

Article Type: Research Article

Abstract

The purpose of this study was to investigate the effects of the Flipped Classroom Model on preservice teachers' attitudes and self-efficacy beliefs about Teaching Principles and Methods course. It was also aimed to consider the opinions of preservice teachers about the model. A quasi-experimental research model with pre-test and post-test control groups was used in the study. The study sample consisted of 78 preservice teachers at a state university in the Western Black Sea Region in Turkey. The Teaching Principles and Methods course was carried out in a 14-week implementation process. The Flipped Classroom model was applied in the experimental group while the traditional teaching methods were applied in the control group. According to the results, it was determined that the model positively affected the preservice teachers' attitudes and self-efficacy beliefs about Teaching Principles and Methods course. Besides having positive opinions about the model, the preservice teachers also pointed out the educational advantages of the model. The negative opinions about the model and the problems encountered during the implementation process were mostly related to the technical matters.

Ters-yüz Edilmiş Sınıf Modelinin Öğretmenlik Meslek Bilgisi Dersinde Kullanılması: Tutum ve Öz-yeterlik İnançları Üzerindeki Etkileri

Makale Bilgisi

DOI: 10.14686/buefad.725291

Makale Geçmişi:

Geliş: 22.04.2020

Kabul: 25.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Ters-yüz edilmiş sınıf,
Öğretmen eğitimi,
Harmanlanmış öğrenme.

Makale Türü: Araştırma
Makalesi

Öz

Bu çalışmanın amacı, Ters-yüz Edilmiş Sınıf Modeli'nin Öğretim İlke ve Yöntemleri dersine yönelik öğretmen adaylarının tutum ve öz-yeterlikleri üzerindeki etkisini incelemektir. Ayrıca öğretmen adaylarının modele ilişkin görüşlerinin alınması da amaçlanmıştır. Araştırmada, ön test-son test kontrol gruplu yarı deneysel araştırma modeli kullanılmıştır. Çalışma grubu, Batı Karadeniz'de yer alan bir devlet üniversitesinde 78 öğretmen adayından oluşmaktadır. 14 haftalık uygulama aşaması Öğretim İlke ve Yöntemleri dersinde gerçekleştirilmiştir. Deneysel grupta Ters-yüz Edilmiş Sınıf Modeli, kontrol grubunda geleneksel öğretim yöntemleri kullanılmıştır. Elde edilen sonuçlara göre, modelin öğretmen adaylarının derse yönelik tutum ve öz-yeterlik inançlarını olumlu yönde etkilediği saptanmıştır. Ayrıca öğretmen adayları modele ilişkin genel anlamda olumlu görüşlere sahipken özellikle eğitsel avantajlarına dikkat çekmişlerdir. Modele yönelik olumsuz görüşler ve uygulama süresince yaşanan sorunlar ise ağırlıklı olarak teknik meselelerle ilgilidir.

*Corresponding Author: mdebbag@bartın.edu.tr

^a Asst. Prof. Dr., Bartın University, Faculty of Education, Department of Educational Sciences, <http://orcid.org/0000-0002-8406-9931>

^b Asst. Prof. Dr., Bolu Abant İzzet Baysal University, Faculty of Education, Department of Educational Sciences, <http://orcid.org/0000-0002-8863-2488>

Introduction

With the importance of the curricula designed for educating individuals with a modern human profile who can comply with the requirements of the modern era, teachers having the competency for applying those curricula, and new educational theories and approaches has come to the foreground. Teachers, one of the complementary factors of the education system, play a crucial role which determines the fate of the society in raising individuals with that qualified human profile to serve in every segment of the society.

The qualities of the new generations to be educated are directly proportional to the qualities of the teachers (Can, 2019; Sandholtz & Ringstaff, 2013). The concept of teachers' professional qualities includes the concepts of both the professional knowledge and the professional skills (Buldu, 2014). The concept of "teacher qualities", whose foundation is laid on the pre-service and post-service experiences of teachers, has had to be updated in accordance with the conditions and requirements of our day. Especially the new theories and approaches, that have put students rather than teachers in the centre of learning, have underlain the new understanding of education. In this sense, HEI (Higher Education Institution) (2007), underlines that the principles of a constructive approach being used in primary education programs should be taken into account in the implementation of teacher education programs.

The teacher profile required in our country is defined in the Article 43 of the National Education Basic Law No. 1739 with the statement that "preparation for the teaching profession is enabled through general knowledge, specific field education, and pedagogical formation". In the courses "pedagogical formation (professional knowledge)" mentioned in this statement, preservice teachers are equipped with the information about how to organize the learning environment and how to teach students by taking their characteristics into account based on the field knowledge courses (HEI, 2007). Therefore, the Teaching Principles and Methods (TPM) course, one of the teaching profession knowledge courses that enables students to turn the theoretical knowledge into behaviours through applications (Küçükahmet, 2003; Taşkın & Hacıömeroğlu, 2010), was tackled in this study as it is of great importance in the organization of the learning environment according to the aforesaid new understanding of education.

According to the definition by HEI, the TPM course is comprised of content including "basic concepts of teaching, teaching and learning principles, the importance and uses of planned study in teaching, the planning of teaching, teaching and learning strategies, teaching methods and techniques, their relation to the teaching tools and materials, teacher's duties and responsibilities, and teacher competencies".

At universities throughout Turkey, the course contents in the European Credit Transfer System catalogues and in the related curricula have been created according to this description. The TPM course, including such essential content for the profession of teaching, is of prime importance in preservice teachers' future teaching in the light of up-to-date methods and principles (Kuzu & Demir, 2015). In other words, one of the main factors that has a role in teachers' fulfilment of the professional responsibilities expected from them is that they know and utilize teaching principles and methods (Uşun, 2007). However, previous studies have revealed that teachers are not able to utilize the teaching methods, techniques, and principles which are prescribed in the usually renewed curricula during the teaching service (Akçay, Akçay & Kurt, 2016; Aykaç, 2011; Demir & Özden, 2013). It has also been revealed that teachers and preservice teachers do not prefer the student-centered methods and techniques which are especially compatible with the new understanding of education (Yeşilyurt, 2013; Yıldırım, Köklükaya & Aydoğdu, 2016), and they see themselves as incompetent in using them (Akçay, Akçay & Kurt, 2016; Soylu, 2009).

In order to achieve the aim of the TPM course, different educational approaches to convey the course content to students should be discussed and tried. Particularly, the fact that there is student activity at the heart of contemporary education (Varış, 1996), and there are many studies showing that active learning methods yield more positive results for students' academic achievement (Aziz & Hossain, 2010; Chan, Wan, & Ko, 2019; Güven, 2011; Yazlık & Erdoğan, 2016), should be taken into consideration in this sense. In addition, knowing that active learning develops professional competences (Niemi & Nevgi, 2014), higher-order thinking skills (Brown, 2014),

attitudes (Kardaş & Öztürk, 2015; Kardaş & Uca, 2016) and self-efficacy perceptions (Fook et al., 2015) of students makes the revision of the TPM course in this direction inevitable.

The self-efficacy beliefs and attitudes mentioned above are the variables taken as a basis in this study. Specifically, Schunk (1991), who stated that self-efficacy beliefs are the most important predictors of individuals' goal-oriented behaviors, emphasized that the satisfaction of achieving the goal also doubled the self-efficacy belief. Besides this characteristic, it is known that self-efficacy is associated with major variables of the teaching process such as motivation and academic achievement (Sharp, 2002; Zimmerman & Cleary, 2006). Similarly, one of the factors affecting the success in the learning process is student attitudes (Küçükahmet, 2008). Whether the attitudes defined as the tendency of individuals to react to any object, event or subject based on their knowledge, experience, and motivation (İnceoğlu, 2004) are positive or negative directly affects the learning process (Güven, 2008). The individuals' attitudes towards the teacher, the teaching material, and the subject area affect their academic achievement (Kara, 2010; Şen & Özgün-Koca, 2005). It is known that individuals who feel the sense of success are more motivated to study (Bandura, 1982). At this point, it is thought that the self-efficacy beliefs and attitudes which preservice teachers develop within the scope of the TPM course, and which are of the essence for their teaching skills, are quite important for their professional lives.

Creating learning environments that will make preservice teachers more active in the TPM course, minimizing the connection problems between theory and in professional knowledge courses, integrating technology much more into the process, ensuring more effective use of the lesson duration, and achieving the overall objectives of the course have become a necessity. In this context, blended learning environments, where the advantages of the traditional classroom environment and new educational technologies are used together, can be considered as an alternative solution to eliminating these drawbacks and limitations. The opportunities offered to the teaching-learning processes, as well as daily life, by the product range equipped with new technologies have enabled the technology to become a preferred structure in education (Admiraal et al., 2017; Dunn & Kennedy, 2019). These new technologies have become an indispensable part, a complement and a supporter of new models, methods and techniques to be used in student-centered teaching-learning processes. In this framework, the importance of blended learning environments, where the advantages of the traditional classroom environment and new educational technologies are used together, are increasing day by day (Lalima & Dangwal, 2017). The Flipped Classroom (FC) model, which has been widely used in educational research in recent years (Mitroka, Harrington & DellaVecchia, 2020; Zhu, Lian & Engström, 2019), is one of the blended learning models in question.

Flipped Classroom Model

In the FC model, lessons are conducted outside of school time, usually through online videos. Within school time, homework, performance tasks, and projects that are expected to be done at home in the traditional understanding, are carried out at school with active and collaborative learning techniques (Awidi & Paynter, 2019; Bergmann & Sams, 2012; Cheng & Weng, 2017; Elmaadaway, 2018). In the "out-of-class" phase, which is the first stage of the model, teachers share their own videos and other educational resources containing theoretical information about the lesson on a common platform that students can access over the internet. With the guidance of their teachers, students access and study the subject and activities of the related course from digital educational sources independently of time and place before coming to class (Zainuddin & Halili, 2016).

In the "in-class" phase of the model, the groups formed by the teacher discuss the subject in the traditional classroom environment of the model first. Then, the group members enter into the process of solving the problems posed about the subject. This not only supports collaborative learning but also helps students' inquiry and problem-solving skills develop (Kong, 2014; Wilson, Waghel & Dinkins, 2019). In this way, on one hand, the model enables the effective use of classroom time in order to make more use of student-centered active learning strategies; on the other hand, it enhances classroom interaction (LaFee, 2013; Milman, 2012). This student-centered learning environment has positive effects on students' attendance at lessons and satisfaction as well as their knowledge and skills (Awidi & Paynter, 2019; Murillo-Zamorano, López Sánchez, & Godoy-Caballero, 2019).

The digital materials used within the scope of the model attract the attention of today's generation Z students, especially at higher education levels, and enable them to establish a connection with the course (Priporas, Stylos,

& Fotiadis, 2017). This situation positively affects students' autonomy and motivation (Abeysekera & Dawson, 2015; Zainuddin, 2018). The studies in the literature show that the model improves students' group work and problem solving skills (Bishop & Verleger, 2013; Zhu, Lian & Engström, 2019), it is more effective than traditional methods regarding knowledge and areas of learning (Rawas, Bano & Alaidarous, 2019), it improves learning outcomes (Cheng, Ritzhaupt & Antonenko, 2018; Van Alten et al., 2019), it strengthens self-efficacy beliefs (Chuang et al, 2018; Thai, De Wever & Valcke; 2017), it enables efficient use of classroom time (Fulton, 2012), allows students and teachers to enjoy using the model and feel good (Ha, O'Reilly., Ng, & Zhang, 2019), gives students positive opinions about the model (Butt, 2014) and develops positive attitudes (Tütüncü & Aksu, 2018). On the other hand, as for the limitations of the model, it has been reported that it requires institutional support, there may be problems with internet access (Greene, 2016), students may resist to a new model (Herreid & Schiller, 2013), teachers find it difficult to develop video materials (Effield, 2012), it is uncertain whether students watch videos, and the interaction outside the classroom is less (Rivera, 2015; Sams & Bergmann, 2013).

The FC model with these characteristics is a powerful alternative which is based on active learning and has many student-centered advantages such as problem solving, individual-group work, use of technology, and class participation. Taking into account both the contemporary education approach and the curricula improved in this direction, it has become inevitable to use new models, methods, and techniques in the pre-service teaching-learning process (Kaya & Büyükkasap, 2005). Another factor causing this necessity is the problems and troubles experienced in training teachers from past to present, especially in professional knowledge (pedagogy) courses. In recent studies, it has been observed that there are various negative evaluations regarding the troubles in the teaching of the related courses and the practical effectiveness of the courses (Kavas & Bugay, 2009; Kumral & Saracaloğlu, 2011; Şallı-Çopur, 2008). Yüksel (2011) emphasized about these evaluations in a summative and supportive manner that the criticism made over the teaching profession knowledge courses since the 1930s has been concentrated on teaching the courses abstractively, independently from each other, and away from intense and repetitive content as well. Therefore, in terms of elimination or minimization of the problems, it is thought that the holistic evaluation of variables such as self-efficacy and attitudes that have an important place are key in the teaching process within the scope of the TPM course, which aims to teach the interrelated basic teaching skills, and will be guiding for making educational inferences about the FC model at the micro level and solve the mentioned problems at the macro level. It is seen that there are a limited number of studies on the use and effectiveness of the FC model in teacher education in literature. It is very important to try new models and approaches that can make teacher education more effective.

In this regard, the main focus of this study is to investigate the “active learning environment”, one of the main cornerstones of the Constructivist Learning Theory, which shapes the current curricula in the Turkish education system, and the "FC model" supporting this environment within the scope of the TPM course. From this point of view, results and evaluations regarding the effectiveness of critical variables for the teaching process, such as attitudes and self-efficacy beliefs towards the course of the preservice teachers who took the TPM course designed within the frame of the principles of FC model during one semester, will be included in the current study.

The purpose of the study

The purpose of this study was to examine the effect of the Flipped Classroom model on preservice teachers' attitudes and self-efficacy beliefs towards the TPM course that they were attending as one of the teaching profession knowledge courses given at higher education level. It was also aimed to determine the opinions of preservice teachers participating in the study about the practices related to the model. Within the scope of this overall purpose, answers to the following questions were sought:

- 1- What is the effect of the Flipped Classroom model on preservice teachers' attitudes towards the TPM course?
- 2- What is the effect of the Flipped Classroom model on preservice teachers' self-efficacy beliefs towards the TPM course?
- 3- What are the opinions of preservice teachers about the use of the Flipped Classroom model in the TPM course?

Method

In this study, quantitative and qualitative research methods were used together. In the quantitative part, a quasi-experimental design with pretest-posttest control groups was used. The effect of the technique used on the experimental group can be investigated according to the results obtained from the pretests and posttests in experimental studies (Büyüköztürk, 2013). While the TPM course was conducted with the FC model in the experimental group of this study, traditional teaching methods were used in the control group.

Table 1. Research Design

	Pretest	Process	Posttest	
Experimental Group (FC)	SES AS	FC Applications (14 Week)	SES A	Qualitative Data Collection
Control Group (Traditional Methods)	SES AS	---	SES AS	

SES: Self-efficacy scale, AS: Attitude scale

In the qualitative part of the study, the descriptive survey model was utilized and the data were obtained from the experimental group. Observing, recording, diagnosing the relationships between the events, and making generalization over the controlled and unchanging principles are the qualities of science used in descriptive survey model.(Yıldırım & Şimşek, 2013) .

Study Group

The study was carried out with 78 (2nd grade) preservice teachers studying at the education faculty of a state university in the Western Black Sea region. There were 37 preservice teachers (20 females, 17 males) in the experimental group of the study and 41 (18 females, 23 males) in the control group. In determining the experimental and control groups, students' university placement exam scores, score types, and overall academic grade point averages were taken into consideration. In order to determine the equivalence of the groups before the experimental process, the attitude and self-efficacy scale was applied as a pretest in teacher undergraduate programs at the faculty of education. Two groups (Elementary Mathematics Education and Science Education) between which there was no statistically significant difference were selected among them as the experimental and control groups. It was also taken into consideration that the same instructor was responsible for the TPM course in the selected classes.

Content and the Procedure

The general structure of the in-class and out-of-class learning environments for the experimental and control groups during the implementation process is shown in Figure 1.





Teaching Principles and Methods Course			
Control Group		Experimental Group	
Traditional Methods		Flipped Classroom	
14 Weeks		14 Weeks	
	Lecture (Traditional methods)		Lecture (Online videos+ Interactive questions)
	Homework Activities		Classroom Activities (Active learning)

Figure 1. Design Of Learning Environments For Experimental And Control Groups

At the beginning of the implementation process, orientation training about the FC model was provided to the students in the experimental group and the problems that may be encountered during the implementation phase were minimized by testing before proceeding to the actual applications. In addition, the instructor was also provided with the training on the FC model before implementation.

In-class and out-of-class activities which were previously planned for the TPM course by the researcher to continue throughout the course period (14 weeks, 42 hours) were carried out with the experimental group students. The videos that the experimental group students watched outside the classroom were produced in a studio environment with the cooperation of the researcher and the responsible instructor. While preparing the videos and the presentations in them, the multimedia design principles proposed by Mayer (2001) within the scope of Multimedia Cognitive Learning Theory were taken into consideration. In addition, in each video lesson, there are sections titled as "What will we learn?", "Why is it important?", "Course video", "Let's think a little" and "Let's not forget". The duration of the videos created according to the weekly-planned lesson subject was arranged to be 12:56 min for the shortest one and 16:11 min for the longest one in accordance with the recommendations in the FC literature. Interactive questions prepared in cooperation with the instructor were included in each video.

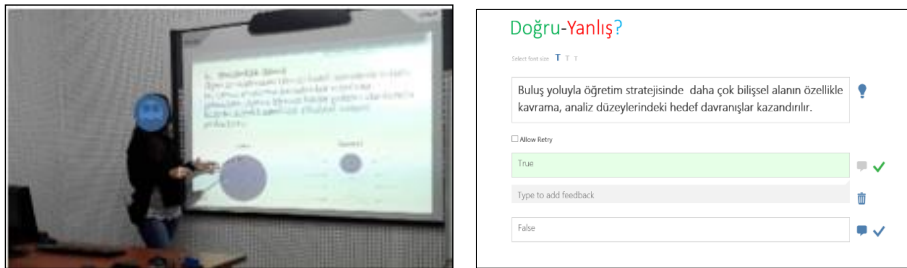


Figure 2. The Images Of Sample Lesson Video And Interactive Questions

The videos were opened to access on the OfficeMix platform weekly. This platform presents the statistics of students' logins to the system, video watching durations, and answers to the questions. These statistics were checked by the researcher and the instructor weekly.

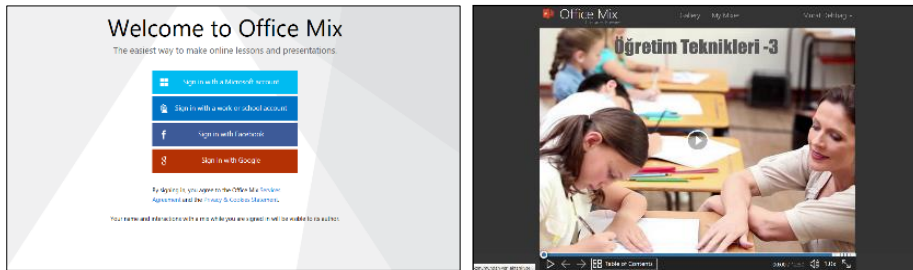


Figure 3. Screenshots Of The Officemix Platform

Video links, announcements, and other sources related to the course were also shared regularly on the education platform of Beyazpano.com.



Figure 4. Screenshots Of The Beyazpano Platform

The procedures applied in the experimental group each week during the process are shown in Figure 5.

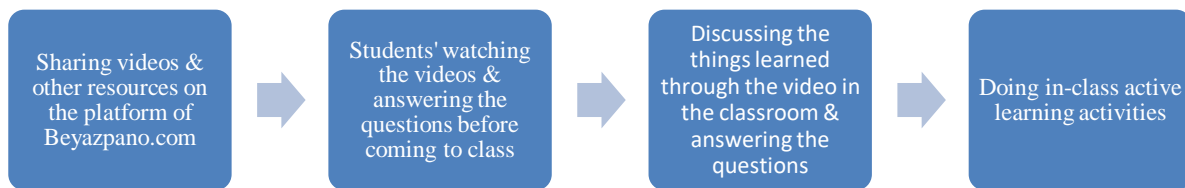


Figure 5. Phases Of The Weekly Flow Of The Lesson

In-class learning activities specific to each week were planned by the researcher in accordance with the topic. It was aimed to get the students to be involved in the process individually or in groups. In this regard, methods and techniques such as concept maps, problem solving, cooperative learning, case study, small or large group discussions, brainstorming, role playing, drama, and educational games were used. The lessons of the experimental group were held in the studio classroom (consisting of displaceable tables and chairs) in order to carry out these activities in a favorable learning environment. Classroom design was changed according to weekly activities. In Figure 6 there are images from the examples of the activities in the experimental group.



Figure 6. Images Of In-Class Active Learning Activities

No intervention was made to the control group. The control group continued with the traditional methods in which the FC model was not applied to the TPM course during the relevant course period. Also, the lessons in this group were mainly teacher-centered; methods and techniques such as lectures, presentations (powerpoint slides), demonstration, and question-answer were used in the classroom. The scales within the scope of the research were applied to the experimental and control groups both at the beginning and at the end of the process. In addition, the opinions of the students in the experimental group about the implementation process and the FC model were taken at the end of the research process. The lessons were carried out by the same instructor in the Experimental and Control groups.

Data Collection Tools

Two scales were used to collect the quantitative data of the research. "Teaching Principles and Methods Course Self-Efficacy Scale" developed by Kuzu and Demir (2015) was used to determine the self-efficacy levels of preservice teachers about the TPM course. The scale, in total, consisted of 33 items under six factors titled "Knowledge of Curriculum Development Process", "Knowledge of Teaching-Learning Approaches", "Knowledge of Applying Teaching Principles and Methods", "Knowledge of Basic Concepts", "Capability to Explain the Knowledge of Teaching Principles and Methods" and "Knowledge of Planning". Factors explain 67% of the total variance. The Cronbach Alpha coefficient (α) of the scale is 0.95, and the reliability coefficient for the factors of the scale varies between 0.85 and 0.91 (Kuzu & Demir, 2015). The scale was of 5-point Likert type. In line with the aims and research questions of this study, the scale was evaluated as one-dimensional; that is, it was analyzed and interpreted over the total score. CFA was conducted to determine whether the construct validity of the TPM-SE scale was ensured within the scope of the present study. The results showed that the suitability statistics of the model with six factors for the 33 items of the scale were within the acceptable range in terms of the fit indices ($\chi^2 = 158.76$, CFI = 0.89, GFI = 0.91, RMSEA = 0.079, SRMR = 0.068).

The "Attitude Scale towards Teaching Principles and Methods Course" developed by Gür-Erdoğan (2011) was used to determine the attitudes of preservice teachers towards the TPM course. The scale consisted of a total of 40 items under three factors titled "internalization", "adoption" and "abnegation". The Cronbach Alpha coefficient (α) of the scale was 0.90, and it was calculated as 0.96 for the "internalization" factor, 0.92 for the "adoption" factor and 0.84 for the "abnegation" factor (Gür-Erdoğan, 2011). The scale was of 5-point Likert type. As in similar studies in the literature (Woolkul, 2014) and in accordance with the aims and research questions of this study, the scale was evaluated as one-dimensional; that is, it was analyzed and interpreted over the total score. In this sense, the high scores obtained from the scale were evaluated as the indicator of high attitude towards the TPM course and low scores as the indicator of low attitude. The data were coded as positive (5) and negative (1) and included in the analysis process accordingly. CFA was conducted to determine whether the construct validity of the TPM-A scale was ensured within the scope of the present study. The results showed that the suitability statistics of the model created with three factors for the 40 items of the scale were within the acceptable range in terms of the fit indices ($\chi^2 = 137.11$, CFI = 0.93, GFI = 0.94, RMSEA = 0.074, SRMR = 0.073).

In the collection of qualitative data, a survey form consisting of open-ended questions prepared by the researcher was used. The survey consisted of four questions, but only one out of the four was taken into consideration in accordance with the purpose of this study. While creating the survey form, the draft questions were examined and corrected by three specialist instructors in terms of content validity. Questions ensuring content validity were rearranged after presenting them to language and assessment specialists. Finally, in order to test the comprehensibility of the questions, they were applied to the students who were at the same level with the study group and the survey form took its final form according to their feedback.

Data Analysis

In the analysis of quantitative data related to the first and second questions of the research; Mann Whitney-U test was used because the data did not meet the normality assumptions. SPSS 15.00 software was used in the analysis of the data and the significance level of .05 was taken as a basis. The effect sizes which had lower sensitivity to the sample size (Richardson, 2011) and were recommended to be reported (Beins & McCarthy, 2012) were also taken into consideration. "r" value was taken into account as the effect size and calculated by the researcher. In interpreting this value, the cutting points of Cohen (1988) were used. The effect size gives standardized information about the magnitude of the difference between the two groups (Beins & McCarthy, 2012).

Content analysis was used in the analysis of the qualitative data related to the third question of the study. Content analysis is the process of summarizing the basic contents of the written information and the messages they contain (Cohen, Manion & Morrison, 2007). Content analysis includes the stages of "data processing", "data coding", "determining the categories", "organizing the codes and categories", "defining and interpreting the findings" (Yıldırım & Şimşek, 2013). These stages were followed respectively in the analysis of qualitative data.

In determining the codes and categories, the concepts emerging in the findings and the related literature were taken into consideration.

Research Ethics

This study was evaluated by Abant Izzet Baysal University Social Sciences Human Research Ethics Committee on 21.09.2016 at the 2016/05 no. meeting and it was ethically approved.

Findings

Within the scope of the first research question; the results of the independent groups Mann-Whitney U test conducted for the examination of the difference between the 'attitude towards TPM' posttest scores of the students in the experimental and control groups are shown in Table 2.

Table 2. The Results Of The Independent Groups Mann-Whitney U Test On The 'Attitude Towards TPM' Posttest Scores Of The Experimental And Control Group Students

	Group	N	Mean Rank	Sum of Ranks	U	Z	P	r
TPM Course Attitude (Posttest)	Experimental Group	37	49,35	1826,00	394,00	-3,65	0,00*	0.41
	Control Group	41	30,61	1255,00				
	Total	78						

*p<0,05

When Table 2 is examined, it is seen that there is a significant difference in favor of the experimental group between the post-implementation 'attitude towards TPM' posttest scores of the experimental and control group students (U = 394.00, p <0.05, r = 0.41). This significant difference is represented by a high effect size. Accordingly, it can be said that the FC model is effective in the development of positive attitudes towards the TPM course by the students. In other words, it can be said that the characteristics of the model regarding its in-class and out-of-class dimensions increase the attitude levels of preservice teachers in terms of teaching skills, teaching methods, and planning the learning environment.

Within the scope of the second research question; the results of the independent groups Mann-Whitney U test conducted for the examination of the difference between the self-efficacy beliefs' posttest scores of the students in the experimental and control groups are shown in Table 3.

Table 3. The Results Of The Independent Groups Mann-Whitney U Test On The 'Self-Efficacy Beliefs' Posttest Scores Of The Experimental And Control Group Students

	Group	N	Mean rank	Sum of ranks	U	Z	p	r
TPM Course Self-efficacy (Posttest)	Experimental Group	37	44,97	1664,00	556,00	-2,02	0,04*	0.22
	Control Group	41	34,56	1417,00				
	Total	78						

*p<0,05

When Table 3 is examined, it is seen that there is a significant difference between the posttest scores of the experimental and control group students who participated in the study in favor of the experimental group (U = 556.00, p > 0.05, r = 0.22). This significant difference is represented by a medium effect size. This finding shows that the FC model positively affects students' self-efficacy beliefs for the course. In other words, it can be said that

the characteristics of the model regarding its in-class and out-of-class dimensions enhance the beliefs of preservice teachers in terms of teaching skills, teaching methods, and planning the learning environment.

Within the scope of the third research question, the content analysis including the opinions of the preservice teachers in the experimental group about the FC model is given in Table 4.

Table 4. The Codes And Categories Including The Preservice Teachers' Opinions About The FC Model

Category	Sub-category	Codes	f
Positive	Educational	Providing opportunity for	16
		Providing active participation in the class	14
		Increasing motivation	11
		Enabling coming to class prepared	9
		Being time-saving	9
		Being student-centered	6
	Technical	The chance for watching the videos over and over again	9
		The practicality of interactive questions	4
		Ensuring attendance to lesson due to the monitoring of the video watching rates	3
	Affective	Increasing self-esteem	11
		Being intriguing	4
		Being liked	3
		Including fun activities	2
Negative	Technical	Being worrisome for those having limited access to the internet	8
		The use-up of the internet quota by the videos	5
		The inaccessibility of videos on some mobile phones bazı telefonlarda açılmaması	4
		Including boring videos	3
	Educational	No lecturing in the classroom	3
		The difficulty of teaching the lesson through videos	3
		The difficulty of questions in the videos	2
	Other	The worry of being assumed not to have watched the videos	6
		The anxiety caused by the monitoring of the video watching statistics	4
		Abstaining from being active in the classroom activities	4

Examples of student responses that form the basis of the findings in Table 4 are given below:

A-1. *“I think Flipped Classroom helps students come to class prepared and be active in the lesson. I think students' self-confidence and ability of self-expression improves because FC helps them become active learners. However, the problems of those whose mobile phones do not support the app or who do not have internet access should be solved.*

A-12. *“After being introduced to this model at the beginning of the semester, I observed in the adaptation process that the model was student-centered. The fact that we come to class with some prior learning motivates and leads us to attend classes much more. I am curious about activities on other topics during the semester.*

Active participation is much better than being lectured, but I get overexcited in lessons. I think the other important feature of the model is that it is time-saving and there will be plenty of time for other activities since lessons are not taught in the classroom.”

A-23. *“As far as I understand, our teachers can even see how many videos we have watched and how long we have stayed in the video. This situation was both surprising and worrying for me. I could not feel comfortable. Also, some interactive questions in the videos were difficult.”*

Within the scope of the third question of the study, the content analysis including the preservice teachers' opinions about the problems they faced in relation to the implementation of the FC model (inside and outside of the classroom) and the suggested solutions is given in Table 5.

Table 5. The Codes And Categories Including The Preservice Teachers' Opinions About The Problems They Faced In The Implementation Process Of The FC Model And The Suggested Solutions For Them

Category	Codes (Problems)	Codes (Solutions)	f
Technical	Internet-based problems	Connecting to a different internet source (library, home, canteen, dormitory etc.)	4
		Connecting through desktop computer	2
		Reconnecting to the internet	2
		Watching the videos when the internet connection is fast	2
	Distraction while watching the videos	Watching in a calm/more proper environment	3
		Watching on another day	2
		Rewatching after pausing the video	2
	Impossibility of asking questions while watching the videos	Asking the question in the classroom	3
		Finding answers to questions during activities	2
		Learning from another source/internet	2
Mobile device-based problems	Getting a tablet computer from counsellor instructor	3	
Incapability to see the questions in the videos	Trying on a different computer, tablet pc or browser	3	
The concern about whether the statistics of video watching are kept accurately	Announcing the watching statistics accurately each week	3	
Educational	Insufficient efforts of some group members in group works	The taking over of the duties of those who do not perform efficiently in the activities by other group members.	2
	Forgettablity of prior learning or watching	Starting the lesson by asking short questions about the videos watched beforehand	2
	Need for additional sources apart from the videos	Uploading additional written worksheets	2
	The physical conditions of the classroom	Moving to an appropriate classroom after the first week	1

Examples of student responses that form the basis of the findings in Table 5 are given below:

A-11. "I usually had difficulty in watching videos before the lesson due to the problems on the internet but I don't think this was a problem related to the model itself as I solved it by watching them through different internet ports. In addition, there were some problems in group work activities. Responsibility awareness should be established to overcome these problems. Everyone should be involved in activities with equal consciousness."

A-5. "I could not watch the videos uploaded to the platform on the phone, our counsellor instructor provided tablet computers to solve this problem. Sometimes I could not see the questions between the videos, but I solved this problem by accessing through a different browser supported with flash player. Although statistics are kept, not everyone can watch the videos sincerely to learn; mini-tests can be made at the beginning of the lesson to see if the videos have been watched or not"

Discussion and Conclusion

A significant difference was found in favour of the experimental group between the post-implementation 'TPM course attitude' post-test scores of the experimental and control group students participating in the study. Accordingly, it can be said that the FC model is effective in the development of positive attitudes towards the TPM course by the students. This situation can be explained by the fact that the model offers an individual learning environment for students who learn at different speeds by means of out-of-class applications (Bergmann & Sams, 2012), enables unlimited repetition of lessons (Bishop & Verleger, 2013; Goedhart et al., 2019; Pierce & Fox, 2012), and gives students the opportunity to be responsible for their own learning (Kara, 2016; Tomas et al., 2019). Similarly, the fact that the model turns the dull learning environment in the classroom into an interactive and collaborative atmosphere (Friedman & Friedman, 2013; Van Alten et al., 2019) based on experiential learning (Gillois, Bosson, Genty, Vuillez & Romanet, 2015; Tan, Brainard & Larkin, 2015; Zheng et al., 2019) can also be said to be effective in this situation. In this context, the students in the experimental group put the theoretical knowledge they acquired outside the classroom into practice in a constructivist learning environment in the classroom in which they became part of a project, participated in activities based on active learning, and had the opportunity to test their basic teaching skills and to enjoy their own learning. Therefore, considering the aforementioned in-class and out-of-class dimensions that can be described as student-and learning-friendly, it can be thought that students identify this situation with the TPM course and their attitudes towards the course are positively affected in this context. As a matter of fact, the positive opinions about participation in classroom activities, motivation for the lesson, coming to class prepared, and using time efficiently which are included in the qualitative findings of the study support this situation.

It is seen that there is a significant difference in favour of the experimental group between the 'TPM course self-efficacy' post-test scores of the experimental and control group students participating in the study. Researches in the literature also support these findings (Chou, 2017; Lai & Hwang, 2016). Accordingly, it can be said that the FC model positively affects students' self-efficacy beliefs towards the course. At this point, it can be seen that preservice teachers in the group studying with the FC model can display their own performances in the interactive and democratic classroom environment, take part in active learning-based activities, and have the opportunity to share what they have learned outside the classroom as part of a team. On the other hand, the improvement in students' attitudes towards the course can be evaluated on the same basis with self-efficacy. In this context, in the literature, there are interactive relationships both between self-efficacy beliefs and attitudes (Koballa & Crawley, 1985; Nikolopoulou & Gialamas, 2009) and between self-efficacy beliefs and motivation (Schunk, 1991). In this regard, Bandura (1997) states that self-efficacy belief affects even individuals' thoughts, motivations and the way they explain their environment. As a matter of fact, the participants emphasized that the model had positive effects on their self-confidence and motivation in most of the opinions obtained in the qualitative dimension of the study. In the light of this information, it is seen that the findings obtained in relation to these variables in this study support each other and show parallelism with the literature in general. Moreover, considering that the self-efficacy beliefs and attitudes developed by teachers affect their future behaviors and teaching performances (Li, 1999; Osborne, Simon & Collins, 2003), it can be foreseen that the FC model could make positive contributions to the professional achievements of preservice teachers in the future. As the self-efficacy perceptions of teachers

increase, they are able to practise their professions more confidently, foresee what they can do, communicate effectively and strive to be successful (Benzer, 2011).

The four main sources of the self-efficacy belief are 'the knowledge that individuals obtain through their own learning experiences', 'the observations they make about the successful or unsuccessful practices of others', 'the community's impact on whether they may be successful or not', and 'the psychological situation they have in relation to the expectation of success or failure'. Each of these sources affects individuals' self-efficacy beliefs. Self-efficacy belief also determines the task selection of the learner, the strategy he/she chooses, and his/her perseverance in performing the task and which thus affects the performance (Bandura, 1994). It can be said that the model used in this study has a positive effect on the self-efficacy beliefs about the TPM course as a result of supporting and consolidating the resources that enhance the self-efficacy belief. In other qualitative findings of the study, the fact that the model gives opportunity to put into practice what they have learned encourages participation in classroom activities and saves time required for the activities; the positive opinions about being prepared for the lesson support all these results and evaluations.

It is seen that the participants' opinions towards the FC model are predominantly "positive". It is noteworthy that most of the positive opinions are about the "educational" aspect. On the other hand, negative opinions mainly include concerns about technical issues. Student opinions in similar studies, in which the FC model was handled, also parallel with these findings (Akgün & Atıcı, 2017; Alsancak-Sırakaya, 2017; Andujar, Salaberri-Ramiro, & Martínez, 2020; Başaran, 2019; Chao, Chen & Chuang 2015; Findlay-Thompson & Mambourquette, 2014; Frydenberg, 2012; Yıldız, Kıyıcı & Altıntaş, 2016). For example, in the research conducted by Yıldız, Kıyıcı and Altıntaş (2016), preservice teachers studying with the FC model emphasized the fact that the model enabled them to practice, reinforce what they learned, be prepared for the lesson, and watch videos over and over again. In the studies of Başaran (2019) and Alsancak-Sırakaya (2015), students also stated, in line with the findings above, that the model increased their motivation while in the findings of studies by Alsancak-Sırakaya (2017) and Görü-Doğan (2015), students emphasized that the model helped them to be prepared for the lesson. In the study by Akgün and Atıcı (2017), students stated that being prepared for the lesson positively affected the active participation in the classroom. This is in line with student opinions in this study and in similar studies in the literature, which have revealed that the model increases active participation (Frydenberg, 2012; Sever, 2014; Stone, 2012). Considering the findings above, in a general sense, each opinion emphasized by preservice teachers can be thought to be explanatory of their attitudes and self-efficacy beliefs towards the course. In this regard, this situation coincides with the quantitative findings of the research. It is noteworthy that the criticisms about the FC model are predominantly related to the "technical" aspect. Similarly, there are studies with various conclusions about the problems experienced by students regarding internet and technological deficiencies (Kocabatmaz, 2016; Milman, 2012; Turan, 2015). Although LaFee (2013) states that the problems related to internet connection can be compensated by distributing to students electronic recordings of the lessons (DVD etc.), it is very difficult in this case to benefit from the advantages, such as the monitoring of students' participation and interactive questions.

Limitations

This study is limited to the preservice teachers who were selected as the sample of this study and were studying in the education faculty where the study was conducted, to the data obtained from them during the 14-week implementation period, to the data collection tools used in the study, and to the factors in these tools.

Recommendations

Based on the findings of the study, it can be suggested to apply the model in lessons that are suitable for the FC model in teacher education programs. This can contribute to students' taking their own learning responsibilities, individual and group works, active learning activities, being part of a project, learning with fun, and their attitudes and self-efficacy beliefs towards the course. However, good planning of both dimensions of the model and creating

a classroom environment based on student interaction and guided by the teacher is important for both the course and other educational variables.

The OfficeMix add-on and website used in the implementation phase have started to work in integration with the Powerpoint application since 2019. In this way, the need for participants to download add-ons has been eliminated. Videos can be recorded via Screencast within the PowerPoint application and can be published on the Microsoft Stream platform. New studies can be planned about these programs and platforms.

The videos to be used in research within the scope of FC model should be long enough not to decrease the students' watching habits. In addition, the fact that the videos are created remarkably and in high resolution in accordance with educational goals and visual rules is very important for achieving the goal of the model. The platform where the videos will be uploaded should be chosen properly to be useful for both teachers and students. Filing a report of the electronic movements of students through the platform will facilitate the control of the process.

In future studies, the effects of the model on different variables that are not included in this study can be investigated. Its effect on teaching skills or different variables or its relationships with them can be explored in depth. In this context, long-term or longitudinal studies may provide more detailed findings.

This study was carried out at higher education level and within the scope of education faculty. Similar studies can be conducted at different educational levels or at different faculties. Correlations and inferences can be made in terms of students' demographic characteristics such as age, gender, and socio-economic status.

Acknowledgments

This study was formed from the first authors' Phd dissertation (The effectiveness of the flipped classroom model designed for teaching principles and methods course curriculum) under the supervision of the second author.

Statement of Publication Ethics

The authors declare that the research has no unethical problem and observe research and publication ethics.

Conflict of Interest

The authors declare that there are no conflicts of interest associated with this paper. Funding: This study was not funded by any organization or institution.

References

- Admiraal, W., Vugt, F. V., Kranenburg, F., Koster, B., Smit, B., Weijers, S., & Lockhorst, D. (2017). Preparing pre-service teachers to integrate technology into K-12 instruction: Evaluation of a technology-infused approach. *Technology, Pedagogy and Education*, 26, 105-120.
- Akçay, N. O., Akçay, A., & Kurt, M. (2016). Ortaokul öğretmenlerinin öğretim yöntem ve tekniklerine yönelik görüş ve yeterliklerinin incelenmesi [Investigation of the secondary school teachers' view and competency to teaching methods and techniques]. *Journal of Research in Education and Teaching*, 5(1), 333-342.
- Akgün, M., & Atıcı, B. (2017). The effect of flipped classroom on learners' academic achievements and views. *Kastamonu Education Journal*, 25(1), 329-344.
- Alsancak-Sırakaya, D. (2015). *Tersyüz sınıf modelinin akademik başarı, öz-yönetimli öğrenme hazırbulunuşluğu ve motivasyon üzerine etkisi [The effect of flipped classroom model on academic achievement, self - directed learning readiness and motivation]*. Unpublished Doctorate Dissertation, Gazi University, Ankara, Turkey.
- Alsancak-Sırakaya, D. A. (2017). Oyunlaştırılmış tersyüz sınıf modeline yönelik öğrenci görüşleri. *Ondokuz Mayıs University Education of Journal*, 36(1), 114-132.
- Andujar, A., Salaberri-Ramiro, M. S., & Martínez, M. S. C. (2020). Integrating Flipped Foreign Language Learning through Mobile Devices: Technology Acceptance and Flipped Learning Experience. *Sustainability*, 12(3), 1110. <https://doi.org/10.3390/su12031110>
- Aykaç, N. (2011). Hayat bilgisi dersi öğretim programında kullanılan yöntem ve tekniklerin öğretmen görüşlerine göre değerlendirilmesi (Sinop ili örneği) [Evaluation of the methods and techniques used in knowledge of life course teaching pro (Sinop case study) gram according to teacher opinions]. *Kastamonu Education Journal*, 19(1), 113-126.
- Awidi, I. T., & Paynter, M. (2019). The impact of a flipped classroom approach on student learning experience. *Computers & Education*, 128, 269-283. <https://doi.org/10.1016/j.compedu.2018.09.013>
- Aziz, Z., & Hossain, A. (2010). A comparison of cooperative learning and conventional teaching on students' achievement in secondary mathematics. *Procedia Social and Behavioral Sciences*, 9, 53-62.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122-47.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachandran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press.
- Bandura, A. (1997). *Self-Efficacy: The exercise of control*. New York, NY: Freeman and Company.
- Başaran, S. (2019). Investigating university students' views on flipped classroom approach. *Proceedings of INTED2019, 13th International Technology, Education and Development Conference*, 8050-8059. <https://doi.org/10.21125/inted.2019.1998>
- Beins, B. C., & McCarthy, M. A. (2012). *Research Methods and Statistics*. New Jersey: Pearson Education.
- Benzer, F. (2011). *İlköğretim ve ortaöğretim kurumlarında görevyapan öğretmenlerin öz yeterlik algularının analizi [An analysis on the sense of self efficacy of the teachers working in primary and high schools]*. Unpublished Master Dissertation, Selçuk University, Konya, Turkey.
- Bergmann J., & Sams A. (2012). *Flip your classroom: Reach every student in every class every day*. Washington, DC: International Society for Technology in Education.
- Bishop, J. L., & Verleger, M. A. (2013). The flipped classroom: a survey of the research. In 120th ASEE National Conference and Exposition, Atlanta, GA (Paper ID 6219). Washington, DC: American Society for Engineering Education.

- Brown, A. L. (2014). Implementing active learning in an online teacher education course. *American Journal of Distance Education*, 28(3), 170-182.
- Buldu, M. (2014). Öğretmen yeterlik düzeyi değerlendirmesi ve mesleki gelişim eğitimleri planlanması üzerine bir öneri [A system level proposal on teacher competency assessment and teacher professional development]. *Millî Eğitim*, 204, 114-134.
- Butt, A. (2014). Student views on the use of a flipped classroom approach: Evidence from Australia. *Business Education & Accreditation*, 6(1), 33-43.
- Büyüköztürk, S. (2013). *Sosyal bilimler için veri analizi el kitabı [Data analysis handbook for social sciences]*. (18. Edition). Ankara: Pegem AkademiYayıncılık.
- Can, E. (2019). Öğretmenlerin meslekî gelişimleri: Engeller ve öneriler [Professional development of teachers: obstacles and suggestions]. *Journal of Qualitative Research in Education*, 7(4), 1618-1650. <https://doi.org/10.14689/Issn.2148-2624.1.7c.4s.14m>
- Chan, S. C. H., Wan, C. L. J., & Ko, S. (2019). Interactivity, active collaborative learning, and learning performance: The moderating role of perceived fun by using personal response systems. *The International Journal of Management Education*, 17(1), 94-102. <https://doi.org/10.1016/j.ijme.2018.12.004>
- Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2018). Effects of the flipped classroom instructional strategy on students' learning outcomes: a meta-analysis. *Educational Technology Research and Development*, 4, 793-824. doi:10.1007/s11423-018-9633-7
- Cheng, Y., & Weng, C. (2017). Factors influence the digital media teaching of primary school teachers in a flipped class: A Taiwan case study. *South African Journal of Education*, 37(1), 1-12. <https://doi.org/10.15700/saje.v37n1a1293>.
- Chou, L.-Y. (2017). The Effect of Flipped Classroom on Self-efficacy and Satisfaction of Computer Auditing. *Advances in Intelligent Systems and Computing*, 841-845. https://doi.org/10.1007/978-3-319-61542-4_86
- Chuang, H., Weng, C., & Chen, C. (2018). Which students benefit most from a flipped classroom approach to language learning?. *Br J Educ Technol*, 49, 56-68. <https://doi.org/10.1111/bjet.12530>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
- Darling-Hammond, L., Hyler, M.E., & Gardner, M. (2017). *Effective teacher professional development*. Palo, Alto, CA: Learning Policy Institute.
- Demir, S., & Özden, S. (2013). Sınıf öğretmenlerinin öğretimsel stratejilere yöntemlere ve tekniklere ilişkin görüşleri: hayat bilgisi dersine yönelik tanılayıcı bir çalışma [Primary school teachers' opinions of instructional strategies, methods and techniques: a descriptive study for science of life class]. *Pamukkale University Journal of Social Sciences Institute*, 14, 59-75.
- Dunn, T. J., & Kennedy, M. (2019). Technology enhanced learning in higher education; motivations, engagement and academic achievement. *Computers & Education*, 137, 104-113.
- Effield, J. (2013). Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN. *TechTrends*, 57(6), 14-27.
- Elmaadaway, M. A. N. (2018). The effects of aflipped classroom approach on class engagement and skill performance in a blackboard course. *British Journal of Educational Technology*, 49(3), 479-491.
- Findlay-Thompson, S. and Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education & Accreditation*, 6, 63-71.
- Fook, C. Y., Dalim, S. F., Narasuman, S., Sidhu, G. K., Fong, L. L., & Keang, K. M. (2015). Relationship between active learning and self-efficacy among students in higher education. *International Academic Research Journal of Social Science*, 1 (2), 139-149.

- Friedman, L. W., & Friedman, H. H. (2013). Using social media technologies to enhance online learning. *Journal of Educators*, 10(1), 1-22.
- Frydenberg, M. (2012). *Flipping Excel*. Proceedings of the Information Systems, Proceedings of the Information Systems Educators Conference, New Orleans Louisiana, USA.
- Fulton, K. (2012). 10 reasons to flip. *Phi Delta Kappan*, 94(2), 20-24.
- Gillois P., Bosson J. L., Genty C., Vuillez J. P., & Romanet J. P. (2015). The impacts of blended learning design in first year medical studies. *Stud Health Technol Inform*, 210, 607-611.
- Greene, C. M. (2016). *Exploring the flipped classroom: Possibilities and limitations*. Unpublished Master Dissertation. Lisbon University, Institute of Education, Portugal.
- Goedhart, N. S., Blignaut-van Westrhenen, N., Moser, C., & Zweekhorst, M. B. M. (2019). The flipped classroom: supporting a diverse group of students in their learning. *Learning Environments Research*. <https://doi.org/10.1007/s10984-019-09281-2>
- Görü-Doğan, T. (2015). Sosyal medyanın öğrenme süreçlerinde kullanımı: Ters-yüz edilmiş öğrenme yaklaşımına ilişkin öğrenen görüşleri [The use of social media in learning processes: Learner views on the inverted learning approach]. *Journal of Open Education Practices and Research*, 1(2), 24-48.
- Gür-Erdoğan. D. (2011). Öğretim ilke ve yöntemleri dersi tutum ölçeği'nin geliştirilmesi [Development of teaching principles and methods course attitude scale]. *International Educational Technology Conference Proceedings Book* (ss.1858-1862). İstanbul University, İstanbul.
- Güven, B. (2008). İlköğretim öğrencilerinin öğrenme stilleri, tutumları ve akademik başarıları arasındaki ilişkinin incelenmesi [An investigation of the relationships among the learning styles of the primary school students, their attitudes and their academic success]. *Turkish Journal of Social Research*, 12(1), 35- 54.
- Güven, E. (2011). *Kaynaştırma uygulamasının yapıldığı sınıflarda işbirlikli öğrenmenin müzik öğretimi üzerindeki etkileri [The Effects of Cooperative Learning on Music Teaching in the Classrooms where Inclusive Practice is Performed]*. Unpublished Doctorate Dissertation, Gazi University, Ankara, Turkey.
- Ha, A. S., O'Reilly, J., Ng, J. Y. Y., & Zhang, J. H. (2019). Evaluating the flipped classroom approach in Asian higher education: Perspectives from students and teachers. *Cogent Education*, 6(1). <https://doi.org/10.1080/2331186x.2019.1638147>
- Herreid, C. F., & Schiller, N. A. (2013). Case studies and the flipped classroom. *Journal of College Science Teaching*, 42(5), 62-66.
- İnceoğlu, M. (2004). *Tutum, algı, iletişim [Attitude, perception, communication]*. Ankara: Kesit Tanıtım Ltd. Şti.
- Kara, A. (2010). Öğrenmeye ilişkin tutum ölçeğinin geliştirilmesi [The development of the scale of attitudes toward learning]. *Electronic Journal of Social Sciences*, 9(32), 49-62.
- Kardaş, M. N., & Öztürk, Y. (2015). Aktif öğrenme tekniklerinin Türkçe öğretiminde başarı, tutum ve uygulamalara yönelik öğrenci görüşleriyle ilişkisi: Bir meta-analiz çalışması [Relationship between active learning techniques and students' views on success, attitude and practices in Turkish teaching: a meta-analysis study]. *International Journal of Languages' Education and Teaching UDES Özel Sayısı*, 1682-1692.
- Kardaş, M. N., & Uca, N. (2016). Aktif öğrenme yönteminin kullanıldığı çalışmaların öğrenci başarısı, tutumu ve görüşleri açısından incelenmesi: Bir meta-analiz çalışması [The relationship between active learning method and the views of students on achievement; attitude and applications: a study of meta-analysis]. *International Journal of Turkish Education Sciences*, 4(7), 118-130.
- Kavas, A. B., & Bugay, A. (2009). Öğretmen adaylarının hizmet öncesi eğitimlerinde gördükleri eksiklikler ve çözüm önerileri [Perceptions of Prospective Teachers about Deficiencies of Pre-Service Teacher Education and Suggestions]. *PAU Journal of Education*, 1 (25), 13-21.

- Kaya, A., & Büyükkasap, E. (2005). Fizik öğretmenliği programı öğrencilerinin profilleri, öğretmenlik mesleğine yönelik tutum ve endişeleri: Erzurum Örneği [Hysics student teachers' profiles, attitudes and anxiety toward teaching profession: case for Erzurum]. *Kastamonu Education Journal*, 13(2), 367-380.
- Koballa, T. R., & Crawley, F. E. (1985). The influence of attitude on science teaching and learning. *School Science and Mathematics*, 85, 222-232.
- Kocabatmaz, H. (2016). Ters yüz sınıf modeline ilişkin öğretmen adayları görüşleri [The ideas of pre-service teachers regarding the "flipped classroom model"]. *Journal of Research in Education and Teaching*, 5(4), 14-24.
- Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Computers & Education*, 78, 160-173. <https://doi.org/10.1016/j.compedu.2014.05.009>
- Kumral, O., & Saracaloğlu S. (2011). Eğitsel eleştiri modeli ile sınıf öğretmenliği meslek bilgisi dersleri programının değerlendirilmesi [Teaching profession courses evaluation with educational criticism: a case study]. *E-Journal of New World Sciences Academy*, 6(1), 106-118.
- Kuzu, S., & Demir, S. (2015). Öğretmen adayları için öğretim ilke ve yöntemleri dersi öz yeterlilik ölçeğinin geliştirilmesi [Developing "teaching principles and methods cors self-efficacy scale" for pre-service teachers]. *Mustafa Kemal University Journal of Social Sciences Institute*, 12(32), 401-415.
- Küçükahmet, L. (2003). Bir meslek olarak öğretmenlik [Teaching as a profession]. L. Küçükahmet, Ş.Ö. Külahoğlu, T. Çalık, G. Topses, A. F. Öksüzoğlu, & A. Korkmaz (Eds.), *Öğretmenlik mesleğine giriş [Introduction to teaching profession]* (ss.1-25) Ankara: Nobel Yayıncılık.
- Küçükahmet, L. (2008). *Öğretimde planlama ve değerlendirme [Planning and evaluation in instruction]*. (17. Edition). Ankara: Nobel yayın dağıtım.
- LaFee, S. (2013). Flipped learning. *Education Digest*, 79(3), 13-18.
- Lai, C.-L., & Hwang, G.-J. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education*, 100, 126-140. <https://doi.org/10.1016/j.compedu.2016.05.006>
- Lalima, & Dangwal, K. L. (2017). Blended learning: an innovative approach. *Universal Journal of Educational Research*, 5, 129-136. <https://doi.org/10.13189/ujer.2017.050116>.
- Li, Q. (1999). Teachers' beliefs and gender differences in mathematics: A review. *Educational Research*, 41(1), 63-76.
- Milman, N. (2012). The flipped classroom strategy: What is it and how can it be used? *Distance Learning*, 9(3), 85-87.
- Mitroka, J. G., Harrington, C., & DellaVecchia, M. J. (2020). A multiyear comparison of flipped- vs. lecture-based teaching on student success in a pharmaceutical science class. *Currents in Pharmacy Teaching and Learning*, 12 (1), 84-87. <https://doi.org/10.1016/j.cptl.2019.10.014>
- Murillo-Zamorano, L. R., López Sánchez, J. Á., & Godoy-Caballero, A. L. (2019). How the flipped classroom affects knowledge, skills, and engagement in higher education: Effects on students' satisfaction. *Computers & Education*, 103608. <https://doi.org/10.1016/j.compedu.2019.103608>
- Niemi, H., & Nevgi, A. (2014). Research studies and active learning promoting professional competences in Finnish teacher education. *Teaching and Teacher Education*, 43, 131-142.
- Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079.
- Pierce, R., & Fox, J. (2012). Vodcasts and activelearning exercises in a "flipped classroom" model of a renal pharmacotherapy module. *American Journal of Pharmaceutical Education*, 76(10).

- Priporas, C., Stylos, N., & Fotiadis, A. K. (2017). Generation Z consumers' expectations of interactions in smart retailing: A future agenda. *Computers in Human Behavior*, 77, 374-381
- Rawas, H., Bano, N., & Alaidarous, S. (2019). Comparing the effects of individual versus group face-to-face class activities in flipped classroom on student's test performances. *Health Professions Education*. <https://doi.org/10.1016/j.hpe.2019.06.002>
- Richardson, J. T. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review*, 6(2), 135-147.
- Rivera, E. (2015). Using the flipped classroom model in your library instruction course. *The Reference Librarian*, 56(1), 34-41.
- Sams, A., & Bergmann, J. (2013). Flip your students' learning. *Educational Leadership*, 70(6), 16-20.
- Sandholtz, J. H. & Ringstaff, C. (2013). Assessing the impact of teacher professional development on science instruction in the early elementary grades in rural US schools. *Professional Development in Education*, 39(5), 678-697.
- Sever, G. (2014). Bireysel çalgı keman derslerinde çevrilmiş öğrenme modelinin uygulanması [The application of flipped learning model on individual violin lessons]. *Journal of Qualitative Research in Education*, 2(2), 27-42.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207-231.
- Sharp, C. (2002). Study support and the development of self-regulated learner. *Educational Research*, 44(1), 29-42.
- Soylu Y. (2009). Sınıf öğretmen adaylarının matematik derslerinde öğretim yöntem ve teknikleri kullanabilme konusundaki yeterlilikleri üzerine bir çalışma [A study on primary school teacher candidates' ability of using teaching methods and techniques in mathematics courses]. *Mersin University Journal of the Faculty of Education*, 5(1), 1-16.
- Stone, B. B. (2012). *Flip your classroom to increase active learning and student engagement*. 28th annual conference on distance teaching & learning. Wisconsin: The Board of Regents of the University of Wisconsin System.
- Şallı-Çopur, D. (2008). *Teacher effectiveness in initial years of service: a case study on the graduates of METU Foreign Language Education Program*. Unpublished Doctoral Dissertation. Middle East Technical University, Ankara, Turkey.
- Şen, A. İ., & Özgün-Koca, S. A. (2005). Orta öğretim öğrencilerinin matematik ve fen derslerine yönelik olan olumlu tutumları ve nedenleri [Causes of negative attitudes of secondary school students towards mathematics and science classes]. *Eurasian Journal of Educational Research (EJER)*, 18, 186-201.
- Tan, E., Brainard, A., & Larkin, G. L. (2015). Acceptability of the flipped classroom approach for in-house teaching in emergency medicine. *Emerg Med Australas*, 27, 453-459.
- Taşkın, Ç. Ş., & Hacıömeroğlu, G. (2010). Meslek bilgisi derslerinin öğretmen adaylarının profesyonel gelişimindeki önemi [Importance of pedagogy courses on preservice teachers' professional development]. *PAU Journal of Education*, 28, 165-174.
- Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best "blend" of lectures and guiding questions with feedback. *Computers & Education*, 107, 113-126. <https://doi.org/10.1016/j.compedu.2017.01.003>
- Tomas, L., Evans, N., Doyle, T., & Skamp, K. (2019). Are first year students ready for a flipped classroom? A case for a flipped learning continuum. *International Journal of Educational Technology in Higher Education*, 16(1). <https://doi.org/10.1186/s41239-019-0135-4>
- Turan, Z. (2015). *Tersyüz sınıf yönteminin değerlendirilmesi ve akademik başarı, bilişsel yük ve motivasyona etkisinin incelenmesi* [The evaluation of flipped classroom method and examination of its effects on academic

- achievement, cognitive load and motivation*]. Unpublished Doctorate Dissertation, Atatürk University, Erzurum, Turkey.
- Tütüncü, N., & Aksu, M. (2018). A systematic review of flipped classroom studies in Turkish education. *International Journal of Social Sciences and Education Research*, 4(2), 207-229. <https://doi.org/10.24289/ijsser.405647>
- Uşun, S. (2007). Öğretim ilke ve yöntemleri, Saraçoğlu, A. S. & Bahar, H. H. (Ed.), *Öğretim yöntem ve teknikleri*, (ss.137-183), İstanbul: Lisans Yayınları.
- Van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2019). Effects of flipping the classroom on learning outcomes and satisfaction: A meta-analysis. *Educational Research Review*, 28(2019), 100281. <https://doi.org/10.1016/j.edurev.2019.05.003>
- Varış, F. (1996). *Eğitimde program geliştirme: teori ve teknikler [Program development in education: theory and techniques]*. (6th edition). Ankara: Alkim Yayınları.
- Wilson, J. A., Waghel, R. C., & Dinkins, M. M. (2019). Flipped classroom versus a didactic method with active learning in a modified team-based learning self-care pharmacotherapy course. *Currents in Pharmacy Teaching and Learning*, 11(12), 1287-1295. <https://doi.org/10.1016/j.cptl.2019.09.017>
- Yazlık, D. Ö., & Erdoğan, A. (2016). İşbirlikli öğrenme ile birlikte kullanılan problem çözme stratejilerinin öğrenci başarısı üzerine etkisi [The effects of problem solving strategies used in combinations with cooperative learning on learner achievement]. *Journal of Kırşehir Education Faculty (KEFAD)*, 17, 1-16.
- Yeşilyurt, E. (2013). Öğretmenlerin öğretim yöntemlerini kullanma amaçları ve karşılaştıkları sorunlar [Teachers' aim in using teaching methods and problems they encounter]. *Atatürk University Journal of Social Sciences Institute.*, 17(1), 163-188.
- Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri [Qualitative research methods in social sciences]*. (8. Edition). Ankara: Seçkin Yayıncılık.
- Yıldırım E. G., Köklükaya, A., & Aydoğdu, M. (2016). Fen bilgisi öğretmen adaylarının öğretim yöntem-teknik tercihleri ve bu tercihlerinin nedenleri [Teaching methods-technical preferences of science teacher candidates and the reasons for these preferences]. *e-Kafkas Journal of Educational Research*, 3(1), 15-25.
- Yıldız, D., Kırıyıcı, G., & Altıntaş, G. (2016). Ters-yüz edilmiş sınıf modelinin öğretmen adaylarının erişimleri ve görüşleri açısından incelenmesi. *Sakarya University Journal of Education*, 6(3), 195-210.
- HEI (Higher Education Institution). (2007). *Öğretmen Yetiştirme ve Eğitim Fakülteleri [Teacher Training and Education Faculties] (1982–2007)*. Ankara: Yükseköğretim Kurulu.
- Yünkül, E. (2014). *Çoklu ortam tasarım ilkelerine göre hazırlanan öğretim yazılımının başarı ve tutuma etkisi [The effect of instructional software prepared according to multimedia design principles on success and attitude]*. Unpublished Doctorate Dissertation, Balıkesir University, Balıkesir.
- Yüksel, S. (2011). *Türk üniversitelerinde eğitim fakülteleri ve öğretmen yetiştirme [Education faculties and teacher training at Turkish universities]*. Ankara: Pegem Akademi.
- Zainuddin, Z. (2018). Students' learning performance and perceived motivation in gamified flipped-class instruction. *Computers & Education*, 126, 75–88. <https://doi.org/10.1016/j.compedu.2018.07.003>
- Zainuddin, Z., & Halili, S. H. (2016). Flipped classroom research and trends from different fields of study. *International Review of Research in Open and Distributed Learning*, 17(3), 313-340. <https://doi.org/10.19173/irrodl.v17i3.2274>.
- Zheng, M., Chu, C.-C., Wu, Y., & Gou, W. (2018). The mapping of online learning to flipped classroom: Small private online course. *Sustainability*, 10(3), 748. <https://doi.org/10.3390/su10030748>
- Zimmerman, B. J., & Cleary, T. J. (2006). Adolescents' Development of Personal Agency. In F. Pajares, & T. Urdan (Eds.), *Adolescence and Education* (Vol. 5): Self-Efficacy Beliefs of Adolescents (pp. 45-69). Greenwich, CT: Information Age Publishing.

Zhu, L., Lian, Z., & Engström, M. (2019). Use of a flipped classroom in ophthalmology courses for nursing, dental and medical students: A quasi-experimental study using a mixed-methods approach. *Nurse Education Today*, 104262. <https://doi.org/10.1016/j.nedt.2019.104262>



Lesson Study in Action: A Multiple Case Study of EFL Teachers

İlknur Bayram^a, Özlem Canaran^{*b}

Article Info

DOI:

10.14686/buefad.730780

Article History:

Received: 04.05.2020

Accepted: 03.06.2020

Published: 05.10.2020

Keywords:

EFL teachers,

Lesson study,

Multiple-case study,

Professional development.

Article Type: Research

Article

Abstract

Traditional professional development efforts aimed at changing teacher behavior through seminars sometimes fall short of meeting contextual needs of schools and teachers. Contemporary professional development points to a change in this 'training' perspective, and acknowledges professional development as a complex undertaking grounded in active teacher participation. Lesson Study can respond to the demands of this paradigm shift, yet its adoption in English as a Foreign Language (EFL) contexts is limited. This multiple-case study aimed at exploring the Lesson Study process experienced by EFL teachers in a Turkish higher education context. Potential benefits of the model and what might prevent its effective implementation were investigated. Participants were 20 EFL teachers. Data from reflective reports, interviews and a questionnaire were analyzed through cross-case analysis. Results showed Lesson Study provided a collaborative learning environment, and improved teachers' knowledge-in-practice. However, teachers' misconceptualizing Lesson Study and lacking support mechanisms were detected among potential pitfalls. To accommodate teachers' professional development needs, schools should adopt practices recognizing their potential as researchers, reflective practitioners, and change agents. It would be helpful to encourage teachers to experiment with Lesson Study, using it as a catalyst for change and benefiting from its advantages to teacher learning.

Uygulamada Ders İmecesini: Yabancı Dil Olarak İngilizce Öğretmenleri Üzerine Bir Çoklu Durum Çalışması

Makale Bilgisi

DOI:

10.14686/buefad.730780

Makale Geçmişi:

Geliş: 04.05.2020

Kabul: 03.06.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

İngilizce öğretmenleri,

Ders imecesi,

Çoklu durum çalışması,

Mesleki gelişim.

Makale Türü: Araştırma

makalesi

Öz

Öğretmen davranışını seminerler yoluyla değiştirmeyi amaçlayan geleneksel mesleki gelişim çalışmaları, okulların ve öğretmenlerin bağlamsal ihtiyaçlarını bazen karşılayamamaktadır. Öğretmenlerin mesleki gelişimi üzerine güncel alan yazın, bu geleneksel yaklaşımda bir değişikliğe işaret etmekte ve mesleki gelişimi öğretmenin etkin katılımına dayanan bir süreç olarak değerlendirmektedir. Ders İmecesini, bu paradigma değişikliğine cevap verebilen bir model olarak kullanılabilir, ancak yabancı dil olarak İngilizce öğretimi bağlamında uygulamaları oldukça sınırlıdır. Bu çoklu durum çalışması, Türkiye'de bir vakıf üniversitesinde İngilizce öğretmenlerinin deneyimlediği Ders İmecesini sürecini araştırmaktadır. Çalışmada, modelin faydaları ve uygulanmasını engelleyen unsurlar araştırılmıştır. Çalışmaya 20 İngilizce öğretmeni katılmıştır. Veriler anket, yansıtıcı rapor ve görüşme yoluyla elde edilmiş ve çapraz durum analizi yapılmıştır. Sonuçlar, modelin öğretmenlere işbirlikçi bir öğrenme ortamı sağladığını ve mesleki uygulama üzerine bilgilerini geliştirdiğini göstermiştir. Ayrıca, öğretmenlerin modeli doğru kavrayamamaları ve süreç boyunca yeterli destek alamamış olmaları yaşanan zorluklar arasındadır. Sonuç olarak, okulların araştırmacı, yansıtıcı düşünün ve değişim elçisi olan öğretmenlerin mesleki gelişim ihtiyaçlarını karşılayacak ve potansiyellerini keşfedebilecekleri uygulamaları benimsemesi gerektiği düşünülmektedir. Öğretmen mesleki gelişimine sağladığı katkılardan dolayı öğretmenlerin, değişim için bir katalizör olarak Ders İmecesini uygulamasına teşvik edilmesi önerilmektedir.

*Corresponding Author: ozlem.canaran@tedu.edu.tr

^aDr., TED University, Center for Teaching and Learning, <https://orcid.org/0000-0001-8109-8051>

^bDr, TED University, Department of English Language Teaching, <https://orcid.org/0000-0003-2605-7884>

Introduction

After graduation, a career-long professional development journey begins for teachers during which they will learn how to fine-tune their teaching skills to better serve the needs of their students (Diaz-Maggioli, 2012). Therefore, continuous professional development (CPD) of teachers has always been a hotly debated topic in all fields of education including the field of English Language Teaching (ELT). Making a distinction between training and development, Ur (1997) states that applied science and craft models of CPD have connotations of ‘training’ imposed on teachers not taking their prior experience into consideration, whereas reflective CPD models carry connotations of ‘development’ initiated by teachers themselves, helping them construct knowledge personally. Teachers are highly critical of CPD offered to them in the form of trainings, or workshops given by a content specialist, in a scheduled time, and without considering their school and classroom context. However, they particularly value CPD opportunities which take place in their own workplace during regular working hours, and are connected to their school and classroom setting (Garet et al., 2001). They also point out that CPD that involves mentoring and coaching benefit their practice more.

Richardson and Diaz-Maggioli (2018) suggest that for a CPD practice to have a powerful effect on teachers, it should be impactful, needs-based, sustained, peer-collaborative, in-practice, reflective, and evaluated. High quality CPD must also occur over a long period of time, and it should include school-based coaching (Adey, Hewitt, Hewitt & Landau, 2004). Lesson Study (LS) with its emphasis on collaboration and reflection on teachers’ classroom practices is regarded as a CPD model that incorporates many features of effective professional development (Lewis & Perry, 2014).

Lesson Study

An integral part of the teaching and learning process in Japan (Fuji, 2014), LS is a CPD model which originated in the East. The model spread to the world after studies began to refer repeatedly to its potential as an approach to improve teaching and learning (Wiburg & Brown, 2006). LS is job-embedded, and carried out collaboratively with a group of teachers who design, teach, analyze, and reflect on a research lesson (Fernandez & Chokshi, 2002). A usual LS implementation is carried out in an iterative cycle comprised of the following four steps; (1) Study curriculum and formulate goals, (2) Plan, (3) Conduct research, and (4) Reflect (Lewis, Perry, & Murata, 2006). Teachers start the LS process by selecting a topic and developing learning goals. Then, they prepare a lesson plan, which is implemented in a real classroom setting by one of the teachers. This specific lesson is called a research lesson, and it is observed by the other teachers in the LS team. Eventually, teachers reflect on this lesson by discussing the observed student behavior and reactions (See Figure 1 for the LS Cycle used in this study).

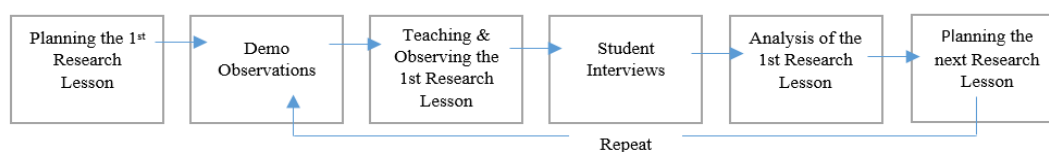


Figure 1. Lesson study cycle in the study

Teachers engaged in these steps work in collaboration to improve their teaching by analyzing their teaching strategies, evaluating their methods, giving and getting feedback from their peers and carefully examining the result of their efforts (Zepeda, 2012). In each LS cycle, teachers work together to refine their lesson plans to improve their teaching through analysis of and reflection on their own lessons (Lewis, 2016), which eventually leads to an improvement in student learning outcomes (Dudley, 2012). LS is reported to develop teachers’ pedagogical content knowledge (Coenders & Verhoef, 2019). There is also evidence that teachers’ involvement in LS as active participants encourages them to sharpen their reflective skills (Stigler & Hiebert, 2009), and enhance their knowledge about learners (Xu & Pedder, 2015).

The model has been used in various countries both in initial (Amador & Weiland, 2015; Cajkler & Wood, 2015) and in-service teacher education (Obara & Bikai, 2019; Takahashi & McDougal, 2016). Similarly, the implementation of LS in Turkey has recently been increasing among teachers from diverse backgrounds. In a similar fashion to the tendency around the world, LS has also been a popular professional development model particularly among science and mathematics teachers in Turkey (Kartal, Ozturk, Ekici, 2012; Yilmaz, Yetkin-Ozdemir, 2019). Results of these studies showed that the model resulted in an increase in the content and pedagogical content knowledge of teachers. Promising results led to the adoption of the model by teachers from different disciplines such as language teaching. In their study, Karabuga and Ilin (2019) worked with five EFL teachers to explore the challenges and benefits of LS and found out that they found the model demanding because of its requiring a great deal of time and effort. However, they also reported that their involvement in LS was worthy of their efforts as it improved their subject knowledge and teaching practices. In a similar study, Yalcin-Arslan (2018) investigated how LS impacted eight preservice EFL teachers' learning and professional development, and found out that teacher learning was facilitated as a result of observations and reflections in the model. Songul et al. (2018) tried out an online version of LS with four EFL teachers from different high schools and concluded that LS increased teachers' knowledge of instructional strategies and technology. LS has also proven to play a facilitative role in the development of EFL teachers as teacher researchers (Demirbulak, 2011).

Although the studies mentioned above have promising results, collaborative and reflective models such as LS are rarely practiced by teachers in Turkey. They are even rarer among university teachers. This necessitates more research to be conducted to explore how these models are implemented and what potential impact they have on the CPD of teachers.

Purpose of the Study

LS is mostly used by mathematics and science teachers in mainstream education. However, there is a lack of research base to claim that LS might serve as an effective CPD model for EFL teachers (Norton, 2018; Yalcin-Arslan, 2018). This study is one of the few research studies in Turkey that is undertaken for this purpose. The purpose of this study is to investigate how LS is interpreted by EFL teachers and what possibilities and challenges might arise during its implementation.

Method

Research design

As we gathered data from and examined several cases, this study was designed as a multiple-case qualitative study (Merriam, 2009). The multiple-case study design aims to explore a case in depth, and it enables researchers to examine a phenomenon from different perspectives through comparisons among several cases (Yin, 2014). This design was considered appropriate for our study which set out to thoroughly examine how teachers benefit from LS as a CPD model. Cases in this study are 'empirical units' (Patton, 2015, p. 422). Groups of teachers who implement LS in teams were treated as cases for analysis. The cases started right after teachers came together as teams to engage in LS, and ended when they completed their LS cycles, wrote up their final report, and presented their findings to their colleagues. Participants were informed about the research aims and methods, and their consent was obtained. They were ensured that they may withdraw from the study any time they wanted without causing them any harm.

Research site and participants

A foundation university in Turkey served as the setting of this study. Ethical approval was obtained from the university's ethics committee. The research setting was purposefully chosen by considering the fact that the researchers would be provided easy access to the site, and the administration would let teachers engage in LS for a prolonged period of time. To illuminate the research questions under investigation and help us reach an in-depth

understanding, we tried to select information-rich cases as suggested by Patton (2015). The participants were chosen through convenience sampling (Creswell, 2007) taking two criteria into account. First, the teachers had to have at least two years of teaching experience to ensure that they have gained a certain amount of classroom experience and improved their pedagogical practices. Second, teachers had to display willingness to try out a new CPD model and take part in the study. Teachers were informed that they would have to write reflective reports, observe their peers, be observed by them, prepare a final report and make a presentation if they accepted to participate in the study. They were further advised that interviews would be held with them, and we would confer with them to verify the results of our study. Participants were represented by numbers to respect their anonymity (See Table 1 for details of study participants).

Table 1. Participants of the study

Team	Term	Teacher No	Gender	Age	Major	Experience (Years)
1	2016-17 Spring	1	Female	24	ELT	2
		2	Female	24	ELT	2
		3	Female	25	ELT	3
		4	Female	24	ELL	2
2	2016-17 Spring	5	Female	27	ELT	5
		6	Male	26	ELT	4
		7	Female	32	ELL	9
		8	Male	39	ELL	3
3	2017-18 Fall	9	Female	25	ELT	3
		10	Female	25	ELT	3
		11	Female	26	ELT	4
4	2017-18 Fall	12	Female	26	ELT	4
		13	Male	29	ELT	6
		14	Female	25	ELT	3
5	2017-18 Spring	15	Female	26	ELT	4
		16	Female	24	ELT	2
		17	Male	26	ELT	4
6	2017-18 Spring	18	Female	25	ELL	3
		19	Female	27	ELT	5
		20	Female	27	ELT	5

* ELT: English Language Teaching, ELL: English Language and Literature, MS: Media Studies

Data collection and analysis

Data were collected through reflective reports, final LS reports, interviews, and questionnaire. Each teacher wrote three reflective reports, and one final LS report per each group was prepared to document LS findings (Cerbin, 2012). Individual interviews aimed at eliciting teachers' opinions regarding LS were conducted with 15 teachers. An online questionnaire developed by Cerbin (2012) was slightly modified and conducted with the participation of 15 teachers.

Data were analyzed through cross-case analysis as described by Miles and Huberman (1994). To understand what has happened in a single case, we, first, analyzed reflective reports, final LS reports, interviews, and the questionnaire separately for each case. We noted down the major themes emerging from a specific case so that we could later compare those themes with other cases. Using the constant comparative method, we examined similarities and differences across all the six cases in order to see if the themes applied beyond one specific case. We refined and eliminated themes until we agreed on all the themes emerging from cases (See Table 2 for the emerging themes).

Table 2. Emerging Themes

Main Theme	Theme	Sub-theme	f	%
Possibilities	Collaborative learning environment	Combined forces	28	48.3
		Companionship	16	27.6
		Fulfilling a common purpose	14	24.1
	Teacher knowledge-in-practice	Reflection on classroom practices	34	33.7
		Looking at learners from a different perspective	26	25.7
		Increase in subject knowledge	28	27.7
Barriers	Misconceptions	Transforming a lesson	13	12.9
		Skill refinement	18	15.9
		Observing teacher behavior	41	36.3
		Overemphasis on lesson planning	25	22.1
	Lack of support mechanisms	'Scientific' research	29	25.7
		Administrative support	31	38.3
		Facilitator support	23	28.4
Expert opinion	27	33.3		

Findings

Findings revealed that LS provided teachers with a collaborative learning environment, and increased teachers' knowledge-in-practice. Despite these possibilities, LS was found to have some barriers that might hinder its effective adaptation to the Turkish EFL context.

Possibilities presented by LS

Collaborative learning environment

A key finding was that LS provided teachers with a safe learning environment based on collaboration and peer support. It should be noted that teachers in this study were not used to working in teams as part of a CPD model, and they repeatedly emphasized it took a tremendous team effort to finish the LS process. Their comments suggested they valued the collaborative nature of LS because it showed them working together was advantageous in many ways. Teacher 3 reported, 'The phases [of LS] showed me that when teachers combined their forces in achieving instructional goals, they could create great work. Different perspectives and experiences made things much better, and collaboration made our job a lot easier.'

Initially, teachers voiced their concerns about the demanding nature of LS. They highlighted it required teachers to carry out several different tasks in a specific period of time and order. This could result in conflicts and disagreements among teammates in terms of allocation of duties, and difference of opinion, which could negatively affect the overall LS experience. This caused teachers to feel doubtful about the success of LS. However, through the end of the process, they noted they learned how to function well as a group by respecting each other, being understanding, taking on responsibilities, and showing eagerness. Teacher 16 indicated, 'As a collaborative study in every sense, LS taught me how to work as a team effectively. Generally, I consider myself as an easygoing person, so I work well in group activities. However, I often end up taking more responsibility. Surprisingly, it wasn't the case in this LS team. Everyone took equal responsibility willingly. Therefore, I learnt having righteous and understanding team members is crucial when working with a group.'

Teachers were also satisfied with the constant companionship provided by the facilitators and team members. They supported each other through constructive feedback and discussions in every phase of LS. This experience enabled them to reconsider their existing beliefs in regard to teamwork. Teacher 12 wrote, 'It actually affected my collaboration with colleagues a lot. I had been thinking a collaborative study would be difficult to implement, but thanks to my facilitator and colleagues, the collaboration and discussions led to positive outcomes all the time.' Teachers' doubts as expressed by Teacher 12 seemed to diminish during the end of the process.

LS united teachers in their attempt to accomplish a shared aim. This also contributed to the formation of a collaborative learning environment. Teachers worked together for a term to finish LS, and one essential factor that kept them going was their enthusiasm to find answers to the pressing questions they framed in the beginning. Teacher 15 commented as follows: ‘Trying to achieve a common purpose kept us together. We all wanted to do something to address our research question. This helped us focus our discussions at times when we diverted from our real question. We all knew that we had an ultimate aim to achieve.’ It is clear that LS enabled teachers to establish harmonious relationships as colleagues who gathered to fulfill a common purpose. Teacher comments showed the feelings of collegiality increased as teachers progressed through the LS process. They got to know each other better as they often worked together, and continuous group work made it possible to gradually learn more about each other’s attitudes and beliefs about issues such as curriculum, lesson planning and language teaching methods. In addition to being more familiar with each other professionally, some group members were observed to develop strong personal bonds, as well.

Teacher knowledge-in-practice

Teachers found LS very beneficial in terms of its increasing their knowledge-in-practice through constant reflection on their classroom practices. Throughout the phases of LS, teachers had to think critically about their decisions regarding in-class activities, interaction patterns, student responses, and materials development. To fine-tune their lesson plan, they analyzed even the minute details very carefully. This is reported to improve their reflective skills. Teacher 9 shared her reflections: ‘Attempting to make things better each time enables us to go through the lesson and teaching process with a critical eye focusing on even minor details. Through observing various teachers and class dynamics, I realized how these variables had a different impact on the same lesson, which provided me with some insights regarding the unexpectedness of teaching.’

The ‘unexpectedness of teaching’ when coupled with the student perspective opened up new opportunities for reflection. LS was reported to provide teachers with ways to consider learners and the learning process from a different point of view as underlined by Teacher 3: ‘It definitely changes one’s attitudes towards teaching and learning especially in terms of student thinking and how they learn.’ Taking students into account in the teaching process was an important moment of revelation for teachers because as emphasized by Teacher 5, teachers in this study tended to value teaching more than learning. Teacher 5 reflects on her culture and teacher education program to provide an explanation for their tendency to underestimate learning; ‘If it weren’t for LS, I would never be able to realize that we should look at lessons from our students’ perspective. In both our culture and undergrad studies, teaching and teachers are given more emphasis than learners and the learning process. This is how we are raised and educated as teachers.’ This somewhat natural inclination was broken as teachers learned how to look at a lesson from students’ point of view by taking their ideas and reactions about a lesson into account. Teacher 10 also commented, ‘LS teaches you step by step to be student-oriented. Through student observations, interviews and video recordings, you have solid evidence of what students think about a particular lesson, and you get to understand them better.’ Teacher 18 also indicted, ‘I realized I had a black box in my head about students. Generally, I used to underestimate their potential before LS.’

Teachers reported that LS increased their subject matter knowledge by enabling them to reflect on what they know and don’t know about a subject. Before picking a learning problem, they had lengthy discussions about the topics students had difficulty in learning. During these discussions, they had to refer to their own understanding, conceptualization and interpretation of a specific topic. For instance, a group of teachers wanted to explore why students could not paraphrase effectively while writing articles. Teachers’ discussions to tackle this problem unearthed the fact that teachers themselves had strikingly different ideas from each other as to what effective paraphrasing means. Teacher 6 reflected ‘LS showed us paraphrasing was a difficult and complex process often misunderstood by both students and teachers. We had some ambiguous thoughts about this concept. Therefore, firstly we tried to conceptualize the term to clarify what it meant to us all.’

Teachers also reported LS enabled them to learn about effective lesson planning. Therefore, teachers spent a considerable amount of time to effectively plan their lessons. They discussed the learning outcomes, interaction

patterns, activities, timing, approach, and the rationales behind their decisions. This process helped them to learn from each other how to plan more effective lessons. Teacher 17 indicated, 'We don't usually plan lessons on paper. When we do so, we do it on our own and in a very casual way. LS helped us break this routine and take lesson planning very seriously. This experience made me believe we should plan lessons in detail from time to time because such kind of lesson planning teaches you many things you might otherwise not be able to learn.'

LS also enabled teachers to implement, observe and reflect on their lesson plans during research lessons. This created another learning opportunity for teachers. They reported that during the implementation of a lesson plan, they could, either as observers or teachers, identify what they needed to have done to better teach the lesson. This promoted teacher learning in regard to how to teach a skill or how to design activities. Teacher 1 commented, 'Having finished three cycles and implemented three research lessons in three different classes, I can certainly say I now know more about how listening can be taught more effectively.' Based on their reflections and analyses, teachers also learned how to improve a lesson. Especially in the second and third cycles of LS, teachers reported they were content with the way they transformed their lessons through modifications. Teacher 20 said, 'Formerly, I had no idea about whether or in what ways I could make a lesson better. I used to think about things that went well in my lesson, and things I needed to change, but that was it. I didn't think about how I would modify the lesson if I had to reteach it in another classroom. But now, we see improving a lesson is just as important as planning it in the first place. Looking at the first, second and third lesson plans, we could easily spot the differences and the progress we had made.'

Barriers to the implementation of LS

Misconceptions

Teachers reshaping LS in their own understanding presents a barrier to its effective implementation. They may mistakenly think LS primarily aims at refining teachers' pedagogical skills. Teacher 19 noted, 'I don't think LS is the right model to use to improve my teaching skills. I can do so with other models such as micro teaching.' This interpretation seemed to influence the perceptions of the teachers regarding the model. Since teachers engaged in CPD activities to polish up their classroom management skills, their main motivation was to achieve satisfactory outcomes in this regard. They also wished to observe their peers to develop their classroom practice. Teacher 7 indicated, 'This model helps us see our colleagues in class and how they implement a lesson similar to the ones we teach. Can't we do the same thing through peer observations?' Peer observation was not common practice in the setting this research was conducted. Therefore, during research lessons, teachers were inclined to focus on how their colleagues dealt with classroom management issues, and exploited materials. For instance, having observed a more experienced colleague, Teacher 5 reflected as follows: 'I think this study is more suitable and practicable for more-experienced teachers because they know well in what areas the students face difficulties or problems.'

Another misconception was that teachers thought LS was mainly about lesson planning. Teachers in this study were observed to spend most of their time to plan research lessons and modify them based on students' feedback and their own reflection. They concentrated on this process so extensively that their efforts mostly centered on improving the lesson plan and making it as flawless as possible. This is highlighted in the comments of Teacher 13: 'We analyze an-hour-long lesson plan and modify it so many times to make it look perfect. I don't think it is worth all the hassle. It is impossible to do the same thing for all the lesson plans we need to teach. So I don't think LS is a sustainable model.' This comment is a typical example of the way teachers new to the model tended to conceptualize it. Teachers' discussions regarding research lessons in this study were usually about the details of the lesson plan and how it was conducted in class. This obviously had a considerable effect on how the model was interpreted by teachers.

Last but not least, teachers believed that LS was specifically designed to carry out research, but they felt confused about the type of research they were supposed to conduct. Teachers were inclined to believe that scientific research and classroom-based research should be split into two dichotomous categories. Therefore, they wanted to clarify whether LS focused more on theory than classroom practice. Teacher 4 reflected on this challenge as

follows: 'I just can't understand what exactly we are trying to do. Are we trying to carry out scientific research or solve the problems we experience in class?' Assuming that LS was a tool to conduct scientific research, they felt not enthusiastic about acting as researchers. The reason why teachers shied away from scientific research may stem from the fact that they found it demanding. Findings showed that they had difficulty in zooming in on the research, making student thinking observable, collecting and analyzing data although they appreciated the chance to carry out research in their classes in a systematic way. Teacher 8 reported, 'You have a chance to conduct research with all its aspects such as finding a problem to study, writing a research question, conducting experiments, analyzing the results and writing a final report. I would not be able to gain this experience if it were not for LS.' However, they also reported feelings of distress and pressure caused by the research process. Teacher 14 highlighted, 'Neither I nor my friends know how to do research. We receive support from our facilitator, but I do not find it enough.' Believing that they were not competent researchers, teachers asked for collegial support, but did not find it sufficient, either. They attributed this incompetence to their pre-service teacher education. Teacher 7 commented, 'Let's admit we superficially learn how to do research in our pre-service education. As an MA student, I still don't know how to conduct a proper scientific research. This affects the research process we are supposed to carry out during LS.'

Lack of support mechanisms

Findings revealed that for teachers to engage in LS, several support mechanisms need to be in place. Most importantly, teachers needed support from the administration to cover for their classes for meetings and observation. Teachers in this study taught 20 hours a week and the administration helped them by arranging their schedules to enable them to observe research lessons and attend meetings. Teacher 20 emphasized, 'I don't think most of the heads in other schools will be willing to cover for teachers so that they can do LS. It was definitely our head who made it possible for us.'

Teachers also needed facilitator support. In this study, there was a facilitator in each team who had prior experience in the implementation of LS. Facilitators offered guidance to the team members about how to conduct LS. This guidance was found to be valuable by teachers because facilitators helped teachers keep their motivation to finalize the LS process. Teacher 11 indicated, 'Without our facilitator, it would be very difficult to have fruitful meetings, proceed from one cycle to the next and write the final report. Since she knew all these processes, having her with us was very heartening.' It should be noted here that the guidance offered by facilitators in this study were mostly about the implementation of the model. Nevertheless, teachers could not receive support from an expert who could facilitate the research process. For instance, teachers occasionally needed to refer to studies conducted similar to their research focus. They also asked for support in terms of developing effective research questions. Since they lacked such expert opinion, they felt incompetent, which reduced their confidence in the quality of research they carried out. Teacher 1 noted, 'I guess we should have had a person from whom we could get advice on issues such as finding a research question, data collection tools and data analysis. Without such support, I've always felt we were doing something wrong.' This feeling resulted in teachers' constantly voicing their concerns about the research they were carrying out and decreased their motivation at times.

Discussion

Findings suggest that to take full advantage of LS in the EFL context, researchers and practitioners need to be well-aware of its challenges and the ways to face them. Research contends that one of the factors that plays a key role in determining the quality of CPD programs is the collective participation of team members (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Richardson & Diaz-Maggioli, 2018). In Turkey, as a result of not being provided with enough opportunities to work collaboratively in the work place, teachers tend to seek compensation for their professional development in seminars, workshops and/or MA programs. This study justifies LS can be a useful guide for teachers who wish to try out how collaborating with their colleagues in a nonthreatening environment could foster their professional development. Kriewaldt (2012) asserts that engaging in LS results in a shift in teachers' practices from individual to collegial activity. The same was true in our case,

as well. When working with their colleagues in a systematic way for an extended period of time, teachers seem to create a close-knit community, and a strong bond begins to form among team members. This might set the scene for a nonthreatening atmosphere where everyone can share ideas, offer suggestions and initiate discussions, all important contributors to the effectiveness of collaborative CPD programs.

As suggested by Borko (2004), teacher learning can be fostered by strong professional communities. Teachers in this study reported they increased their knowledge in several aspects through their participation in LS. Our findings corroborate what Lewis and Hurd (2011) underline about the contribution of LS to teacher learning. Discussing their ideas openly, getting feedback from their peers and students regarding their classroom practice, and reflecting on their lesson plans promoted teacher learning with regard to subject matter knowledge and knowledge of students. Little (2002) asserts that teacher learning communities contribute to instructional improvement, as well. Teachers in our study reported LS revealed the fact that they understood some concepts in their fields superficially. Through reflection and critical discussion, they received gains in content knowledge, which, later, was associated with the improvement of their classroom teaching.

As underlined by the situated learning theory (Lave & Wenger, 1991), we cannot separate learning from the activity and its context. In the same way, teacher learning is fostered when CPD takes place in teachers' own contexts and classrooms (Putnam & Borko, 2000). By reflecting on their instructional plans, carefully examining videotapes of research lessons, conducting in-depth interviews with students, and analyzing samples of student work, teachers add more both subject matter and pedagogical knowledge to their existing repertoire. These findings are in line with the findings reported by Yalcin-Arslan (2018) and Vrikki, Warwick, Vermunt, Mercer, and Van Halem (2016). The findings of this study further suggest LS fosters teacher learning by enabling them to examine their practices in their own setting through collaborative interactions with colleagues and students. In her study with pre-service EFL teachers, Yalcin-Arslan (2018) found out that LS raised teachers' awareness about their students. In another study conducted with the participation of teachers from 64 schools that implemented LS in Singapore, it was found out that LS resulted in an increase in teachers' understanding of how students learn (Lim, Lee, Saito, & Haron, 2011). Teachers in this study also underlined that LS enabled them become more student-oriented. Having few opportunities to reflect on what students think about a lesson or how they make sense of the activities teachers bring to their classes, teachers used to think that students would not be of any help to them in interpreting and analyzing a lesson. Noting that the language classes in Turkish higher education are mainly teacher-centered and text-book driven (British Council, 2015), we believe one of the significant transformations teachers went through was in this aspect. Halfway through the LS process, they began to point out that the model helped them recognize that students could offer valuable feedback and suggestions about how a lesson could be improved. Therefore, viewing the lesson from the perspective of the students is another important finding of this study. Our findings are in line with Lee (2019) who suggests LS improves teachers' skills about student thinking as they plan and reflect on lessons.

Although LS is a well-defined CPD model, its implementation may pose different challenges to teachers implementing it in different contexts. In our case, we found out there were some issues to be considered before its implementation. Firstly, LS originated in Japan, which has a different cultural background in educating and developing teachers. LS has been implemented in Japan since the early 1900s (Fernandez & Yoshida, 2004), and is a well-established practice among Japanese teachers. Its interpretation by other cultures has some potential risks, one of which lies in the understanding of the gist of the model. Teachers in our cases (and maybe rightly so) drew a comparison between LS and other CPD practices they know, such as micro teaching, peer observation, and action research. Although this seems to help teachers relate with the model in the first place, a deeper analysis reveals it might also cause them to underestimate the core meaning and value of LS. We, therefore, strongly recommend the reason why teachers need to 'study' lessons in such a comprehensive model as LS should be made clear to them.

Another common misconception was the teachers' tendency to perceive LS as a tool to conduct a scientific research study. This considerably changed the way they perceived it and made them question their competency as

teacher researchers. Teachers also articulated unease about collecting, analyzing, and interpreting data. Hargreaves (1996) claims that teachers believe it is mainly a researcher's responsibility to carry out research which is mostly theory-based. Because of this long-held assumption, teachers in our study felt reluctant about doing research, stating that it is not their job to do it. However, as pointed out by Nunan (1997), the distinction to be made between practitioner research and regular research should not rely on the person who carries it out, rather it should focus on the quality of the research activity itself.

This study also revealed support mechanisms are crucial to the success of LS. In our case, teachers needed support in three different forms; administrative, facilitator, and expert. Administrative support is a prerequisite for LS. We think schools should deal with issues such as finding substitute teachers, arranging meeting time and places, releasing LS participants from extra workload etc. if they want teachers to fully benefit from this experience. In our case, this was achieved well, which was appreciated by teachers. LS in Japan is carried out under the guidance of mentors who offer advice and foster communication within the team (Chichibu, 2016). Similarly, we had facilitators in each group, who had finished one LS implementation before. Their support was perceived to play a key role in the smooth implementation of the model. However, teachers lacked expert support, which had a considerable impact on the way they formed research questions and sought answers to them. Teachers continuously underlined they felt insecure trying to develop a sound research question, design data collection tools, and eventually analyze and interpret data. They reported a university professor could help them in this process by offering expert opinion on such issues. Similarly, in a study carried out by Yayli (2012), it was found out that conducting research presents challenges to teachers especially at phases such as data analysis and interpretation, and they require assistance to overcome such challenges. In CPD models such as LS, this process can be facilitated through mediators who, as suggested by Ur (2016), might be experienced teachers or teacher trainers having enough time to read research articles, and share insights with teachers, and thus making research accessible to them.

Conclusion

This study aimed to find out the benefits and challenges of a LS implementation in a Turkish higher education context. Although studies recently began to report on the contributions of the model to EFL teacher professional development in Turkey at tertiary level (Bayram & Bikmaz, 2018; Bayram & Canaran, 2019; Karabuga & Ilin, 2019; Yalcin Arslan, 2018), we are still in need of a sound research base that will assist us in knowing how to integrate the model into our culture. It should also be noted that studies in Turkey exploring the potential of the model as a CPD tool tend to produce similar results to the studies in different parts of the world. Thus, we are of the opinion that in countries such as Turkey where LS is a recent phenomenon among EFL teachers, we need to do more than reporting its benefits on teacher professional development if we wish future LS practices to reach a wider audience, and to improve its implementation. However, we do strongly believe in the assertion put forward by Lillge (2019) who stated that differentiating PD practices rather than insisting on "one size fits all" attitude will benefit EFL teachers in the long run enabling them to apply PD learning in their classroom practices.

Both Japan and Turkey have a long tradition of education. However, a comparison between these countries reveals that they differ significantly from each other in terms of CPD practices. Turkey is still struggling with issues such as lack of professional staff, collaboration, feedback and systematicity in teacher professional development (Bayrakci, 2009). This implies that we need further investigation before we can fully understand and effectively adapt the model to our culture. In addition to these challenges, concepts inherent in LS such as learner-centeredness, and teacher research are relatively new in the Turkish educational practices. Without reaching a common understanding as to the implications of these concepts for CPD, we cannot be optimistic enough to expect LS to solve our educational issues no matter how promising the model is. That being said, it is also apparent that we need to experiment with such models more to see what it is that we need to learn to support our teachers in more effective means. We also have to think of ways to modify the model so that it better suits our established educational practices rather than transferring it without making any alterations. Thus, LS might be implying a

change in our educational philosophy and we should accept that it will take time and effort to redesign and internalize it.

Limitations and Recommendations

This study has potential limitations. Since this was a qualitative study, the number of participants was limited, and they mostly shared similar backgrounds in terms of their ages, education, and work experience. Future research might examine how teachers from diverse backgrounds perceive LS. As most of the teachers who took part in this study were new teachers, it was not possible to make comparisons between their understandings of the model to that of the experienced teachers. Additionally, this study was conducted at a foundation university. Future researchers might wish to focus on the implications of the model on experienced teachers employed at state universities.

Although their contributions to LS is well-documented, knowledgeable others and experts could not be integrated into this study because of lack of access to such people in our context. This study might be replicated including the support of a knowledgeable other and an expert, and to what extent they affect the implementation of the model could be investigated. Contrastive studies might also focus on LS implementation with and without the support of knowledgeable others.

LS becomes more meaningful with follow-up studies that assess the outcomes of the implementation of the model. However, we could not follow up on the effects of LS in participating teachers' classroom practices and their students. Investigating whether students noticed a difference in the teaching practice of LS participants could be a starting point for future studies. The model's effect on student learning outcomes could also be a potential research venue.

Statement of Publication Ethics

We declare that the research has no unethical problem and we observe research and publication ethics.

Researchers' Contribution Rate

Researchers contributed equally to every phase of the study.

Conflict of Interest

The study has no conflict of interest.

References

- Adey, P., Hewitt, G., Hewitt, J., & Landau, N. (2004). The professional development of teachers: Practice and theory. Springer Science & Business Media.
- Amador, J., & Weiland, I. (2015). What preservice teachers and knowledgeable others professionally notice during lesson study. *Teacher Educator*, 50(2), 109-126.
- Bayrakci, M. (2009). In-Service teacher training in Japan and Turkey: A comparative analysis of institutions and practices. *Australian Journal of Teacher Education*, 34(1), 10-22.
- Bayram, İ. & Bıkmaz, F. (2018). Exploring the lesson study experience of EFL instructors at higher education: A pilot study. *Journal of Qualitative Research in Education*, 6(3), 313-340.
- Bayram, İ. & Canaran, Ö. (2019). An investigation of Turkish novice EFL teachers' perceptions of lesson study. *International Journal of Curriculum and Instruction*, 11(1), 172-189.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3-15.
- British Council (2015). *The state of English in higher education in Turkey. A Baseline Study*. Yorum Basın Yayın Sanayi Ltd. Şti, Ankara.
- Cajkler, W., & Wood, P. (2015). Lesson Study in initial teacher education. In P. Dudley (Ed.), *Lesson study: Professional learning for our time* (pp. 87-103). London: Routledge.
- Cerbin, B. (2012). *Lesson study: Using classroom inquiry to improve teaching and learning in higher education*. Virginia: Stylus Publishing, LLC.
- Chichibu, T. (2016). Impact on lesson study for initial teacher training in Japan: Focus on mentor roles and kyouzai-kenkyuu. *International Journal for Lesson and Learning Studies*, 5(2), 155-168.
- Coenders, F. & Verhoef, N. (2019) Lesson Study: professional development (PD) for beginning and experienced teachers. *Professional Development in Education*, 45(2), 217-230.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks, CA: Sage.
- Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597-604.
- Demirbulak, D. (2011). Training English language student teachers to become teacher researchers. *Procedia Social and Behavioral Sciences*, 30, 491-496.
- Diaz-Maggioli, G. (2012). *Teaching language teachers: Scaffolding professional learning*. United Kingdom: Rowman & Littlefield Education.
- Dudley, P. (2012). Lesson study development in England: from school networks to national policy. *International Journal for Lesson and Learning Studies*, 1(1), 85-100.
- Fernandez, C., & Chokshi, S. (2002). A practical guide to translating lesson study for a U.S. setting. *Phi Delta Kappan*, 84(2), 128-135.
- Fernandez, C., & Yoshida, M. (2012). *Lesson study: A Japanese approach to improving mathematics teaching and learning*. Routledge.
- Fujii, T. (2014). Implementing Japanese lesson study in foreign countries: Misconceptions revealed. *Mathematics Teacher Education and Development*, 16(1), 65-83.

- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.
- Hargreaves, D. (1996) Teaching as a research-based profession: possibilities and prospects. *The Teacher Training Agency Annual Lecture*. London: Teacher Training Agency.
- Karabuga, F., & Ilin, G. (2019). Practicing lesson study in a Turkish education context. *International Journal for Lesson and Learning Studies*, 8(1), 60-78.
- Kartal, T., Ozturk, N., & Ekici, G. (2012). Developing pedagogical content knowledge in preservice science teachers through microteaching lesson study. *Procedia-Social and Behavioral Sciences*, 46, 2753-2758.
- Kriewaldt, J. (2012). Reorienting teaching standards: learning from lesson study. *Asia-Pacific Journal of Teacher Education*, 40(1), 31-41.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press.
- Lee, M. Y. (2019). The development of elementary pre-service teachers' professional noticing of students' thinking through adapted Lesson Study. *Asia-Pacific Journal of Teacher Education*, 47(4), 383-398.
- Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement? The case of lesson study. *Educational Researcher*, 35(3), 3-14.
- Lewis, C. & Hurd, J. (2011). *Lesson study step by step: How teacher learning communities improve instruction*. Portsmouth: Heinemann.
- Lewis, C. & Perry, R. (2014). Lesson study with mathematical resources: A sustainable model for locally-led teacher professional learning. *Mathematics Teacher Education and Development*, 16(1), 22-42.
- Lewis, C. (2016). How does lesson study improve mathematics instruction?. *ZDM – The International Journal on Mathematics Education*, 48(4), 571-580.
- Lillge, D. (2019). Uncovering conflict: Why teachers struggle to apply professional development learning about the teaching of writing. *Research in the Teaching of English*, 53(4), 340-362.
- Lim, C., Lee, C., Saito, E., & Syed Haron, S. (2011). Taking stock of lesson study as a platform for teacher development in Singapore. *Asia-Pacific Journal of Teacher Education*, 39(4), 353-365.
- Little, J. W. (2002). Locating learning in teachers' communities of practice: Opening up problems of analysis in records of everyday work. *Teaching and Teacher Education*, 18(8), 917-946.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.
- Miles, M., & Huberman, A. (1994). *Qualitative data analysis*. Thousand Oaks, CA: Sage.
- Norton J. (2018). Lesson study in higher education: A collaborative vehicle for professional learning and practice development of teachers of English for specific purposes. In: Kirkgöz Y., Dikilitaş K. (eds) *Key Issues in English for Specific Purposes in Higher Education*. Springer, Cham.
- Nunan, D. (1997). Developing standards for teacher-research in TESOL. *TESOL Quarterly*, 31(2), 365-367.
- Obara, S., & Bikai, N. (2019). Promoting math teacher active learning with the lesson study approach: A case study of in-service teachers' perspectives. *International Journal for Lesson and Learning Studies*, 8(2), 135-148.
- Patton, M. Q. (2015). *Qualitative research and evaluation methods*. Los Angeles: SAGE.
- Putnam, R., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4-15.
- Richardson, S. & Diaz Maggioli, G. (2018). Effective professional development: Principles and best practice. Part of the Cambridge Papers in ELT series. Cambridge: Cambridge University Press.

- Songul, Delialioglu & Ozkose Biyik. (2018). An investigation of Turkish EFL teachers' development through an online professional development program. Yang, J. C. et al. (Eds.) (2018). *Proceedings of the 26th International Conference on Computers in Education. Philippines: Asia-Pacific Society for Computers in Education*.
- Stigler, J. W., & Hiebert, J. (2009). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. Simon and Schuster.
- Takahashi, A., & McDougal, T. (2016). Collaborative lesson research: Maximizing the impact of lesson study. *ZDM: Mathematics Education*, 48, 513–526.
- Ur, P. (1997). Teacher training and teacher development: A useful dichotomy? *The Language Teacher*, 21(10).
- Ur, P. (2016). (Why) do language teachers need the research? *The Teacher Trainer*, 30(1).
- Vrikki, M., Warwick, P., Vermunt, J. D., Mercer, N., & Van Halem, N. (2017). Teacher learning in the context of Lesson Study: A video-based analysis of teacher discussions. *Teaching and Teacher Education*, 61, 211-224.
- Wiburg, K., & Brown, S. (2006). *Lesson study communities: Increasing achievement with diverse students*. Thousand Oaks, CA: Corwin Press.
- Xu, H., & Pedder, D. (2015). Lesson Study: an international review of the research, in Dudley, P (Ed.) *Lesson Study: Professional Learning for our time*, London, Routledge, pp. 24-47.
- Yalcin-Arslan, F. (2018). The role of lesson study in teacher learning and professional development of EFL teachers in Turkey: A case study. *TESOL Journal*, 10(2).
- Yayli, D. (2012). A hands-on experience of English language teachers as researchers. *Teacher Development*, 16(2), 255-271.
- Yilmaz, N., & Yetkin-Ozdemir, I. E. (2019). An investigation of pre-service middle school mathematics teachers' discussion skills in the context of microteaching lesson study. *The Eurasia Proceedings of Educational and Social Sciences*, 13, 37-43.
- Yin, R. K. (2014). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.
- Zepeda, S. J. (2012). *Professional development: What works?* New York: Routledge.



TEOG (TEPSE) English Test: Content Validity and Teachers' Views

Ayşenur UZUN^{*a}, Ferit KILIÇKAYA^b

Article Info

DOI: 10.14686/buefad.732132

Article History:

Received: 04.05.2020

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Content Validity,
English Test,
TEPSE.

Article Type: Research Article

Abstract

One of the most important dynamics of the educational setting all over the world is examinations, and some of those are English tests. In Turkey, English tests for the students preparing for the high schools were included in the national exams with the Level Determination Exam (SBS) in 2008 for the first time, and Transition Examination from Primary to Secondary Education (TEPSE) replaced them in 2013. The effects of these exams have been investigated; however, to the best knowledge of the author, other principles of language assessment such as validity and reliability have not been investigated based on the analysis of documents. This study, therefore, aimed to investigate content validity of the English tests in TEPSE, which were conducted between 2016 and 2017. Data collection procedure included the analyses of TEPSE English tests, the coursebook, the curriculum of 8th grade and semi-structured interviews held with 21 English language teachers. The analyses of the frequently used items in the coursebook and table of specifications were used to examine the content validity. The results revealed that despite some factors, TEPSE English tests between 2016 and 2017 have content validity based on the alignment between the coursebook and TEPSE English tests.

TEOG İngilizce Sınavı: İçerik Geçerliliği ve Öğretmen Görüşleri

Makale Bilgisi

DOI: 10.14686/buefad.732132

Makale Geçmişi:

Geliş: 04.05.2020

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

İçerik Geçerliliği,
İngilizce Testi,
TEOG.

Makale Türü: Araştırma
Makalesi

Öz

Tüm dünyada eğitimin en önemli dinamiklerinden bir tanesi sınavlardır ve bunların bazıları İngilizce sınavlarını da içermektedir. Türkiye’de, liseye hazırlanan öğrenciler için uygulanan İngilizce sınavlarına ilk kez 2008 yılında SBS’de yer verilmiş ve 2013 yılında bu sınav TEOG ile yer değiştirmiştir. Bu sınavların etkileri incelenmiştir fakat -bilindiği kadarıyla- geçerlilik ve güvenilirlik gibi dil değerlendirmesinin diğer ilkeleri araştırılmamıştır. Bu yüzden, bu çalışma 2016-2017 döneminde uygulanan TEOG İngilizce testlerinin içerik geçerliliğine ilişkin öğretmen görüşlerinin yanı sıra bu dönemlerde yapılan testlerin içerik geçerliliğini araştırmayı hedeflemiştir. Veri toplama yöntemi, 2016-2017 döneminde yapılan TEOG İngilizce sınavlarının analizini, ders kitabının analizini, 2016-2017 8. Sınıf müfredatını ve 21 İngilizce öğretmeniyle yapılmış olan yarı yapılandırılmış görüşmeyi içermektedir. Ders kitabında sık kullanılan yapıların analizi ve belirtke tablosu içerik geçerliliğini değerlendirmek için kullanılmıştır. Sonuçlar, bazı uyumsuzluklar, eşit olmayan dağılımlar ve dört dil becerisinin ihmeline rağmen 2016-2017 döneminde yapılan TEOG İngilizce sınavlarının ders kitabı ile uyumu açısından içerik geçerliliğinin olduğunu ortaya koymuştur.

*Corresponding Author: aysenuruzunn@gmail.com

^a Teacher, Ministry of National Education, <https://orcid.org/0000-0003-3701-7140>

^b Prof. Dr., Mehmet Akif Ersoy University, Faculty of Education, Burdur, <https://orcid.org/0000-0002-3534-0924>

Introduction

Language assessment is one of the dynamics of educational settings; therefore, it is a critical issue in language teaching to test the students' performance on the determined content. Brown (2004) voiced the traditional and alternative assessments as two ways of assessments, and traditional assessment might be summarized as standardized tests including generally multiple-choice format which focused on 'right' answers. Külekçi (2016) also revealed language proficiency exams in the world such as TOEFL, IELTS, PTE and GEPT; however, there were also language proficiency exams conducted in Turkey such as KPDS, UDS, and YDS, which is still in use. While the language exams 'KPDS', 'UDS', and 'YDS' were proficiency examinations, there were some English tests for the secondary school students, which were a must to attend a high school. These English tests started to be included in the national exams in 2008 in Turkey. Even though this system started with SBS (MoNE, 2011), it was followed by TEPSE (Transition Examination from Primary to Secondary Education) in 2013 which was also replaced by LGS (Transition Examination to High Schools) in 2018 (MoNE, 2018) in the course of conducting the current study.

Language assessment and its importance were emphasized by many scholars such as Brown (2004), Hughes (2003), Ekbatani (2011), and Solano-Flores (2016). One of the principles of language assessment "validity", and Brown and Abeywickrama (2010) also indicate that the sub-components of the validity are content-related evidence, criterion-related evidence, construct-related evidence, consequential validity, and face validity. Even though the other four types of validity are also important, content validity is the key concept of this study. Hughes (2003) states that "A test is said to have content validity if its content constitutes a representative sample of the language skills, structures, etc. with which it is meant to be concerned" (p. 26). Ekbatani (2011) asserts that content validity is consistence between objectives/functions of the test and the test itself. Hughes (2003) also indicates the importance of content validity by focusing on two important reasons. The first reason is that having a content validity provides an accurate measurement and guarantees the construct validity. The second reason is that the lack of content validity results in harmful washback effect. If the content of lesson does not match the content of the test, the learning and teaching are affected negatively. The importance of 'content validity', one of the basic principles of language assessment was also underscored by Brown and Abeywickrama (2010), Ekbatani (2011), and Gorsuch and Griffee (2018).

Content validity plays a crucial role in assessment as Hughes (2003) mentioned before. Based on the presence of language exams, content validity of such exams has been drawing researchers' attention for many years, and many researchers focused on this issue in their studies (Alderson & Kremmel, 2013; Al-Adawi & Al-Balushi, 2016; Haiyan & Fuqin 2005; Nicholson, 2015; Razmjoo & Tabrizi, 2010; Siddiek, 2010). For example, Siddiek (2010) investigated content validity of Sudan School Certificate English examination based on the alignment between the coursebook and the exam, and emphasized that this alignment increases content validity of the test. Nicholson (2015), who analyzed the TOEIC exam in Korea, found that content validity of the exam was weak because it did not test real communicative language skills. Even though the results of the several studies reviewed indicated low or lack of content validity of language exams, other studies (Ing et al., 2015; Jaturapitakkul, 2013; Kang & Chang, 2014; Külekçi, 2016) indicated high content validity in several other language tests. Ing et al. (2015), Kang and Chang (2014), and Sim (2015) focused on the exams which were content valid besides the using the table of specifications. Moreover, there were also some studies (Gömleksiz & Aslan, 2017; Ökmen & Kılıç, 2016; Kılıçkaya, 2016; Vural, 2017) conducted on TEPSE English tests, which investigated teaching methods, students' views, and teachers' views from different perspectives. Vural (2017) investigated content validity of English tests in TEPSE in 2014 by only taking the views into consideration, while Gömleksiz and Aslan (2017) investigated the students' perspectives towards TEPSE English tests conducted between 2016 and 2017.

It was claimed that content validity would be affected negatively if the tests were not able to measure communicative competence (Al-Adawi & Al-Balushi, 2016; Haiyan & Fuqin, 2005; Nicholson, 2015; Siddiek, 2010). Moreover, inconsistency between the coursebook and the test, and unequal distribution of the items also cause lack of content validity (Razmjoo & Tabrizi, 2010; Siddiek, 2010). However, if there is a consistency among the coursebook, curriculum, and tests, it means that these tests have content validity as it was emphasized in the studies of Aksan (2001), Jaturapitakkul (2013), and Kang and Chang (2014). Although there are several studies conducted on content validity of exams in other countries and also in Turkey, to the best knowledge of the author, there is not any detailed study conducted on content validity of TEPSE English tests between 2016

and 2017. As it was emphasized by many researchers, content validity of a test is very crucial to test students' performances on the intended area. Besides, the researcher was teaching English to 8th graders in those years and noticed some problems in the tests regarding content validity. Therefore, the researcher of the current study focused on content validity of TEPSE English tests conducted between 2016 and 2017. Moreover, content validity of TEPSE English tests in those years has not been investigated based both on the documents and on the teachers' views. For this purpose, this study aimed to investigate content validity of English tests in TEPSE between 2016 and 2017 by analyzing the items in the tests, the coursebook, and the curriculum on which the language tests were. Besides, the interviews held with teachers were also analyzed to reveal their views on content validity of TEPSE English tests.

In order to reach these aims, the research questions used in this study are listed as follows:

- 1- To what extent do the English tests in TEPSE conducted between 2016 and 2017 have content validity?
 - a) Do the English tests in TEPSE exactly focus on the frequently used items in the coursebook "Upturn in English"? If yes or no, which items are tested or not tested?
 - b) Is there an exact match between functions of the provided syllabus and the questions in the English language test in TEPSE?
- 2- What are English language teachers' views on content validity of English tests in TEPSE?

Method

Research Design

In order to obtain information about content validity of English tests in TEPSE, mixed method research design was utilized. The data collection methods of a qualitative study are observations and interviews (Creswell, 2009). In this study, semi-structured interview and documents which are TEPSE English tests and the coursebook "Upturn in English 8" were used to collect the data. Interview is a way of collecting qualitative data by asking questions to the interviewee, and can be conducted in many ways such as face to face, via phone, and internet (Christensen et al., 2015). The interviews in this study were held with 21 English language teachers teaching English to 8th grade students between 2016 and 2017. On the other hand, another way of collecting data is documents. Creswell (2009) stated that documents are beneficial for collecting data, and the public and private documents might be used. From this perspective, this study used the coursebook "Upturn in English" provided by MoNE and TEPSE test questions between 2016 and 2017 as documents, and the researcher benefited from quantitative analysis to compare the frequency of vocabulary items in the coursebook and the test questions. The reasons to analyze the frequency of vocabulary items in the coursebook rather than the curriculum are that in Turkey, the English curriculum is realized with the coursebooks, and neither the coursebook nor TEPSE English tests in those years included some of the vocabulary items suggested by the English curriculum. Furthermore, the table of specifications provided by Newman et al. (1973 as cited in Newman et al., 2013) was adapted and used to analyze TEPSE English tests questions based on the functions. After collecting the data from the interviews and the documents, the researcher compared the results and made interpretations on content validity of TEPSE English tests between 2016 and 2017.

Population and Sample/Study Group/Participants

As one of the ways of sampling procedure, the purposeful sampling strategy was used to select the participants of the interviews, which intends to select participants based on specific criteria (Lochmiller & Lester, 2017). The participants of this study were 21 English language teachers teaching English to 8th grade students in Burdur, Afyonkarahisar, Ağrı, Istanbul, Ardahan, Antalya, Ankara, Hakkari, Şırnak, Elazığ, Konya, Denizli, Erzurum, Kilis, İzmir, Kocaeli, Samsun, and Van. The results of TEPSE conducted in 2016-2017 could not be taken into consideration while choosing the provinces because, to the best knowledge of the author, MoNE did not announce the whole list of each province's results in TEPSE. Therefore, the researcher asked for the volunteer teachers teaching English to 8th grade students through TEPSE groups on social media. Based on

this announcement, 21 English language teachers teaching English to 8th grade students from eighteen different provinces accepted being included in the current study, and required permissions were given by MoNE.

Table 1. The Ranks of Selected Provinces

Province	Rank	Province	Rank	Province	Rank
Burdur	3	İzmir	43	Ardahan	66
Denizli	9	Elazığ	50	Kilis	69
Antalya	11	Konya	51	Van	77
Ankara	14	İstanbul	55	Hakkari	78
Kocaeli	30	Afyon	58	Ağrı	79
Samsun	41	Erzurum	65	Şırnak	80

Table 1 presents the ranks of the selected provinces based on the average point of placement basic scores of the system for TEPSE (TUIK, 2016). The ranks of the determined provinces based on average placement scores for TEPSE (TUIK, 2016) were worthy of notice, which vary from the highest scores to lowest. When these provinces were considered, samples from seven regions of Turkey were included in the current study.

Data Collection Tools

The current study is a mixed method study, and benefited qualitative and quantitative data collection. Creswell (2012) listed the types of qualitative data as observations, interviews, and audio-visual materials. This study used semi-structured interviews and documents to collect data. The coursebook “Upturn in English” and TEPSE English tests between 2016 and 2017 were compared based on quantitative analysis, and interviews were held with 21 English language teachers teaching English to 8th grade students.

Documents. Documents are the way of collecting data, and they might be either personal or official (Christensen et al., 2015). In this study, the document were the official ones such as the coursebook “Upturn in English” provided by MoNE and TEPSE English test questions between 2016 and 2017. Table of specification was used to analyze content validity of TEPSE English tests, and the coursebook ‘Upturn in English’ which is provided by MoNE was analyzed in terms of frequency of the language use and vocabulary items by using quantitative analysis. In Turkey, the curricula are realized with coursebooks, and neither the coursebook nor TEPSE English tests in those years included some of the vocabulary items suggested by curriculum. Therefore, analyzing the frequency of vocabulary items in the coursebook and TEPSE English tests is another dimension of this study. Biemiller (2003) stated that vocabulary is important to determine the success in reading skill. As mentioned before, TEPSE is a standard multiple choice-test and based on reading skill; therefore, the researcher intended to analyze and compare the frequency of vocabulary items in the coursebook “Upturn in English” and in TEPSE English tests to determine the alignment between them. This alignment or misalignment is useful to decide on to what extent TEPSE English test has content validity.

Semi-structured interviews. Interview, a way of collecting qualitative data, is defined as asking questions to the people what they think about on a determined issue, and it helps researcher to check whether the previously gathered data are parallel to views of the participants of the study (Fraenkel, Wallen, & Hyun, 2012). Creswell (2012) states that one-on-one interview is the one which is also called as individual interview, and is a way in which the questions are asked to the only one person at a time. He also defines the telephone interviews as being a meaningful way of collecting data from the participants of the study who live in different or distant places; therefore, asking the questions via telephone might be possible to collect data (Creswell, 2012). Therefore, the researcher conducted face to face, one-on-one interviews and telephone interviews to collect data. Semi-structured interviews were conducted in this study since semi-structured interviews are more flexible according to Gas and Mackey (2012). The interviews which were held with the teachers in Turkish is a 3-question semi

structured interviews that might provide opportunities to gather detailed and wide range of information on the issue.

Data Collection

Table 2. The Steps in Data Collection Procedure

Steps	Actions taken
Analysis of annual plan and syllabus	Determining the functions of the units
	Making the list of determined language use patterns
Analysis of coursebook	Making the list of language use patterns
	Making the frequency list of vocabulary items
Analysis of TEPSE English tests	Categorizing questions by using table of specifications
	Making the list of language use items
Interviews	Making the frequency list of vocabulary items
	Semi-structured interviews held with 21 English language teachers.

As it can be seen in Table 2, the annual plan and syllabus provided by MoNE were analyzed based on the functions of the units and determined language use patterns. Then, the coursebook ‘Upturn in English’ was analyzed to make a frequency list which included the frequency of vocabulary items and language use patterns that were used in the coursebook. After making the list, the provided syllabus of 8th grade English subject was taken into consideration to make a table of specifications. For the first term TEPSE English test, the functions of the first three units in the plan were used to make the table of specification while the functions of the first eight units were for the second term TEPSE English test. The reason of choosing functions of first three and first eight units was that students were responsible for the first three units in the first term TEPSE while they were responsible for the first eight units in TEPSE English test which were conducted in the second term (MoNE, 2016).

After making the table of specification, the English tests in TEPSE were analyzed based both on table of specifications and frequency list which included the numbers of vocabulary items and language use patterns. Moreover, the semi-structured interviews with 21 English language teachers were conducted. Before conducting these interviews, the coursebook, TEPSE English tests, plan provided by MoNE, and the main interview questions were sent via e-mail to the participants.

The following questions were asked in the interviews:

- 1- Do the English language tests in TEPSE exactly focus on the frequently used items in the coursebook? If yes or no, which items are tested or not tested?
- 2- Is there an exact match between functions of the provided syllabus and the questions in the English language test in TEPSE?
- 3- Do you have any comments?

Data Analysis

The data collected from semi-structured interviews, analyses of exam questions based on table of specifications, and frequency list were used to determine content validity of English tests in TEPSE. Comparative analysis was utilized in order to analyze the coursebook and TEPSE English tests based on the vocabulary items and language patterns. Therefore, the word frequency lists were prepared by analyzing the coursebook and TEPSE English tests based on the vocabulary items and language use patterns. While preparing

these words frequency lists, the researcher used software called as 'Word Frequency Counter' (Pterneas, 2009). The coursebook "Upturn in English" was turned into a word document and modified to differentiate some words from each other such as writing the auxiliary verb "do" as "doyou" with a pronoun and writing action verb "do" as a separate item. After such modifications, documents were copied into the program 'Word Frequency Counter' (Pterneas, 2009), and this program provided the words with their frequency numbers. The lists provided by the program were revised by focusing on the content words and some function words such as conjunctions and some auxiliary verbs indicating tenses. The final version of the lists provided the frequency of the 'language use patterns' and vocabulary items that the coursebook included. The same steps were followed in the analyses of TEPSE English tests between 2016 and 2017, and the results of the frequently used items in the coursebook and in the exams were compared. In this analysis, 'language use patterns' in the coursebook focusing on the functions provided by MoNE (2016), the suggested annual plan provided by Antalya Provincial Directorate of National Education (2016), and the word frequency lists prepared by the researcher were used. Based on these documents, the coursebook was analyzed and 'language use patterns' were determined.

According to Davidson and Lynch (2002), table of specifications is a useful way to construct a test and includes great deal of information such as skills, subskills, number of items, desired score weighting, and special materials. Table of specification is a chart including the topics, objectives and the number of questions in the test. Moreover, Cheng and Fox (2017) emphasize the importance of developing a table of specifications, which is helpful for creating high quality tests. The reason of choosing table of specification to analyze the test questions was that a specification of the skills is a must to determine whether a test has a content validity or not (Hughes, 2003). The analysis of TEPSE English tests was conducted by considering the example of table of specification provided by Newman et al. (1973 as cited in Newman et al., 2013). The used table of specification based on the syllabus of 8th grade was developed by focusing on the functions of predetermined units which the students were responsible for in TEPSE English tests. The exam questions which were 40 in total were analyzed one by one by using the table of specifications, and the function of each question was determined with the help of table of specifications. Furthermore, the recorded interviews were transcribed by the researcher. In this study, descriptive codes which indicate main topics were used to analyze the interview data. Griffiee (2012) stated that reliability is comparing the consistency between two raters based on the assigned codes. Therefore, this classification and codes were revised once again and discussed with an experienced researcher to be sure about the reliability after the coding procedure. Miles and Huberman (1994 as cited in Griffiee, 2012) provided a formula to calculate the reliability, and this formula might be given as dividing the number of agreements into the number of the agreements plus disagreements. The codes assigned by the other rater were obtained and compared with the codes assigned by the researcher, and the reliability was calculated as 0.96. As a final analysis, findings on analysis of the coursebook, analysis of TEPSE English tests and interviews were compared, which might provide a better understanding on content validity of English test in TEPSE.

Research Ethics

The required permission from Ministry of National Education was obtained for data collection which was conducted between October 2017 and June 2018.

Findings

Content Validity of English Tests in TEPSE Conducted in 2016-2017

In this section, the coursebook "Upturn in English" was analyzed based on the frequently used 'language use patterns' and vocabulary items. In Turkey, the curricula are realized with coursebooks, and neither the coursebook nor TEPSE English tests in those years included some of the vocabulary items suggested by curriculum. Therefore, it was considered crucial to compare the frequency of vocabulary items in the coursebook and TEPSE English tests. Moreover, this section also presents the results on whether there is an alignment between functions of the provided syllabus and the questions in the exam.

Alignment between the English Tests in TEPSE and the Coursebook "Upturn in English" Based on the Frequently Used Items

In this section, TEPSE English test questions in 2016-2017 were analyzed based on the frequently used vocabulary items and language use patterns, and the details were presented in the following sub-sections.

Analysis of the 2016-2017 TEPSE English Tests Based on Frequency of Vocabulary and Language Use Items

In the analysis of the 2016-2017 TEPSE English tests, the same methods which were used to analyze the coursebook ‘Upturn in English’ were followed by the researcher. With the help of the software ‘Word Frequency Counter’ (Pterneas, 2009), the following lists which provide the top 30 frequently used items were presented, and they helped researcher to decide to what extent TEPSE English tests had content validity. Top 30 frequently used items in the 2016-2017 1st term TEPSE English test and in the coursebook were determined. When the frequency of these items in the coursebook was taken into consideration, the following table (Table 3) might be beneficial to decide whether the frequently used items in the coursebook were presented in the exam or not.

Table 3. The Frequency List of Top-30 Items Based on TEPSE English Test (2016-2017 1st Term) and the Coursebook

Items	E1	C1	E2	C2	E3	C3	E.t	Ct	Items	E1	C1	E2	C2	E3	C3	E.t	C.t.
does...?	7	26	6	40	0	9	13	75	but	4	15	0	10	0	2	4	27
vegetable	0	0	0	0	9	14	9	14	can	2	5	0	5	2	5	4	15
eat	2	3	0	3	6	7	8	13	home	4	4	0	1	0	1	4	6
pizza	0	0	0	1	8	8	8	9	put	0	0	0	0	4	22	4	22
like	4	11	0	17	3	6	7	34	meat	0	0	0	0	4	3	4	3
watch / movie	7	14	0	2	0	0	7	16	music	3	4	1	6	0	0	4	10
friend	7	12	0	7	0	1	7	20	sure	3	3	0	0	1	0	4	3
movie	6	21	0	4	0	0	6	25	then	2	6	0	2	2	9	4	17
minutes	0	0	0	0	5	22	5	22	Where	2	5	2	3	0	0	4	8
would like to	4	39	1	4	0	0	1	43	always	2	2	0	5	2	1	4	8
action	5	2	0	0	0	0	5	2	fry	0	0	0	0	3	13	3	13
and	1	14	0	41	4	73	5	128	going to(t)	2	52	1	1	0	0	3	53
fix	0	0	5	3	0	0	5	3	refuse	3	8	0	0	0	0	3	8
prefer	2	0	1	11	2	0	5	11	study/ exam	3	10	0	2	0	0	3	12
dislike	3	1	0	0	1	0	4	1	What	2	19	0	16	1	6	3	41
favorite	2	5	1	7	1	5	4	17	Why	0	3	1	3	2	1	3	7

Table 3 provides the frequency list of top-30 items in the 2016-2017 1st term TEPSE English test and in the coursebook. The number of frequency of items in the coursebook can be seen based on the units as ‘C1, C2, etc.’, while the number of frequency of items in the exam can be seen based on the units as ‘E1, E2, etc.’. Table 3 presents the findings on the alignment between the coursebook and the test. When the analysis of the coursebook “Upturn in English” based on the frequently used items and the 2016-2017 2nd term TEPSE English test were compared, the results could be presented in Table 4.

Table 4. The Frequency List of Top-30 Items Based on TEPSE English Test (2016-2017 2nd Term) and the Coursebook

Items	E1	C1	E4	C4	E5	C5	E6	C6	E7	C7	E8	C8	E.t	C.t
friends	0	12	2	14	8	11	1	0	1	1	0	1	12	39
does ..?/do..?	2	26	4	17	3	50	0	33	0	21	0	10	9	157
extreme sports	0	0	0	0	0	0	8	16	0	0	0	0	8	16
net	0	0	1	0	7	8	0	0	0	0	0	0	8	8
use	0	1	1	9	7	28	0	2	0	0	0	2	8	42
and	0	14	0	20	3	30	5	34	0	42	0	65	8	205
Has/have	2	18	0	7	3	17	0	2	0	8	2	8	7	60
prefer	0	0	1	3	2	0	3	18	0	11	0	0	6	32
all	0	0	0	5	3	4	2	5	0	0	1	8	6	22
enjoy	1	4	0	0	0	1	5	6	0	1	0	3	6	15
I think	1	1	0	0	1	1	4	10	0	0	0	2	6	14
like	0	11	0	4	1	0	4	9	0	4	0	13	5	41
more/-er than	0	1	2	0	0	0	3	27	2	8	0	0	5	36
as	0	1	0	1	2	2	2	1	0	3	0	1	4	9
do	1	19	0	5	2	11	1	23	0	3	0	10	4	71
go	3	5	0	4	0	5	0	3	1	10	0	0	4	27
internet	0	0	1	0	3	47	0	0	0	0	0	0	4	47
located	0	0	0	0	0	0	0	0	4	2	0	0	4	2
most	0	1	1	2	1	6	2	1	0	5	0	0	4	15
sports	0	2	0	0	0	1	4	18	0	1	0	0	4	22
why	1	3	2	5	0	2	1	10	0	6	0	2	4	28
adrenalin seeker	0	0	0	0	0	0	4	6	0	0	0	0	4	6
never	0	1	0	4	3	4	0	0	0	0	0	0	3	9
usually	0	0	1	7	2	14	0	4	0	1	0	6	3	32
visit	1	8	0	1	0	2	0	0	2	14	0	2	3	27
Were/was	0	1	0	0	0	0	0	3	3	15	0	2	3	21
What time	2	1	0	2	1	1	0	0	0	0	0	0	3	4
always	0	2	0	2	3	3	0	0	0	0	0	4	3	11
because	0	4	0	5	1	6	2	13	0	5	0	4	3	37
come	1	14	0	12	0	1	0	0	1	3	1	3	3	33

As it can be seen in Table 4, 2016-2017 2nd term TEPSE English test does not include any questions on Unit-2 and Unit-3; therefore, the table above does not have any columns on these units. However, Table 4 indicates that except some of the items, most of the frequently used items in the test were also presented frequently in the coursebook.

Table 5. Assigned Numbers to the Functions

Units	Functions	Assigned Number to The Functions	Units	Functions	Assigned Number to The Functions
UNIT-1 Friendship	Accepting and refusing	1	UNIT-2 Teen life	Describing the frequency of actions	6
	Apologizing	2		Expressing likes and dislikes	7
	Giving explanations/ reason	3		Expressing preferences	8
	Making simple inq.	4		Making simple inq.	9
	Telling the time, days and dates	5		Stating person opinions	10
UNIT-3 Cooking	Describing simple processes	11	UNIT-4 Communication	Expressing concern and sympathy	15
	Expressing preferences	12		Handling phone conversation	16
	Making simple inquiries	13		Making simple inquiries	17
	Naming common objects	14		Talking about plans	18
UNIT-5 Internet	Accepting and refusing	19	UNIT-6 Adventure	Expressing preferences	26
	Giving explanations/ reason	20		Giving explanations/ reasons	27
	Making excuses	21		Making simple comparison	28
	Making simple requests	22		Making simple inquiries	29
	Making simple inquiries	23		Stating personal opinions	30
	Talking about plans	24		Talking about what people do regularly	31
UNIT-7 Tourism	Telling the time, days and dates	25	Talking about past events	32	
	Describing places	33	Expressing feelings	40	
	Describing weather	34	Expressing likes/dislikes	41	
	Expressing preferences	35	Expressing obligation	42	
	Giving explanations/ reason	36	UNIT -8 Chores	Giving explanations / reasons	43
	Making simple comparisons	37	Making simple inquiries	44	
	Stating personal opinions	38	Making simple suggestions	45	
	Talking about past events	39			

Alignment between Functions of the Provided Syllabus and the Questions in the English Tests in TEPSE

In this section, English tests in TEPSE conducted in 2016-2017 were analyzed by adapting table of specification to decide on to what extent these exams had content validity or not.

Content Validity of English Tests in TEPSE between 2016 and 2017

The questions of 2016-2017 1st term TEPSE English test were published by MoNE (2016b), and the questions of 2016-2017 2nd term TEPSE English test were published by MoNE (2017). The questions were revised and summarized based on the functions of each unit, which MoNE (2016) provided. The example of table of specification was provided by Newman et al. (1973 as cited in Newman et al., 2013). This provided table of specification was adapted and used in this study to analyze the test questions. The table of specification in this study includes not only the functions but also the numbers of the functions; therefore, numbers were assigned to each function of the units. The assigned numbers and the functions are listed in Table 5, and the table of specifications of 2016-2017 1st TEPSE English Test is given in Figure 1. As it can be clearly seen in Figure 1, there are three units that the students were responsible for the 2016-2017 1st term TEPSE English test. The functions of each unit are presented, and distributions of questions based on these functions can be seen in this table. Based on Figure 1, it can be stated that the questions were not distributed equally on the functions and the units. This table reveals that there were some items casting a doubt on content validity, and they were presented with the symbol “*”. The details of this table of specification might be provided as follows:

Based on the functions of the units:

1. There are eight questions on the functions of Unit 1- Friendship, but one of these questions “question 2” casts a doubt on content validity because this question is on the topic of Unit 2.
2. There are six questions on the functions of Unit 2- Teen life, and four of these questions “question 1,4,17 and 18” cast a doubt on content validity because these questions are on the topic of Unit 1 and 3.
3. There are six questions on the functions of Unit 3- Cooking, and two of these questions “question 13 and 14” cast a doubt on content validity because they are on the topic of Unit 2.

Based on the topics of the units:

1. There are nine questions on the topic of Unit 1- Friendship, but one of these questions “question 17” is on the function “expressing likes and dislikes” of Unit 2.
2. There are five questions on the topic of Unit 2- Teen life; however, there are questions “questions 2, 13 and 14” that might be the focus of the functions “giving explanation reason” of Unit 1- Friendship and the function “naming common objects” of Unit 3- Cooking.
3. There are six questions on the topic of Unit 3- Cooking; however, two of these questions “question 1 and 18” are on the functions “expressing likes and dislikes” and “stating personal opinions” of Unit 2.

According to the table of specification, the number of the functions of each unit is different from each other. While Unit 1 and Unit 2 have five functions, Unit-3 has four functions. When the table of specification is examined, it can be noticed that some of the functions are common in some of the units. Moreover, there are eleven different functions in total in the first three units. The functions of first three units can be seen in Table 6.

Table 6. Functions of the First Three Units

FUNCTION	UNIT	FUNCTION	UNIT
Making simple inquires	1, 2, 3	Expressing likes and dislikes	2
Accepting and refusing	1	Expressing preferences	2, 3
Giving explanation/reason	1	Stating personal opinions	2
Apologizing	1	Describing simple process	3
Telling the time days and dates	1	Naming common objects	3
Describing the frequency of	2		

When Table 6 is considered, it can be noticed that the number of functions was eleven, and the number of questions in TEPSE English test was 20. Based on the table, two questions could have been asked on each function; however, the table of specification shows that there were more questions on some of the functions and units while there was not any question on the other functions. It can be said that the questions were not distributed equally to the functions and the units. The table of specification of 2016-2017 2nd term TEPSE English test is presented in Figure 2, Figure 3, and Figure 4.

According to Figure 2, Figure 3, Figure 4 and the plan that MoNE published, there were five units both in the first term and in the second term; however, the students were responsible for the first three units in the 1st term TEPSE English test while they were responsible for the first eight units in the 2nd term TEPSE English test. According to the table, which was presented based on the functions of the related units and the test questions, there were some items casting a doubt. The details of this table of specification might be provided as follows:

Based on the functions of the units:

1. There are three questions on the functions of Unit 1- Friendship but one of them “question 1” is on the topic of Unit 8.
2. There are two questions on the functions of Unit 2-Teenlife but these questions “question 15 and 19” cast a doubt on content validity because they are on the topic of Unit 5 and Unit 6.
3. There are three questions on the functions of Unit 3- Cooking and all of these questions “question 11, 13 and 14” cast a doubt because they are actually on the topic of Unit 4, Unit 6 and Unit 8.
4. There are two questions on the functions of Unit 4- Communication.
5. There are two questions on the functions of Unit 5- Internet.
6. There are four questions on the functions of Unit 6-Adventure, but one of these questions casts a doubt on content validity because it is on the topic of Unit 5.
7. There are three questions on the functions of Unit 7- Tourism.
8. There is one question on the functions of Unit 8- Chores.

Based on the topics of the units

1. There are two questions “question 5 and 6” on the topic of Unit 1- Friendship.
2. There is not any question on the topic of Unit 2- Teen life; however, there are two questions “question 15 and 19” that might be the focus of the functions “expressing likes and dislikes” and “expressing preferences” of Unit 2- Teen life.
3. There is not any question on the topic of Unit 3- Cooking; however, the number of questions on the function “naming common objects” of Unit 3 is three.
4. There are three questions “question 2, 4 and 11” on the topic of Unit 4- Communication, but one of them “question 11” casts a doubt because the function of this question is on “naming common objects” which belongs to Unit 3.
5. There are four questions “question 3, 18, 19 and 20” on the topic of Unit 5- Internet; however, “the questions 18 and 19” cast doubt because the function of ‘the question 18’ is “talking about what people do regularly” in Unit 6 and the function of ‘the question 19’ is “expressing preferences” in Unit 2.
6. There are five questions on the topic of Unit 6- Adventure; however, the functions of two questions “question 13 and 15” are “naming common objects” in Unit 3 and “expressing likes and dislikes” in Unit 2.
7. There are three questions “question 7, 9 and 12” on the topic of Unit 7- Tourism.
8. There are three questions “question 1, 10 and 14” on the topic of Unit 8- Chores; however, the function of ‘the question 1’ is “apologizing” in Unit-1 while the function of ‘the question 14’ is “naming common objects” in Unit-3.

As it can be clearly seen, the number of the functions of each unit is different from each other. When the table of specification is examined, it can be noticed that some of the functions are common in some of the units, and there are twenty-three different functions in total in the first eight units, which can be examined in Table 7.

Table of Specification of 2016-2017 1 st Term TEPSE English Test									
The number at the top of the cells indicates the assigned number to the function, and the number at the bottom indicates the test item. The number at the top of the cell in the column 'totals' indicates the assigned number to the function, while the number at the bottom indicates the number of the test items)									
**' means that this item casts a doubt on content validity									
UNITS	FUNCTIONS	KNOWLEDGE	COMPREHESION	APPLICATION	ANALYSIS	SYN./EVAL.	AFFECTIVE	PSYCHOMOTOR	TOTALS
UNIT-1 FRIENDSHIP	Accepting and refusing		1						1
	Apologizing		5,12,16						3
	Giving explanations/ reason		3						3
	Making simple inquiries		2*, 15						2
	Telling the time, days and dates		4						4
UNIT-2 TEENLIFE	Describing the frequency of actions		7,10						2
	Expressing likes and dislikes		9						1
	Expressing preferences		1						7
	Making simple inquiries		1*, 17*						2
	Stating person opinions		8						8
	Describing simple processes		4*						1
UNIT-3 COOKING	Expressing preferences		9						9
	Making simple inquiries		6,8						2
	Naming common objects		10						1
	Expressing preferences		18*						10
UNIT-3 COOKING	Making simple inquiries		11						11
	Naming common objects		19,20						2
	Expressing preferences		13						1
	Making simple inquiries		3						13
UNIT-3 COOKING	Naming common objects	14							1
	Expressing preferences	11, 13*,14*							3

Figure 1. Table of specification of 2016-2017 1st term TEPSE English test

Table of Specification of 2016-2017 2ndTerm TEPSE English Test
 The number at the top of the cells indicates the assigned number to the function, and the number at the bottom indicates the test item. The number at the top of the cell in the column 'totals' indicates the assigned number to the function, while the number at the bottom indicates the number of the test items)
 '*' means that this item casts a doubt on content validity

UNITS	FUNCTIONS	KNOWLEDGE	COMPREHESION	APPLICATION	ANALYSIS	SYN./EVAL.	AFFECTIVE	PSYCHOMOTOR	TOTALS
UNIT-1 FRIENDSHIP	Accepting and refusing		1 5						1 1
	Apologizing		2 1*						2 1
	Giving explanations/ reason								
	Making simple inquiries		4 6						4 1
	Telling the time, days and dates								
UNIT-2 TEENLIFE	Describing the frequency of actions								
	Expressing likes and dislikes		7 15*						7 1
	Expressing preferences		8 19*						8 1
	Making simple inquiries								
	Stating person opinions								
UNIT-3 COOKING	Describing simple processes								
	Expressing preferences								
	Making simple inquiries								
	Naming common objects	14 11*,13*,14*							14 3

Figure 2. Table of specification of 2016-2017 2nd term TEPSE English test-1

Table of Specification of 2016-2017 2nd Term TEPSE English Test
The number at the top of the cells indicates the assigned number to the function, and the number at the bottom indicates the test item. The number at the top of the cell in the column 'totals' indicates the assigned number to the function, while the number at the bottom indicates the number of the test items)
'*' means that this item casts a doubt on content validity

UNITS	FUNCTIONS	KNOWLEDGE	COMPREHENSION	APPLICATION	ANALYSIS	SYN./EVAL.	AFFECTIVE	PSYCHOMOTOR	TOTALS
UNIT-4 COMMUNICATION	Expressing concern and sympathy								
	Handling phone conversations								
	Making simple inquiries		2, 4						2 17
	Talking about plans								
UNIT-5 INTERNET	Accepting and refusing								
	Giving explanations/ reason		20						1 20
	Making excuses								
	Making simple requests								
	Making simple inquiries		3						1 23
	Talking about plans								
UNIT-6 ADVENTURE	Telling the time, days and dates								
	Expressing preferences		17						1 26
	Giving explanations/ reasons		8						1 27
	Making simple comparisons								
	Making simple inquiries								
	Stating personal opinions		16						1 30
	Talking about what people do regularly		18*						1 31
Talking about past events									

Figure 3. Table of specification of 2016-2017 2nd term TEPSE English test-2

Table of Specification of 2016-2017 2ndTerm TEPSE English Test
 The number at the top of the cells indicates the assigned number to the function, and the number at the bottom indicates the test item. The number at the top of the cell in the column ‘totals’ indicates the assigned number to the function, while the number at the bottom indicates the number of the test items.
 ‘*’ means that this item casts a doubt on content validity.

UNITS	FUNCTIONS	KNOWLEDGE	COMPREHESION	APPLICATION	ANALYSIS	SYN./EVAL.	AFFECTIVE	PSYCHOMOTOR	TOTALS
UNIT-7 TOURISM	Describing places								
	Describing the weather		7 34						1 34
	Expressing preferences								
	Giving explanations/ reason								
	Making simple comparisons		12 37						1 37
	Stating personal opinions								
	Talking about past events		9 39						1 39
UNIT-8 CHORES	Expressing feelings								
	Expressing likes and dislikes								
	Expressing obligation		10 42						1 42
	Giving explanations/ reasons								
	Making simple inquiries								
	Making simple suggestions								

Figure 4. Table of specification of 2016-2017 2nd term TEPSE English test-3

Table 7. Functions of the First Eight Units

FUNCTION	UNITS	FUNCTION	UNITS
Making simple inquires	1,2,3,4,5,6,7	Handling phone conversation	4
Accepting and refusing	1,5	Talking about plans	4, 5
Giving explanation/reason	1, 5, 6, 7, 8	Making excuse	5
Apologizing	1	Making simple request	5
Telling the time days and dates	1, 5	Making simple comparisons	6, 7
Describing the frequency of actions	2	Talking about what people do regularly	6
Expressing likes and dislikes	2,8	Talking about past events	6, 7
Expressing preferences	2, 3, 6, 7	Describing places	7
Stating personal opinions	2, 6, 7	Describing the weather	7
Describing simple process	3	Expressing obligation	8
Naming common objects	3	Making simple suggestions	8
Expressing concern and sympathy	4		

Table 7 shows that the number of functions was twenty-three, and the number of questions in TEPSE was twenty. Each question of the test could have focused on only one function rather than asking more questions on some of the functions. The table of specification shows that there were more questions on some of the functions and units while there was not any question on the other functions and units.

The Teachers' Views toward Content Validity of TEPSE English Tests Conducted Between 2016 and 2017

In the semi-structured interviews, three questions were addressed to the teachers to reveal their views on TEPSE English tests which were conducted between 2016 and 2017. The interview questions were parallel to the research questions that the researcher tried to find answers by analyzing the documents. The questions are:

1. Do the English language tests in TEPSE exactly focus on the frequently used items in the coursebook? If yes or no, which items are tested or not tested?
2. Is there an exact match between functions of the provided syllabus and the questions in the English language test in TEPSE?
3. Do you have any comments?

The semi-structured interview data collected from 21 English language teachers teaching English to 8th grade students, and they were coded and categorized after the transcribing process.

Alignment between the English Tests in TEPSE and the Coursebook "Upturn in English" Based on the Frequently Used Items

The responses of the teachers were analyzed and provided in the following sub-sections.

Focused Both on the Vocabulary and Language Use Patterns.

More than half of participants' view (n=14) about TEPSE English tests based on the frequently used items might be presented as:

"I cannot say that the vocabulary items or language use patterns which were not presented in the coursebook were included in the exams. After answering the questions which were published by MoNE, I noticed that the items in the coursebook were used in the options or in the question itself" (Participant 19, Age:31).

"I think that, generally, the tests focused on the vocabulary items and language use patterns in the coursebook" (Participant 15, Age:31).

The Tested Items Even Though They Were Not the Focus of the Coursebook.

Based on the responses, more than half of the participants (n=13) stated some tested items in TEPSE English tests even though they were not frequently used in the coursebook. According to their responses, these items were 'drum, frying pan, before, after, and, snowshoeing'. The following quotation might be useful:

"Of course, there were some words, which we did not extremely focus in the exams. One of them was the word 'drum'. Although this word was not the focused one in the coursebook, it was included in the exam...And also, 'before' and 'after' were used in the exams, while the sequence words like 'first and second' were frequently used in the coursebook" (Participant 13, Age:31).

The Tested Items Included in the Coursebook.

The items tested in the exams were mentioned by some of the participants (n=9). Based on the responses, the following quotation summarizes the language use patterns and vocabulary items that TEPSE English test tested:

"I have noted the conspicuous ones such as:

In the 2016-2017 1st TEPSE: Expressing opinion, responding to offers, present simple tense, expressing preference, be going to, cooking, expressing preference, and conjunctions.

In the 2016-2017 2nd TEPSE: Phone conversations, present simple tense, comparatives, expressing opinion, be going to, conjunctions, simple past tense, imperatives, extreme sports, and chore" (Participant 3, Age:28).

Alignment between Functions of the Provided Syllabus and the Questions in the English Tests in TEPSE.

The theme of the interview question-2 and most indicative quotations were presented in the following subsections.

Alignment Problem between the Functions and the Exams/no Alignment.

Based on the responses, two participants indicated the alignment problem between the functions and the exams. One of the quotations is provided as follows:

"Listening, writing, and speaking cannot be exactly included because TEPSE is a multiple-choice exam. Therefore, the only skill out of four skills is reading. However, to me, TEPSE are also unable to assess reading skill since the questions in the tests do not align with each other when we consider on the functions" (Participant 2, Age:25).

The Exams Align with the Functions in General.

Most of the participants (n=18) indicated that the questions in TEPSE generally aligned with the functions. The following statement is provided to emphasize the views of participants.

"In fact, they align with each other...There are some functions which were frequently tested such as 'giving explanation and reason, expressing concern and sympathy, frequency'...Of course, there are some functions could not be tested because all of them could not be tested at the same time. However, the questions were based on nearly all of the functions" (Participant 11, Age:25).

Distribution of Questions Based on the Functions/units.

More than half of the participants (n=12) made comments on the distribution of questions based on the units. Ten participants stated that the questions based on the units were not equally distributed in some of the English tests in TEPSE while two of them stated that the questions were distributed equally. The following two quotations present these two views:

"When TEPSE between 2016-2017 were taken into consideration, the distribution of the questions based on the topics was not equal...For instance, the topics of Unit-2 and Unit-3 were not included in the 2016-2017 2nd term TEPSE English test and it could not test what it intended to test. The twenty questions could have been distributed equally to units" (Participant 6, Age:32).

"The questions were good and equally distributed" (Participant 10, Age:31).

Inconsistency between the Functions and the Units.

Nearly half of the participants (n=9) indicated the inconsistency between the functions and the units. One of the participants stated as:

"As I stated before, -the question on 'drum'- the function of this question does not belong to this unit. I mean it is a vocabulary question on the function 'naming object' but this function was not among the functions of this unit... Maybe some students had difficulties but they could tolerate and answer these questions because

they were exposed to these functions in the previous units. However, I think that it would be better if the questions were asked based on the functions of the related units” (Participant 15, Age: 31).

The Functions/Items which were not Tested.

Based on the responses (n=2), the following quotation might reveal the view towards the items which were not tested.

“For instance, we use a great variety of expressions to express idea, to make an offer etc.; however, just a few of them were included. The expressions such as ‘why don’t we’, ‘what about’, and ‘how about’ could have been used” (Participant 4, Age:25)

Functions Based on 4 Skills vs Exams.

Five participants stated that four skills both the coursebook and the functions focused on could not be tested in the exams. One of the quotations was presented as follows:

“The functions were generally based on the communicative ones while the exams were multiple-choice tests. The coursebook focused on reading and listening... Of course, these activities were useful to improve students’ English; however, the students assume as if these activities were waste of time because of not being tested in the exams...” (Participant 12, Age: 24).

Suggestions and Comments of Participants.

Interview question-3 examines the other comments and suggestions of the participants, and provided in the following sub-sections.

Four Skills vs. Exams.

Based on the responses, nearly half of the participants (n=9) emphasized that these exams could not test four language skills. The following quotation might summarize the views of the participants:

“The major problem in teaching foreign languages is that there are not any proper criteria to teach listening, writing, speaking, and even reading in our country. We have exams just to test grammar and vocabulary knowledge” (Participant 9, Age:27).

The Coursebook vs TEPSE.

Four participants mentioned the relation between the coursebook and TEPSE as a response to question-3. Based on these responses, two of them criticized the coursebook while the rests focused on the good sides of it.

“I think that the coursebook should be developed, and I demand that the coursebook should be more consistent with the exams. I used the coursebook provided by MoNE... and we do not have an opportunity to buy supplementary resources. That’s why the coursebook should be more consistent with the exams” (Participant 12, Age:24).

“Well, the coursebook was generally focusing on the items and using them frequently. From this perspective, I think it was much more effective and efficient” (Participant 19, Age:31).

Pros of TEPSE.

The pros of TEPSE such as content validity, number of questions and the matching between the coursebook and the exams were also emphasized by the participants (n=8):

“There were some good sides of the exams. I think that positive sides were conducting two exams in a year, including the first three units in the first term TEPSE, and including the following five units in the second term TEPSE. Also, I think that conducting make-up exams were also a positive side... (Participant 19, Age:31).

TEPSE vs LGS.

Based on the responses more than half of the participants (n=20) mentioned LGS exams focusing on the number of questions, content validity and the point value of English test questions, and criticized it. The responses indicated that more than half of the participants (n=15) compared TEPSE and LGS, and they stated that they were in favor of TEPSE exams. The following quotations might prove this inference:

“I think, even though we criticized TEPSE in some aspects, it was better than the new system (LGS), and it could test more functions than the LGS can” (Participant 11, Age:25).

“As I stated before, in the LGS English tests, the number of questions and point value of English test questions were decreased. The decrease in the point value of the questions changed the views of the students toward English test in the exam. Also, when we focus on the exam, it seems that the decrease in the number of questions lowers content validity” (Participant 16, Age:26).

Suggestions.

Five participants provided some suggestions toward the language exams in Turkey by focusing on the four language skills and the way of presenting questions. These suggestions might be presented as:

“But I wish that listening, speaking, and writing were also included, and we could assess them objectively. These types of things might be included if it is possible to conduct a new system” (Participant 15, Age:31).

Discussion and Conclusion

Content Validity of TEPSE English Test

The current study aimed to investigate content validity of TEPSE English tests conducted between 2016 and 2017. As Wolf, Farnsworth and Herman (2008) emphasize that the purpose of a test is the first step of validation; thus, they also supported the idea of matching the content of the assessment with the intended construct. Therefore, based on the interviews and documents, the researcher tried to find answers to the research questions. The results show that the findings that the researcher obtained from the documents were triangulated with the responses of the participants. The items that the researcher obtained from the documents were also voiced by the participants.

Alignment between the Coursebook and TEPSE English Tests Based on the Frequently Used Items

Language items used in the coursebook and the tests are crucial as Hughes (2003) states “A test is said to have content validity if its content constitutes a representative sample of the language skills, structures, etc. with which it is meant to be concerned” (p.26). For this purpose, the alignment gains importance considering the frequently used items between the coursebook and TEPSE English tests. The analyses of both the coursebook and the English tests in TEPSE show that most of the frequently used items in the tests were also the ones used frequently in the coursebook, which was also emphasized with a similar finding obtained in the study of Jaturapitakkul (2013) which revealed content validity of the traditional English language tests in Thailand by focusing on the alignment between the tests and the content that the students learnt in the classroom. Moreover, the consistency between the coursebook and TEPSE English tests affects content validity positively as it was also emphasized in the studies of Aksan (2001) and Kang and Chang (2014).

English test which was conducted in the 2016-2017 1st term included the frequently used items in the coursebook. The frequency list which was presented in Table 3 showed that the frequently used items in the test were included in the coursebook, and the frequency of these items was nearly parallel to the frequency of these items in the test. However, there were some items in the test which were not included in the coursebook. The number of the items in the test shows that there were 204 language items in the test while, 26 of the items were used once or none in the coursebook. This means that 87.26% of the language items in the test were used more than once in the coursebook. Moreover, Table 3 based on the frequency list of Top-30 items verifies that 2016-2017 1st term TEPSE English test mostly focused on the frequently used items in the coursebook. When the English test in TEPSE in 2016-2017 2nd term was taken into consideration, the frequency list in Table 4 shows that the most frequently used items in the test were also used frequently in the coursebook. However, the items which were not included in the coursebook were used in the test. When the number of these items was taken into

consideration, the number of the items used in the test was 220; however, 18 of them were used once or none in the coursebook. This means that 91.82% of the items in the test were also used in the coursebook more than once. Moreover, Table 4 based on the frequency list of Top-30 items verifies that 2016-2017 2nd term TEPSE English test mostly focused on the frequently used items in the coursebook

As a result, contrary to the study of Siddiek (2010), which emphasized the reason of lacking content validity of Sudan School Certificate English examinations as not having questions based on the textbook, and the study of Abella, Urrutia and Shneyderman (2003), which criticized language achievement tests because of not being valid measures of content area knowledge, the contents of TEPSE English tests were generally based on the coursebook. Most of the items in TEPSE English tests were also included in the coursebook and used frequently, which might indicate that there is an alignment between the coursebook and TEPSE English tests based on the frequency of the items. As it was also emphasized in the study of Külekçi (2016), providing representatives of the items intended to be assessed in the test proves content validity. Therefore, alignment between the coursebook and the test based on the frequently used items might increase content validity of TEPSE English tests. The study of Kang and Chang (2014) strengthens the idea that TEPSE English tests have content validity because they stated that because of being based on the textbook and curriculum, PECT had appropriate content to test learners' English skills. Moreover, the study of Aksan (2001) emphasized content validity of an exam based on the alignment between the exam and the content of the coursebook; therefore, the alignment between TEPSE English tests and the coursebook might prove content validity of TEPSE English tests.

Alignment between the Functions and TEPSE English Tests

The alignment between the functions and TEPSE English tests gains importance since as Ekbatani (2011) asserts, content validity is consistence between objectives/functions of the test and the test itself. For this purpose, table of specifications based on the tests were created by the researcher as it was also used in the studies of Sims (2015) and Newman et al. (2013) to analyze content validity of the tests. These researchers considered the table of specifications as a way of determining the alignment between the functions and the test items to analyze content validity.

In table of specification of TEPSE English test conducted in the 1st term of 2016 and 2017, Table 6 reveals that two questions could have been asked on each function to distribute the questions equally both on the functions and the units. However, based on the functions, there were eight questions on Unit-1, six questions on Unit-2 and Unit-3. When the topics were taken into consideration, there were nine questions on Unit-1, five questions on Unit-2, and six questions of Unit-3. Even though the distribution of the questions seems nearly equal, there were six questions casting doubt on content validity because of the inconsistencies between the topics and functions of these questions. However, most of the questions were on the intended functions provided by MoNE.

In addition to the 2016-2017 1st term TEPSE English test, 2016-2017 2nd term TEPSE English test was also examined. Figures 2, 3, and 4 show that based on the functions; there were three questions on Unit-1, Unit-3, Unit-6, and Unit-7, while there were two questions on Unit-2, Unit-4, and Unit-5, and only one question on Unit-8. However, based on the topics, there were two questions on Unit-1 and three questions on Unit-4, Unit-7 and Unit-8. Moreover, it was determined that there were four questions on Unit-5, and five questions on Unit-6, while there was not any question on Unit-2 and Unit-3. Each question of the test could have been focused on only one function rather than asking more questions on some of the functions. Moreover, the distribution of the questions was not equal as it can be seen in Figures 2, 3, and 4. These inconsistencies between the functions and the units cast a doubt on content validity, and there were seven questions emphasizing these inconsistencies even though most of the questions were on the intended functions.

As a conclusion, the results show that the distribution of the questions based on the functions in the 1st term TEPSE English test seems more equal than the 2nd term TEPSE English test. Besides, there were some questions casting doubt because of the inconsistency between the functions and units of these questions. However, more than half of the questions in each test were on the functions that they intended to test, which was also emphasized in the similar findings obtained in the studies of Vural (2017) and Fathony (2017), while the questions casting doubt might affect content validity of the tests negatively. This was also emphasized by Chakwera (2004) who stated that there was an alignment between content validity and curricular validity which

covers the functions. However, when the functions and the questions were examined thoroughly, it can be stated that the functions could be tested based on the units that the students were responsible for. The effect of the equal distribution of the questions on content validity was also emphasized in the study of Razmjoo and Tabrizi (2010) on TEFL M.A Entrance Examination. Similar to the results of TEPSE English tests in the current study, Razmjoo and Tabrizi's study indicated that there was not an equal distribution of items among the content categories and that TEFL M.A. Entrance Examination was not a valid one in terms of content validity. This might mean that the functions could be tested but the inequality in distribution of the functions might affect content validity negatively.

The Teachers' Views toward Content Validity of TEPSE English Tests Conducted between 2016 and 2017

One of the research questions of the current study aimed to determine the teachers' views toward content validity of TEPSE English tests conducted between 2016 and 2017. For this purpose, semi-structured interviews were held with 21 English language teachers teaching English to 8th grade students.

Alignment between the Coursebook and TEPSE English Tests Based on the Frequently Used Items

As it was voiced by Hughes (2003), a test which has content validity is the test representing the items that will match the content. For this purpose, teachers' views were also taken into consideration in addition to the findings obtained from the analysis of documents.

Based on the responses, 23.80% of the participants (n=5) expressed that TEPSE English tests mostly focused on language use patterns in the coursebook rather than vocabulary items. Moreover, 66.6% of the participants (n=14) agreed that TEPSE English tests were generally in alignment with the coursebook based on the frequently used items. The following statement might clarify this assumption:

"I think that, generally, the tests focused on the vocabulary items and language use patterns in the coursebook" (Participant 15, Age:31).

This assumption might be strengthened with the findings obtained from the documents. When the percentages of the included items in the test were taken into consideration, 87.26% of the items in the 2016-2017 1st term TEPSE test and, 91.82% of the items in the 2016-2017 2nd term TEPSE test were used more than once in the coursebook. Even though there were many items which were frequently used both in the coursebook and the tests, 61.9% of the participants (n=13) indicated that the tests included some items as key words which were not frequently used in the coursebook. The mostly emphasized item which was not focused on the coursebook was presented as 'drum (n=6)'. The following response expresses this as follows:

"Of course, there were some words, which we did not extremely focus in the exams. One them was the word 'drum'. Although this word was not the focused one in the coursebook, it was included in the exam" (Participant 13, Age:31).

When the responses of participants were taken into consideration, the most conspicuous item which was tested even though it was not frequently used in the coursebook was 'drum'. Regarding the documents, 'drum' was used once in the coursebook in the coursebook. This might mean that including such items in the test might affect content validity negatively; however, when the number of the items was considered, most of the items in tests were frequently used in the coursebook. Contrary to the studies of Siddiek (2010) and Abella, Urrutia and Shneyderman, (2003) which attributed the lack of content validity in exams to their not having questions based on the textbook, Jaturapitakkulin (2013) emphasized content validity of traditional English language tests in Thailand by focusing the alignment between the test and the content that the students learnt in the classroom. In addition, Aksan (2001) examined content validity of English language exams at Niğde University, and the participants were asked the question 'to what extent is the content of coursebook represented in the exams'. The responses revealed that most of the teachers were positive on this issue, and this indicated that these exams had content validity based on teachers' views. Therefore, it can be inferred that the alignment between the coursebook and TEPSE English tests based on the frequency of items might prove content validity of TEPSE English tests.

Alignment between the Functions and TEPSE English Tests

As it was voiced by Ekbatani (2011), alignment between the functions and the tests was crucial in terms of content validity. In line with this, the teachers' views were obtained on the second research question during the interviews. Based on the responses, 85.7% of the participants (n=18) agreed that there was an alignment between the functions and TEPSE English tests despite some inconsistencies and unequal distributions of questions across units. One of quotations on the alignment can be presented as follows:

"In fact, they align with each other...There are some functions which were frequently tested...Of course, there are some functions could not be tested because all of them could not be tested at the same time. However, the questions were based on nearly all of the functions" (Participant 11, Age:25).

47.61% of the participants (n=10) indicated that there was not an equal distribution of the questions based on the units/functions while 9.52% of the participants (n= 2) thought that the questions were distributed equally based on the units, especially the first three units. Moreover, 42.85% of the participants (n=9) emphasized the inconsistencies between the functions and the units. As in the study of Razmjoo and Tabrizi (2010) on TEFL M.A Entrance Examination which indicated that TEFL M.A. Entrance Examination was not a valid one in terms of content validity because there was not an equal distribution of items among the content categories, content validity of English tests in TEPSE might be also affected negatively. However, the participants of the current study also stated that these inconsistencies might not be a problem because of the exposure of the students to these functions in the previous units. The following statement might provide an insight into this issue:

"As I stated before, in the question on 'drum', 'the function of this question does not belong to this unit -I mean it is a vocabulary question on the function 'naming object' but this function was not among the functions of this unit...As I stated before, even though the unit does not include this function, maybe some students had difficulties but they could tolerate and answer these questions because they were exposed to these functions in the previous units" (Participant 15, Age:31).

Additionally, 57.14% of the participants (n=12) expressed that these exams could not assess four language skills as it was emphasized in the study of Akin (2016) which indicated that YDS tests grammar, vocabulary, and reading comprehension rather than four language skills. The following quotation on this issue is presented:

"The major problem in teaching foreign languages is that there are not any proper criteria to teach listening, writing, speaking, even reading in our country. We have exams just to test grammar and vocabulary knowledge" (Participant 9, Age:27).

To conclude, the findings regarding to the views of teachers toward content validity of TEPSE English test revealed that great majority of the participant agreed that TEPSE English tests had content validity despite some inconsistencies, unequal distributions, which were also emphasized in the study of Razmjoo and Tabrizi (2010) and the lack of assessing four language skills. These findings are also in alignment with those of the study conducted by Vural (2017), in which most of the teachers agreed that TEPSE test questions tested the functions in the coursebook, while acknowledging its failure in assessing listening and speaking skills, which could affect content validity negatively. Al- Adawi and Al-Balushi (2016) also obtained similar underscoring need to test listening and speaking in the exams. Moreover, the studies conducted by Weiping and Juan (2005), Haiyan and Fuqin (2005), and Nicholson (2015) emphasized the weak content validity of the exams due to the failure in reflecting the students' communicative competence. Therefore, from this perspective, content validity of TEPSE English tests can be stated to be affected negatively.

Other Comments

Based on the responses, the comments of participants focused on four language skills, TEPSE, LGS, and the coursebook. Several participants also provided some suggestions to the exams conducted in Turkey. Similar to the study of Mart (2014), which also emphasized both the negative and positive perspectives of the teachers toward TEPSE, the views of the participants toward TEPSE tests were mostly positive.

As it was also emphasized in the study of Gömleksiz and Aslan (2017), 57.14% of the participants agreed that these exams could not assess four language skills. Similarly, the current study revealed 95.23% of the participants criticized LGS in some aspects. Moreover, the participants compared TEPSE and LGS, and 71.42%

of them stated that TEPSE was better than LGS considering the number of questions, content validity, and point value of test questions. The following quotation might summarize these perspectives:

“As I stated before, in the LGS English tests, the number of questions and point value of English test questions were decreased. The decrease in the point value of questions changed the views of the students toward English test in the exam. Also, when we focus on the exam, it seems that the decrease in the number of questions lowers content validity” (Participant 16, Age:26).

“I think, even though we criticized TEPSE in some aspects, it was better than the new system (LGS), and it could test more functions than LGS can” (Participant 11, Age:25).

The participants (23.8%) suggested improvements in the exams conducted in Turkey by indicating the need to focus on the four language skills, which was in alignment with the findings of the studies conducted by Vural (2017) and Al- Adawi and Al-Balushi (2016). Moreover, presenting the questions in different formats was also stated.

“But, I wish that listening, speaking, and writing were also included, and we could assess them objectively. These types of things might be included if it is possible to conduct a new system” (Participant 15, Age:31).

Overall Summary of the Study

Language assessment has a crucial role in education, and the importance of assessment has been voiced by many researchers. Brown and Abeywickrama (2010) reflected the principles of language assessment as practicality, reliability, validity, authenticity, and washback. When the educational setting of Turkey is considered, exams which are generally multiple-choice are at the very heart of the educational system. Based on this fact, TEPSE English tests among the language tests in Turkey is the focus of the current study. This exam has been suddenly replaced by another exam ‘LGS’; however, the researcher had already started carrying out this study. There was not any study investigating content validity of TEPSE English tests conducted between 2016 and 2017. Also, to the best knowledge of the author, there was only one study conducted on content validity of English test in TEPSE (Vural, 2017). In her study, Vural (2017) focused on TEPSE English test in 2014 and the data were only based on the teachers’ views. The current study; therefore, aimed to find out to what extent English tests in TEPSE conducted between 2016 and 2017 have content validity based on the analysis of documents and teachers’ views. In order to obtain information about content validity of English tests in TEPSE, mixed research method was used. As Creswell (2009) stated that observations, interviews, and documents are the ways of data collection methods, and the current study benefited from the documents such as syllabus provided by MoNE, the coursebook ‘Upturn in English’ and TEPSE English tests conducted between 2016 and 2017. Besides, semi-structured interviews were held with 21 English language teachers teaching to 8th grade students in eighteen different provinces. As quantitative analysis, the coursebook ‘Upturn in English’ and TEPSE English tests were analyzed and compared based on the frequency of the items. In Turkey, curricula are realized with coursebooks, and neither the coursebook nor TEPSE English tests in those years included some of the vocabulary items suggested by curriculum. Therefore, analyzing the frequency of vocabulary items in the coursebook and TEPSE English tests is one of the aims of the current study. Moreover, the table of specification provided by Newman et al. (1973 as cited in Newman et al., 2013) was adapted and used to analyze TEPSE English tests based on content validity. The following main research questions were investigated.

1. To what extent do the English tests in TEPSE conducted between 2016 and 2017 have content validity?
2. What are English language teachers’ views on content validity of English test in TEPSE?

First of all, the alignment between the coursebook and TEPSE English tests based on the frequently used items was crucial as Hughes (2003) stated “A test is said to have content validity if its content constitutes a representative sample of the language skills, structures, etc. with which it is meant to be concerned” (p.26). The findings obtained from the documents and interviews revealed that most of the frequently used items in the tests were also used frequently in the coursebook. The details of the alignment between the coursebook and TEPSE English tests can be presented as:

1. 87.26% of the language items in the 2016-2017 1st term TEPSE English test were used more than once in the coursebook.

2. 91.82% of the items in the 2016-2017 2nd term TEPSE English test were also used in the coursebook more than once.

Also, the frequency lists of top-30 items based on TEPSE English tests and the coursebook (See Table 3 and 4) show similar results, which means that there is an alignment between the coursebook and TEPSE English tests regarding the frequently used items. Moreover, Kang and Chang (2014) state that a test has content validity if it is based on the textbook and curriculum; therefore, it can be stated that TEPSE English tests have content validity based on the representativeness of frequently used items. Moreover, Ekbatani (2011) claims that content validity is a consistence between objectives/functions of the test and the test itself. In regard, the alignment between the functions and TEPSE English tests was another focus of this study. The findings obtained from the table of specifications revealed that:

1. The distribution of the questions based on the topics, especially in the 2nd term TEPSE English test, was not exactly equal.
2. The distribution of the questions based on the functions in the 1st term TEPSE English test seems more equal than the 2nd term TEPSE English test.
3. There were some questions casting doubt on content validity because of the inconsistency between the functions and units of these questions.
4. More than half of the questions in each test were on the functions that they intended to test
5. The functions could be tested based on the units that the students were responsible for.

Razmjoo and Tabrizi (2010) emphasized the effect of the equal distribution of the items on content validity, and the impact of consistency between the functions and tests on content validity was voiced by Ekbatani (2011). Therefore, it can be inferred that the inconsistencies and unequal distributions in the tests affected content validity of TEPSE English tests negatively. However, it cannot be denied that more than half of the questions in each test could test what they intend to test, and the questions were on the predetermined functions provided by MoNE.

In response to the first research question, it can be claimed that TEPSE English tests between 2016 and 2017 seem to have content validity based on the alignment between the coursebook and the tests, while their content validities were affected negatively because of some inconsistencies and unequal distributions of the questions. In addition to the documents, teachers' views were the other focus of the current study. The participants' responses were investigated, and results might be presented as follows:

1. 66.6% of the participants agreed that there was an alignment between the coursebook and TEPSE English tests based on the frequently used items, while 23.80% of the participants expressed that TEPSE English tests focused on language use patterns in the coursebook rather than vocabulary items.
2. 61.9% of the participants indicated that the tests included a few items as key words which were not frequently used in the coursebook.

Based on the responses, it might be stated that there was an alignment between the coursebook and TEPSE English tests regarding the frequency of the items. However, including some items which were not frequently used might affect content validity negatively. Fortunately, most of the items in the tests were also used frequently in the coursebook. Aksan (2001) revealed that representativeness of the content in the tests proves content validity; therefore, it can be implied that the most of the participants agreed on content validity of TEPSE English tests based on the representativeness of frequently used items.

The current study has also focused on the views of teachers toward the alignment between the functions and TEPSE English tests. The responses of the participants can be presented as:

1. 85.7% of the participants agreed that there was an alignment between the functions and TEPSE English tests despite some inconsistencies and unequal distributions.
2. 47.61% of the participants indicated that there was not equal distribution of the questions based on the units/functions

3. 14.28% of the participants agreed that the questions were distributed equally based on the first three units.
4. 42.85% of the participants emphasized the inconsistencies between the functions and the units. However, they also stated that these inconsistencies might not be a problem.
5. 57.14% of the participants expressed that these exams could not assess four language skills
6. 95.23% of the participants criticized LGS in some aspects such as the number of questions, point value of English test questions, and content validity.
7. 71.42% of them stated that TEPSE was better than LGS considering the number of questions, content validity, and point value of test questions.

The responses indicate that the participants agreed on content validity of TEPSE English tests regarding the alignment between the functions and tests despite some inconsistencies and neglecting assessing four language skills. Moreover, the participants compared LGS and TEPSE, and criticized the LGS for the decrease in the number of the questions and in the point value of English test questions. They also stated that the number of the questions in LGS English test which is 10, might affect content validity negatively when compared to the number of questions in TEPSE English test which was 20. Therefore, the participants were in favor of conducting TEPSE English test rather than LGS English test. Moreover, the participants of the current study also demand a test which can assess four language skills because they believe that language learning mean more than vocabulary and grammar, and students should be tested based on these skills, which might also improve content validity if it is implemented successfully. As a conclusion, it can be put forward that TEPSE English tests conducted between 2016 and 2017 seem to have high content validity based on the alignment among the coursebook, functions, and the tests; however, content validity of these tests was also affected negatively because of some inconsistencies, unequal distributions, and lacking of assessing four language skills. The reason for this might be attributed to the frequent changes in the educational system in Turkey. TEPSE English tests are one of the exams which were also prone to the changes based on the system and could not test what intend to test in some aspects. To improve content validity of these exams, it might be suggested that these exams include the neglected features such as assessing four language skills as mentioned in the studies of many researchers like Aslan and Gömleksiz (2017), and Vural (2017). Moreover, equal distribution of the topics/functions in the exams plays a crucial role in content validity as it was emphasized in the studies of Razmjoo and Tabrizi (2010); therefore, the questions should be distributed equally based on the topics/functions.

Acknowledgments

This study is based on the M.A. thesis of the first author, which was submitted to the Institute of Educational Sciences at Mehmet Akif Ersoy University in 2019 under the supervision of Prof. Dr. Ferit Kılıçkaya.

Statement of Publication Ethics

The authors of this article declare that the research has no unethical problem, and required permission to collect data was obtained from Ministry of National Education.

Researchers' Contribution Rate

The first author collected data, analyzed and prepared necessary reports while the second author supervised, guided and finalized the research process.

Conflict of Interest

The authors of this article declare that there is not conflict of interest.

References

- Abella, R., Urrutia, J., & Shneyderman, A. (2003, February). *An examination of the validity of English language assessment test scores in a LEP student population*. Paper presented at the annual meeting of the National Association for Bilingual Education, New Orleans, LA. Retrieved from <http://oer.dadeschools.net/nabe03paper.pdf>
- Akın, G. (2016). Evaluation of national foreign language test in Turkey. *Asian Journal of Educational Research*, 4(3), 11-21. Retrieved from <http://www.multidisciplinaryjournals.com/wp-content/uploads/2016/04/FULL-PAPER-EVALUATION-OF-NATIONAL-FOREIGN-LANGUAGE-TEST-IN-TURKEY.pdf>
- Aksan, M. M. (2001). *Instructors' perceptions of the content validity of the English language exams at Niğde university* (Unpublished Master's Thesis). Bilkent University, Ankara, Turkey. Retrieved from <http://www.thesis.bilkent.edu.tr/0001838.pdf>.
- Al-Adawi, S. S. A., & Al-Balushi, A. A. K. (2016). Investigating content and face validity of English language placement test designed by Colleges of Applied Sciences. *English Language Teaching*, 9(1), 107-121. doi:10.5539/elt.v9n1p107
- Alderson, C. J., & Kremmel, B. (2013). Re-examining the content validation of a grammar test: The (im)possibility of distinguishing vocabulary and structural knowledge. *Language Testing*, 30(4), 535-556. doi:10.1177/0265532213489568.
- Antalya Provincial Directorate of National Education (2016). *2016-2017 eğitim-öğretim yılı örnek yıllık plan [2016-2017 educational year sample annual plan]*. Retrieved from http://ilbap.meb.k12.tr/icerikler/2016-2017-egitim-ogretim-yili-ornek-yillik-planlari_2705897.html
- Biemiller, A. (2003). Vocabulary: Needed if more children are to read well. *Reading Psychology*, 24(3-4), 323-335. doi: 10.1080/02702710390227297
- Brown, H. D. (2004). *Language assessment: Principles and classroom practices*. Pearson Education.
- Brown, H. D., & Abeywickrama, P. (2010). *Language assessment: Principles and classroom practices* (2nd ed.). Pearson Education.
- Chakwera, E. W. J. (2004). *Content validity of independently constructed curriculum-based examinations* (Unpublished Doctoral Dissertation). Graduate School of the University of Massachusetts, Amherst, U.S.A.
- Cheng, L., & Fox, J. (2017). *Assessment in language classroom: Teachers supporting student learning*. Palgrave.
- Christensen, L. B., Johnson, B. R., & Turner, A. L. (2015). *Research methods, design, and analysis* (12th ed.). Pearson.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE Publications.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson Education.
- Davidson, F., & Lynch, B. K. (2002). *Testcraft- A teacher's guide to writing and using language test specifications*. Yale University Press.
- Ekbatani, G. (2011). *Measurement and evaluation in post-secondary ESL*. Routledge.
- Fathony, F. (2017). *An analysis on content validity of English summative test items of second grade students at Mtsn Malijambe in the academic year 2015/2016* (Unpublished Master's Thesis). The State Islamic Institute, Surakarta, Indonesia.
- Fraenkel, R. J., Wallen, E. N., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8th ed.). McGraw-Hill.

- Griffiee, T. D. (2012). *An introduction to second language research methods: Design and data*. California, CA: TESL-EJ Publications.
- Gorsuch, G., & Griffiee, D. T. (2018). *Second language testing for student evaluation and classroom research*. Information Age Publishing Inc.
- Gömlüksiz, M. N., & Aslan, S. (2017). Secondary school students' views about the effectiveness of TEOG exam on English language learning: A qualitative study. *International Journal of Social Science*, 11(64), 1-14. doi: 10.9761/JASSS7375.
- Haiyan, W., & Fuqin, Z. (2005). A validation of CET for testing candidates' communicative competence and a proposal of a university-based communicative test. *CELEA Journal*, 28(2), 26-31. Retrieved from <http://www.celea.org.cn/teic/60/60-26.pdf>
- Hughes, A. (2003). *Testing for language teachers (2nd ed.)*. Cambridge University Press
- Ing, L. M., Musah, M. B., Al-Hudawi, V. H. S., Tahir, L. M., & Kamil, M. N. (2015). Validity of teacher made assessment: A table of specification approach. *Asian Social Science*, 11(5), 193-200. doi:10.5539/ass.v11n5p193.
- Jaturapitakkul, N. (2013). Students' perceptions of traditional English language testing in Thailand. *Academic Journal of Interdisciplinary Studies*. 2(3), 445-452. doi:10.5901/ajis.2013.v2n3p445.
- Kang, M., & Chang, H. (2014). Ensuring validity of practical English certification of local office of education in Korea. *Pan-Pacific Association of Applied Linguistics*, 18(2), 111-122. Retrieved from http://paal.kr/download/18_2/18-2-7_Mun-koo_Kang_and_Hyung-ji_Chang.pdf
- Kılıçkaya, F. (2016). Washback effects of a high-stakes exam on lower secondary school English teachers' practices in the classroom. *Lublin Studies in Modern Languages and Literature*, 40(1), 116-134. doi:10.17951/lsml.2016.40.1.116.
- Külekçi, E. (2016). A concise analysis of the Foreign Language Examination (YDS) in Turkey and its possible washback effects. *International Online Journal of Education and Teaching (IOJET)*, 3(4), 303-315. Retrieved from: <http://iojet.org/index.php/IOJET/article/view/141/143>
- Lochmiller, C. R., & Lester, J. N. (2017). *An introduction to educational research: Connecting methods to practice*. Sage Publications.
- Mackey, A., & Gas, M. S. (Eds.). (2012). *Research methods in second language acquisition: A practical guide*. Blackwell Publishing.
- Mart, M. T. (2014). *Determination of tutors' views on the common exams applied in secondary schools within the student passing process from primary education to high school education (TEOG)* (Unpublished Master's Thesis). Zirve University, Gaziantep, Turkey. Available from Council of Higher Education Thesis Centre.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis. (2nd ed.)*. Sage.
- MoNE. (2011). *Sınavla öğrenci alacak ortaöğretim kurumlarına ilişkin merkezi sınav başvuru ve uygulama kılavuzu [Guidelines for applicants regarding to secondary education institutions which admits the students based on the central exams]*. Retrieved from http://mevzuat.meb.gov.tr/html/608_0.html
- MoNE. (2016). *2016-2017 eğitim ve öğretim yılı merkezi sistem ortak sınavları [TEPSE in 2016-2017 educational year]*. Retrieved from: <http://ttkb.meb.gov.tr/www/2016-2017-egitim-ve-ogretim-yili-merkezi-sistem-ortak-sinavlari/icerik/281>.
- MoNE. (2016b). *8. Sınıf 1. dönem İngilizce dersi merkezi ortak sınavı [English exam questions for grade 8 in the first semester]*. Retrieved from https://odsgm.meb.gov.tr/meb_iys_dosyalar/2016_11/24014749_ingilizce_a.pdf.
- MoNE. (2017). *8. Sınıf 2. dönem İngilizce dersi merkezi ortak sınavı [English exam questions for grade 8 in the second semester]*. Retrieved from http://odsgm.meb.gov.tr/meb_iys_dosyalar/2017_04/27131529_YNGYLYZCE_A.pdf

- MoNE (2018). *Sınavla öğrenci alacak ortaöğretim kurumlarına ilişkin merkezi sınav başvuru ve uygulama kılavuzu [Guidelines for applicants regarding to secondary education institutions which admits the students based on the central exams]*. Retrieved from: https://www.meb.gov.tr/sinavlar/dokumanlar/2018/MERKEZI_SINAV_BASVURU_VE_UYGULAMA_KI_LAVUZU.pdf
- Newman, I., Frye, B., Blumenfeld, G., & Newman, C. (1973). *An introduction to the basic concepts of measurement and evaluation*. University of Akron.
- Newman, I., Lim, J., & Pineda, F. (2013). Content validity using a mixed method approach: Its application and development through the use of a table of specifications methodology. *Journal of Mixed Method Research*, 7(3), 243-260. doi: 10.1177/1558689813476922.
- Nicholson, S. J. (2015). Evaluating the TOEIC® in South Korea: Practicality, reliability and validity. *International Journal of Education*, 7(1), 221-233. doi: 10.5296/ije.v7i1.7148.
- Ökmen, B., & Kılıç, A. (2016). The effect of language teaching methods on academic success in Turkey. *Journal of Education and Training Studies*, 4(10), 193-199. doi: 10.11114/jets.v4i10.1767.
- Pterneas, V. (2009). Word frequency counter [Software]. Available from <https://www.softpedia.com/get/Office-tools/Other-Office-Tools/Word-Frequency-Counter.shtml>
- Razmjoo, S., & Tabrizi, H. (2010). A content analysis of the TEFL M.A entrance examinations (case study: Major courses). *Journal of Pan-Pacific Association of Applied Linguistics*, 14(1), 159-170. Retrieved from <http://files.eric.ed.gov/fulltext/EJ920511.pdf>
- Siddiek, G. A. (2010). The impact of test content validity on language teaching and learning. *Asian Social Science*, 6(12), 133-143. Retrieved from <http://www.ccsenet.org/journal/index.php/ass/article/view/6817/6305>
- Sims, M. J. (2015). A valid and reliable English proficiency exam: A model from a university language program in Taiwan. *English as a Global Language Education*, 1(2), 91-125. doi: 10.6294/EaGLE.2015.0102.04.
- Solano-Flores, G. (2016). *Assessing English language learners: Theory and practice*. Routledge.
- TUIK. (2016). *2015 well-being index for provinces*. Retrieved from: <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=24561>.
- Vural, A. (2017). *The assessment of consistency of 8th grade English course curriculum to the questions in TEOG English exam according to teachers' opinions* (Unpublished Master's Thesis). Gaziantep University, Gaziantep, Turkey. Retrieved from Council of Higher Education Thesis Centre.
- Weiping, G., & Juan, L. (2005). Test analysis of college students' communicative competence in English. *Asian EFL Journal*, 7(2). Retrieved from http://www.asian-efl-journal.com/June_05_wg.pdf
- Wolf, M. K., Farnsworth, T., & Herman, J. (2008). Validity issues in assessing English language learners' language proficiency. *Educational Assessment*, 13(2-3), 80-107. doi:10.1080/10627190802394222.



Investigation of the Relationship Between the Interpersonal Problem-Solving Skills and Self-Determination Levels of Pre-Service Teachers who Received and did not Receive Art Training

Aşkın Ceren Erez^{*a}, Orhan Taşkesen^b

Article Info

DOI: 10.14686/buefad.757271

Article History:

Received: 24.06.2020

Accepted: 27.09.2020

Published: 05.10.2020

Keywords:

Interpersonal Problem Solving,

Assertiveness,

Art,

Art Education

Article Type:

Research Article

Abstract

This research aimed to investigate the relationship between the problem-solving skills and assertiveness levels of students, who received and did not receive art education in faculty of education, and whether these two variables differ according to the gender, grade differences, and attended school. The study group included the education departments of Erzincan Binali Yıldırım University, Faculty of Education in 2018-2019. The purposeful sampling method was used in this research which was conducted to reveal the relationship between the problem-solving skills and assertiveness levels of students who received and did not receive art education in faculty of education, and whether these two variables differ according to the gender, grade differences, and attended school, is suitable to the relational survey model. As a result of the research, it was found that there was significant difference regarding the gender and grade variable. However, it was realized that there was a significant difference in the interpersonal problem-solving scores between some departments.

Sanat Eğitimi Alan ve Almayan Öğretmen Adaylarının Kişilerarası Problem Çözme Becerileri ve Kendini Belirleme Düzeyleri Arasındaki İlişkinin İncelenmesi

Makale Bilgisi

DOI: 10.14686/buefad.757271

Makale Geçmişi:

Geliş: 24.06.2020

Kabul: 27.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Kişilerarası Problem Çözme,

Kendini Belirleme Düzeyi

(Güvenlik),

Sanat,

Sanat Eğitimi.

Makale Türü:

Araştırma Makalesi

Öz

Bu araştırmada, Eğitim Fakültesin'de sanat eğitimi alan ve almayan öğrencilerin, kişilerarası problem çözme becerileri ve kendini belirleme düzeyleri arasındaki ilişkiyi, bu iki değişkenin cinsiyet, sınıf farkları, okunan bölüme göre değişip değişmediğini incelemek amaçlanmıştır. Çalışma grubunu, Erzincan Binali Yıldırım Üniversitesi Eğitim Fakültesinde 2018-2019 yıllarında öğrenim görmekte olan bölümler oluşturmaktadır. Belirlemede amaçlı örnekleme yöntemi kullanılmıştır. Sanat eğitimi alan ve almayan öğrencilerin kişilerarası problem çözme becerileri ve kendini belirleme düzeyleri arasındaki ilişkiyi, bu iki değişkenin cinsiyet, sınıf farkları, okunan bölüme göre değişip değişmediğini ortaya koymak üzere yapılan bu çalışma ilişkisel tarama modeline uygundur. Cinsiyet ve sınıf değişkenine ilişkin anlamlı bir farkın olmadığı görülmüştür. Bölüm değişkenine göre ise, bazı bölümler arasında kişilerarası problem çözme puanlarında anlamlı farklılık saptanmıştır.

*Corresponding Author: askin_ceren_24@hotmail.com

^aTeacher, <https://orcid.org/0000-0001-7914-2893>

^bProf. Dr., Erzincan Binali Yıldırım University, Faculty of Education, <https://orcid.org/0000-0002-8945-3676>

Introduction

“Interaction with people inevitably leads to the occurrence of the interpersonal problems” (Terzi, 2003, p.5). For individuals to keep up with the environment and time they are in, to maintain a healthy and happy life, to achieve their goals in the future, it is necessary to develop effective solutions against the difficulties and all kinds of obstacles they encounter. “To deal with these life-long challenges, individuals need to identify their behaviour when faced with problems, decision-making strategies, and the roadmaps required to reach a solution, because problems are dependent on their ability to resolve.” (Çeşit, Ece & Kafadar, 2012, p.710). Problem-solving skills help people adapt to the environment where they are. That is, each problem requires a solution; for this, it is necessary to learn how to solve problems. “The definitions of assertiveness include expressing itself as it is, transferring its pros and cons to other individuals, facing negative demands, making requests without hesitation from other individuals, protecting and defending the rights of individuals without violating their rights” (Çelik, 2016, p. 25).

There are several pieces of research in the literature on the topics of interpersonal problem-solving and self-realization. In these studies, while there are artistic activities among the activities related to the interpersonal problem-solving skills and assertiveness strategies, the researchers clearly state that there are not the sufficient number of studies that investigate the relationship between art education, problem-solving and self-realization, neither abroad nor domestically. Mercin & Alakuş (2007, p.15) referred the significance of the issue as follows: in addition to being a being that needs education in many ways, one of the basic aspects of people's education in art education. Art education is one of the important elements in both individual and social education, along with education in subject, science, technical fields, philosophy and kinesthetic fields. “In studies conducted on the solution of problems, in addition to the cognitive, behavioural, affective and psychological dimensions, personality factors such as self-confidence, creativity, responsibility and overcoming fears also influence the problem-solving process.” (Bingham, 1998 Trans. Çeşit, Ece & Kafadar, 2012, p.711). From this point, to acquire problem-solving skills, individuals need to receive a wide-ranging education in which they can educate themselves in many ways. “Even within this broad framework, it has positive effects on the ability to solve the problems of art education, which is observed to have positive results obtained from the researches on the development of individuals.” (Çeşit, Ece & Kafadar, 2012, p.716).

Interpersonal Problem Solving

“Problems, arising from interpersonal relationships, affect people very deeply and are among the most common problems of today. Many people, with whom the person interacts since birth, are effective in determining the personality, mental health and attitudes and behaviours of that person” (Nacar & Tümkaya, 2011, p.500).

Self-Determination (Assertiveness)

“Assertiveness can be defined as a set of behaviours that care about others. Accordingly, assertiveness contributes to the enjoyment of the individual from his/her life and to have positive relationships with her/his environment” (Tan, 2006, p.66).

Relationship between Interpersonal Problem-solving and Assertiveness

“Interpersonal relations and the nature of these relations have an important place in human life. These relations are positive only if the mutual rights are protected and these rights are respected. It is a behaviour that individuals are required to protect their rights as well as protect their rights. Such behaviours emerge when the social skills are sufficient and these skills facilitate human relations. Respecting the rights and thoughts of others, defending and defending their rights and thoughts, that is, being assertive helps the individual to use social skills appropriately.” (Acar, 2008, p.343). In this context, the topic of “assertiveness” is one of the most important social skills needed to establish and maintain healthy interpersonal relationships.

Definition of Art Education

According to Kaya (Art Magazine), art education has an important place in the formation of a civilized nation. The development of individuals who have a high level of creative, aesthetic enjoyments, developed

awareness in the point of dissatisfaction around them and an awareness of effectiveness required to change them can be provided with art education, which started to be given since childhood. A highly sensitive and, at the same time, the modern citizen is a conscious, equipped and educated person who can design is uncomfortable in the face of the tastes around his/her. Art education also acts as a cement that enables societies to come together on the way of civilization.

Research Purpose

In this research, it was aimed to compare the interpersonal problem-solving skills and assertiveness levels of the students, who received and did not receive art education in the Faculty of Education, and to determine whether it differs according to some variables (gender, class level and department of education).

Sub-purposes

1. Is there a significant difference between self-determination (assertiveness) levels of students who received and did not receive art education?
2. Is there a significant difference between interpersonal problem-solving skills of students who received and did not receive art education?
3. Is there a significant difference between the self-determination (assertiveness) levels of students according to the class level?
4. Is there a significant difference between the interpersonal problem-solving skills of students according to the class level?
5. Is there a significant difference between the self-determination (assertiveness) levels of the students according to the departments they study?
6. Is there a significant difference between the interpersonal problem-solving skills of the students according to the departments they study?
7. Is there a significant relationship between self-determination (assertiveness) and interpersonal problem-solving skills of students receiving art education?
8. Is there a significant relationship between self-determination (assertiveness) and interpersonal problem-solving skills of students not receiving art education?
9. Is there a significant difference between students' self-determination (assertiveness) levels in the context of the gender variable?
10. Is there a significant difference between the interpersonal problem-solving skills of the students in the context of the gender variable?

Method

Research Model

In this study, which was conducted to investigate if there was a relationship between the students of the Faculty of Education who received and did not receive art education and their interpersonal problem-solving skills and assertiveness levels and whether these two variables differ in terms of gender, class according to the attended department. Relational survey model as a quantitative research method was employed.

Population

The population of this research consists of 3500 who study at the Faculty of Education in a medium-sized province located in the Eastern Anatolia Region of Turkey in 2018-2019 academic year.

Sample

The scale sample of the research consisted of 500 pre-service teachers, selected with the purposeful sampling method, from the Faculty of Education in Erzincan Binali Yıldırım University. The participants consisted of 500 students, - between the ages of 18-30- who attend the university at all class levels in the Preschool Education Division, Turkish Education Division, Classroom Education Division, Guidance and Psychological Counseling Education Division, Science Education Division, Mathematics Education Division, Painting Business Education Division, Music Education Division, Physical Education and Sports Department, Computer and Instructional Technologies Education Department, voluntarily attending to answer the scales applied in the research.

Data Collection Tool

Two scales were applied to collect the necessary data for this research. These are the (1) Interpersonal Problem-solving Inventory, (2) Self-Determination (Assertiveness) Inventory. The information related to these scales were given below, in detail.

Analysis of the Data

The analysis of the data was performed in SPSS 20.00 statistical package programs. Descriptive statistics for variables were tested using correlation and variance analyzes using the SPSS 20.00 program. Research objectives were tested at the .05 significance level.

First, the Kolmogorov-Smirnov Normality test was used to test whether the research data demonstrated normal distribution. The Cronbach Alpha Coefficient was calculated to measure the reliability and validity of Interpersonal Problem-solving and Self-Determination (Assertiveness) Inventories. The independent sample t-test analysis was used to find a significant difference between the frequency distributions of the participants' demographic characteristics and their self-determination (Assertiveness) levels. Besides, the independent sample t-test was applied to find a significant difference between the interpersonal problem-solving skills of the students according to their gender. One-Way Variance Analysis (ANOVA) was used to find out the difference between students' level of class and the study department variable, between self-determination (Assertiveness) and interpersonal problem-solving skills.

At the same time, the Pearson Correlation coefficient test was used to test the relationship between students' interpersonal problem-solving skills and reliability levels.

Findings

Findings related to the First Sub-problem

Is there a significant difference between self-determination (assertiveness) levels of students received and did not receive art education?

The difference between self-determination (assertiveness) levels of students who received and did not receive art education is presented in Table 1.

Table 1. T-test Results Related to the Students Who Received and did not Receive Art Education in Terms of the Self-determination (Assertiveness)

	n	\bar{X}	T	p
Received Art Education	114	75.35	-.195	.846
Not Received Art Education	386	75.62		

In terms of self-determination (assertiveness), the difference between students who received and did not receive art education was analysed. Accordingly;

It was found that there was not a significant difference between the assertiveness levels of the students who received art education ($\bar{x}=75.35$) and the assertiveness levels of those who did not receive art education ($\bar{x}=75.62$) according to $t=-.195$, $p>.05$. It was observed that the average scores of the students from the assertiveness inventory are at the 'moderate' level.

Findings related to the Second Sub-problem

Is there a significant difference between interpersonal problem-solving skills of students who received and did not receive art education?

The difference between the students, who received and did not receive an art education, in terms of the interpersonal problem-solving skills is presented in Table 2.

Table 2. The T-test Results of the Students, Who Received and did not receive Art Education, in Terms of the Interpersonal Problem-Solving Skills

	n	\bar{X}	S.d.	T	p
Received Art Education	114	143.51	24.08	-.472	.637
Did not Receive Art Education	386	144.77	25.40		

In Table 2, the difference between students who received and did not receive art education in terms of interpersonal problem-solving skills was analysed. Accordingly;

It was found that there was not a significant difference between the interpersonal problem-solving skills of the students who received art education ($\bar{x}=143.51$) and the interpersonal problem-solving skills of those who did not receive art education ($\bar{x}=144.77$) according to $t=-.472$, $p>.05$. It was observed that the score averages of the students from the interpersonal problem-solving skills inventory were at 'moderate' level.

Findings related to the Third Sub-problem

Is there a significant difference between the self-determination (assertiveness) levels of students according to the class level?

One-way analysis of variance (ANOVA) results related to the difference of assertiveness levels of students according to their class levels are presented in Table 3.

Table 3. One-way Analysis of Variance (ANOVA) Results Related to the Difference of Assertiveness Levels of Students According to Their Class Levels

		Total of Squares	Sd	Average of Squares	F	Sig.	Significance Difference
Assertiveness	Betw.G.	669.81	3	223.27	1.328	.265	
	In-groups	83406.87	496	168.15			
Total		84076.68	499				

As the analysis of the data related to the assertiveness levels of the students according to their class levels was analysed;

It was found that there was not any significant difference in the assertiveness levels of the students according to $F=1.328$, $p>.05$ as it was analysed in terms of the class levels.

Findings Related to the Fourth Sub-problem

Is there a significant difference between the interpersonal problem-solving skills of students according to the class level?

One-way analysis of variance (ANOVA) results related to the difference of assertiveness levels of students according to their class levels are presented in table 4.

Table 4. One-Way Analysis of Variance (ANOVA) Results for the Analysis of Data on Interpersonal Problem-solving Skills of Students According to Class Level

		Total of Squares	Sd	Average of Squares	F	Sig.	Significance Difference
Interpersonal Problem-solving	Betw.G.	4517.60	3	1505.86	2.412	.066	
	In-groups	309639.36	496	624.27			
	Total	314156.96	499				

As the analysis of the data related to interpersonal problem-solving skills according to the grade levels of the students in Table 4 is analysed;

When the interpersonal problem-solving skills of the students were examined according to their class levels, it was found that there was no significant difference according to $F = 2.412$, $p > .05$.

Findings related to the Fifth Sub-problem

Is there a significant difference between the self-determination (assertiveness) levels of the students according to the departments they study?

Data analysis related to the assertiveness of the students according to their departments is presented in Table 5.

Table 5. One-Way Analysis of Variance (ANOVA) Results for the Analysis of the Data on the Assertiveness Levels of the Students According to the Department

		Total of Squares	Sd	Average of Squares	F	Sig.	Significance Difference
Assertiveness	Betw.G.	2868.16	10	286.81	1.727	.072	
	In-groups	81208.52	489	166.07			
	Total	84076.68	499				

* Categories: "1=Pre-school."; "2=Turkish."; "3=Science."; "4=Social St."; "5=Mathematics Edu."; "6=ICT Edu."

In Table 5, the difference between the assertiveness levels of the students according to the department they studied is examined. Accordingly;

It was determined that there was not a significant difference $F=1.727$, $p > .05$ as the assertiveness levels of the students were analysed according to the department they studied.

Findings Related to the Sixth Sub-problem

Is there a significant difference between the interpersonal problem-solving skills of the students according to the departments they study?

The analysis of the data on the interpersonal problem-solving skills according to the department they study is presented in Table 6.

Table 6. One-Way Analysis of Variance (ANOVA) Results for the Analysis of Data on Interpersonal Problem-solving Skills According to the Department

		Total of Squares	Sd	Average of Squares	F	Sig.	Significance Difference
Interpersonal Problem-solving	Betw.G.	23538.70	10	2353.87	3.961	.000*	1-2
	In-groups	290618.26	489	594.31			1-3
							1-4
							5-6
							5-3
							5-2
							5-4
	Total	314156.96	499				

* Categories: "1=Pre-school."; "2=Turkish"; "3=Science."; "4=Social St."; "5=Mathematics Edu."; "6=ICT Edu."

The difference between the interpersonal problem-solving skills of the students according to their departments is analysed in Table 6. According to the Tukey test to test which sections the difference is between, a significant difference is observed $F=3.961$, $p<.05$ when the interpersonal problem-solving skills of the students are analysed according to the department they study. It is originated from the reason that the significant difference is higher in the problem-solving skills of the students at the Department of Turkish Education ($X=152.25$), compared with the students at the Department of Pre-school Education ($X=135.38$) and students at the Department of Secondary School Mathematics ($X=130.48$); from that the problem-solving skills of the students at the Department of Pre-school Education ($X=135.38$) are lower than the students at the Department of Science Education ($X=153.71$) and the students in the Department of Social Studies ($X=152.23$); that the problem-solving skills of the students at the Department of Secondary School Mathematics Education ($X=130.48$) are lower than the students at the Department of ICT Education and ($X=150.62$), the students at the Department of the Science Education ($X=153.71$) and the students at the Department of Social Studies Education ($X=152.23$).

Findings Related to the Seventh Sub-problem

Is there a significant relationship between self-determination (assertiveness) and interpersonal problem-solving skills of students receiving art education?

The relationship between self-determination (assertiveness) and interpersonal problem-solving skills of the students studying at the department of art is presented in Table 7.

Table 7. Correlation Relationship Results Between Self-Determination And Interpersonal Problem-solving Skills of Students Receiving Art Education

	Interpersonal Problem Solving	Assertiveness
Assertiveness	Pearson Correlation	.005
p		.956
n		115

The relationship between self-determination (assertiveness) and interpersonal problem-solving skills of the students who received art education is analysed in Table 7. Accordingly;

It was found that there was a positive low level of insignificant relationship between the assertiveness and interpersonal problem-solving skills of the students $r=.005$, $p(.956)>.05$, who received art education.

Findings Related to the Eighth Sub-problem

Is there a significant relationship between self-determination (assertiveness) and interpersonal problem-solving skills of students not receiving art education?

The relationship between self-determination (assertiveness) and interpersonal problem-solving skills of students who do not receive art education is presented in Table 8.

Table 8. Correlation Relationship Results Between Self-Determination and Interpersonal Problem-solving Skills of Students not Receiving Art Education

	Interpersonal Problem Solving	Assertiveness
Assertiveness	Pearson Correlation	.041
p		.416
n		386

The relationship between the assertiveness and interpersonal problem-solving skills of the students who did not receive art education is presented in Table 8. Accordingly;

There is a positive moderately insignificant relationship between the assertiveness and interpersonal problem-solving skills of the students $r=.041$, $p(.416)>.05$.

Findings Related to the Ninth Sub-problem

Is there a significant difference between students' self-determination (assertiveness) levels in the context of the gender variable?

Independent samples t-test of the difference in assertiveness level of students according to their gender are presented in Table 9.

Table 9. Independent Samples T-Test Results Related to the Students' Self-Determination Level (Assertiveness) Average Difference

	Gender	N	\bar{X}	S.d	T	P
Assertiveness	Male	185	74.48	12.48	1.429	.154
	Female	315	76.20	13.24		

As the skills related to the average difference in self-determination level of students according to their gender indicated in Table 9 is analysed;

It was found that there was no significant difference between the assertiveness levels of the female students ($=76,20$) and the assertiveness levels of the male students ($=74,48$), which is as $t=1,429$, $p>.05$.

Findings related to the Tenth Sub-problem

Is there a significant difference between the interpersonal problem-solving skills of the students in the context of the gender variable?

The independent samplings t-test results related to the interpersonal problem-solving level average difference according to the gender of the students are presented in Table 10.

Table 10. The Independent Samplings T-Test Results Related to the Interpersonal Problem-solving Level Average Difference According to the Gender of the Students

	Gender	N	\bar{X}	S.d	T	P
Interpersonal Problem Solving	Male	185	144.38	24.36	0.74	.941
	Female	315	144.55	25.54		

As the skills related to the average difference of interpersonal problem-solving level according to the gender of the students indicated in Table 10 is analysed;

It was determined that there was no significant difference between the interpersonal problem-solving skills of the female students ($=144,55$) and the interpersonal problem-solving skills of the male students ($=144,38$), which is as $t=.074$, $p>.05$.

Discussion and Conclusion

1. In terms of the interpersonal problem-solving skills of the students according to the gender variable, there is no significant difference between the interpersonal problem-solving skills of the female students ($n=144,55$) and the interpersonal problem-solving skills of the male students ($n=144,38$) according to $t=,074$, $p>,05$. As the researches conducted on the relevant issue were investigated, no significant difference was encountered according to gender variable in the research with the title of “The General of Problem Solving Skill” by Çeşit, (2011). Similarly, even in the research conducted by Didin (2016), no significant difference was found between the interpersonal problem-solving skills of the students, who took and did not take art education, according to their gender. In many studies focusing on the interpersonal problem-solving skills, no significant difference was reached according to gender variable (Karamehmetoğlu, 2017; Yılmaz, 2015; Topal, 2011; Terzi, 2000).

2. As the general interpersonal problem-solving skill of the students is analysed according to the class levels they study, no significant difference was encountered according to $F=2.412$, $p>,05$. In similar studies, it is noticed that findings, that interpersonal problem solving skills demonstrate significant differences according to class level and not, are encountered. Many studies, in which there is no significant difference in interpersonal problem-solving skills according to class level, exist in the literature (Didin, 2016; Nacar, 2010; Otacioğlu, 2008; Gürbüzöğlü, 2008). In addition, Çeşit (2011) found a significant difference in comparing high school students' problem-solving skills in terms of class levels.

3. As the assertiveness of the students in terms of the gender variable is taken into consideration, there is no significant difference between the assertiveness levels of the female students ($n=76,20$) and the assertiveness levels of the male students ($n=74,48$) according to $t=1,429$, $p>,05$. In similar studies, it is mostly encountered that there are no significant difference in the self-determination (confidence) levels of students according to gender (Zengin, 2017; Çelik, 2016; Ateş, 2015; Voltan-Acar, 2008). Besides, in the research by Metin, 2014, the difference that is no statistically significant according to gender, was found between the self-determination inventory confidence sub-dimension scores of the nursing students, who participated in the study.

4. As the assertiveness levels of the students according to their study departments are analysed, it is found that there is no significant difference according to $F=1.328$, $p>,05$.

5. As the assertiveness levels of the students in terms of their departments are analysed, no significant difference was encountered according to $F=1.727$, $p>,05$.

6. As the problem-solving skills of the students are examined according to their department, there is no significant difference according to $F=3.961$, $p<,05$. This significant difference is originated from that the significant difference is higher in the problem-solving skills of the students at the Department of Turkish Education ($X=152.25$), compared with the students at the Department of Pre-school Education ($X=135.38$) and students at the Department of Secondary School Mathematics ($X=130.48$); from that the problem-solving skills of the students at the Department of Pre-school Education ($X=135.38$) are lower than the students at the Department of Science Education ($X=153.71$) and the students in the Department of Social Studies ($X=152.23$); that the problem-solving skills of the students at the Department of Secondary School Mathematics Education ($X=130.48$) are lower than the students at the Department of ICT Education and ($X=150.62$), the students at the Department of the Science Education ($X=153.71$) and the students at the Department of Social Studies Education ($n=152.23$).

7. There is a relationship, which is a positive and low level of significance between the assertiveness and interpersonal problem-solving skills of the students who received art education according to $r=.005$ $p>,01$.

8. There is a positive and moderate level of insignificant relationship between the assertiveness and interpersonal problem-solving skills of the students who did not receive art education according to $r=.041$ $p>,01$.

9. No significant difference was encountered between the assertiveness levels of the students who received art education ($n=75.35$) compared with the assertiveness levels of those who did not receive art education ($n=75.62$) according to $t=.195$, $p>,05$.

10. There is no significant difference in interpersonal problem-solving skills of the students who received art education ($n=143.51$) and the interpersonal problem-solving skills of the students who did not receive art education ($n=144.77$) according to $t=-.472$, $p>,05$.

According to these results, it was found that the assertiveness levels of the pre-service teachers were not influenced in terms of the gender, class differences and the departments in which they study. Similarly, it was determined that the interpersonal problem-solving skills of the pre-service teachers were not affected by their gender and class differences. However, the difference was found among the students in some departments in terms of the interpersonal problem-solving skills. The reason for this is that it affects the outcome of students studying in some departments, in which the analytical thinking skills are given at a higher level, as well as those who receive art education in the faculty of education. Furthermore, the fact that students studying at the departments of primary school and pre-school education receive art education courses also affected the result. The students, who do not study at the departments of visual arts and music education and believe that they have a special talent, and going to various courses to improve this ability affected the result.

Acknowledgments

The article was created in Erzincan Binali Yıldırım University, Institute of Social Sciences, Department of Fine Arts Education, Master's thesis, which was published in the National Thesis Center in 2019, in the Department of Painting and Business Education.

References

- Acar, V. N., Arıcıoğlu A., Gültekin F. ve Gençanırım D. (2008). Investigation of the Security Levels of University Students. *Hacettepe University Journal Of Education Faculty*, 35(35), 342-350. <http://dergipark.ulakbim.gov.tr/hunefd/article/view/5000048518>
- Çelik, O. (2016). *Investigation of Psychological Well-Being Perceived Social Competence and Security in Teacher Candidates*. (Publication Num: 450013). Published Master Dissertation, Erzincan Binali Yıldırım University, Institute Of Social Sciences, Erzincan, Turkey.
- Çeşit C., Ece S.A. ve Kafadar H. (2012). Investigation of Problem Solving Skills and Self-Esteem Levels of High School Students with and without Art Education (Bolu Province Example). *International Online Journal of Educational Sciences*, 4(3), 706-726. http://www.iojes.net/userfiles/Article/IOJES_786.pdf
- Didin E. (2016). *Investigation of the Humo Styles and Interpersonal Problem Solving Skills of Adolescents Who Receive Art Education and Those Who Have Not*. (Publication Num:417244). Published Master Dissertation, Ankara University, Health Sciences Institute, Ankara, Turkey.
- Gökbuzoğlu, B. (2008). *Examining the Relationship Between Adolescents Aggression Levels and Problem Solving Skills*. (Publication Num:219948). Published Master Dissertation. Marmara University Institute of Education Sciences, İstanbul, Turkey.
- Karamehmetoğlu, M. (2017). *Investigation of the Role of Emotional Intelligence Levels of Physical Education Teachers in Determining Professional Self-Efficacy and Problem Solving Skills*. (Publication Num:469599). Published Master Dissertation. Marmara University Institute of Education Sciences, İstanbul, Turkey.
- Mercin, L. Alakuş, A.O. (2007). Necessity of Art Education for Individual and Society. *D.Ü.Ziya Gökalp Journal Of Education Faculty*, 9(-), 14-20. http://zgefdergi.com/Makaleler/1995489730_09_02_Mercin-Alakus.pdf
- Metin, M. (2014). *Reliability Levels and Attachment Styles of Nursing Students*. (Publication Num:369936). Published Master Dissertation. Haliç University, Health Sciences Institute. İstanbul, Turkey.
- Nacar F. S. (2010). *Examination of Classroom Teachers Communication and Interpersonal Problem Solving Skills*. (Publication Num:286038). Published Master Dissertation. Çukurova University, Institute Of Social Sciences, Adana, Turkey.
- Nacar, F. S. & Tümkaya S. (2011). Examining the Communication and Interpersonal Problem Solving Skills of Classroom Teachers. *Elementary Education Online*, 10(2), 493-511. <http://dergipark.ulakbim.gov.tr/ilkonline/article/view/5000037952>
- Otacıoğlu, S. G. (2008). Comparison of Music Education Students Level of Problem Solving, Selfs Confidence and Instrument Success. *Selçuk University, Ahmet Kelesoglu Journal of Educational Sciences*, 26, 143 - 154. <https://avesis.marmara.edu.tr/yayin/642742d9-d82d-40cd-8740-ffba4bf17f5b/muzik-egitimi-bolumu-ogrencilerinin-problem-cozme-ozguven-duzeyleri-ile-calgi-basilarinin-karsilastirilmasi>
- Tan, S. (2006). *Investigation of Stress Coping Styles in Adolescents in Terms of Assertiveness Level and Some Variables*. (Publication Num: 187621) Published Master Dissertation. Gazi University Institute of Educational Sciences, Ankara, Turkey
- Terzi, Ş. (2003). Interpersonal Problem Solving Skill Perceptions of Sixth Grade Students. *Gazi University Education Sciences Department, Turkish Journal of Educational Sciences*, 1(2), 0-0. <https://dergipark.org.tr/tr/download/article-file/256456>
- Topal H. (2011). *Investigation of there lationship Between Faculty of Education Students Interpersonal Problem Solving Skills and Orientations and Non-Functional Attitudes*. (Publication Num: 299907). Published Master Dissertation. Çukurova University, Institute Of Social Sciences, Adana, Turkey.

- Yılmaz E. (2015). *Police Interpersonal Problem Solving Skills, Anger and Anger Expression Styles*. (Publication Num:394824). Published Master Dissertation. Hacettepe University Institute of Education Sciences. Ankara, Turkey.
- Zengin, Ö. (2017). *Investigation of Reliability Characteristics of University Students According to Their Use of Media Tools*. (Publication Num: 451239). Published Master Dissertation. Atatürk University Institute of Education Sciences, Erzurum, Turkey.



Language Awareness and Second Language Acquisition: Is there a link?

Eda Başak HANCI-AZİZOĞLU*^a

Article Info

DOI: 10.14686/buefad.764394

Article History:

Received: 05.07.2020

Accepted: 28.09.2020

Published: 05.10.2020

Keywords:

Language Awareness,
Metalinguistic Awareness,
Process Modeling.

Article Type:

Abstract

The conceptual analysis of language awareness is being extensively investigated with varying connotations. The first objective of this research study aims to investigate the extent of the interaction between the development of language awareness and second language acquisition. As a second objective, this study hypothesizes that the conceptual definition of language awareness, in terms of being a linguistic terminology, needed further clarification, and this could be explored through categorizing data that are derived from selected published articles into common themes. Process mapping research methodology is effectively used within this linguistic study. The articles that are thematically explored within this research study are selected based on the fact that they used language awareness as a separate linguistic conceptual entity within the scope of their research. The results of this study suggests that a process modeling technique can be used to associate collected data within categories in order to show the common themes of language awareness. Even though the overall data were partly inconclusive due to lack of consistency in terminological use of the term "language awareness," this research study suggests categorical relationships in a conceptual process model and shows that language awareness has a positive impact on language acquisition process.

Dil Bilinci ve İkincil Dil Edinimi Bağlantısı

Makale Bilgisi

DOI: 10.14686/buefad.764394

Makale Geçmişi:

Geliş: 05.07.2020

Kabul: 28.09.2020

Yayın: 05.10.2020

Anahtar Kelimeler:

Dil bilinci,
Metabilimsel Farkındalık,
Süreç Modeli.

Makale Türü:

Öz

Dil bilinci süregelen bilimsel çalışmalarda sıkça irdelenmesine rağmen farklı çağrışımlarda kullanılmaktadır. Bu araştırmanın ilk hedefi, dil bilincinin gelişimi ile ikinci dil edinimi arasındaki etkileşim kapsamını incelemeyi amaçlamasıdır. İkinci amaç olarak; bu çalışma, dil bilinci kavramının dilbilimsel bir terminoloji olarak netlik kazanması gerektiği tezini savunmuştur. Dil bilinci üzerine yayımlanmış makalelerden elde edilen verilerin ortak temalara göre süreç sınıflandırılması yoluyla araştırılabileceği hipotezi savunulmuş ve ortak kavramsal temalar tespit edilmiştir. Bu dilbilimsel yayımda süreç haritalama araştırma metodu etkili bir biçimde kullanılmıştır. Bu araştırma çalışmasında; dil bilinci kavramı açısından incelenen makalelerde, dil bilinci bağımsız bir dilbilimsel kavram olarak kapsamlı irdelenmiş ve incelenmiştir. Bu çalışmanın sonuçları, dil farkındalığıyla ilişkili ortak temaları göstermek için toplanan verileri kategorilerle ilişkilendirmek için süreç modelleme tekniğinin etkili kullanılabileceğini göstermektedir. Araştırma çalışmalarında "dil farkındalığı" teriminin terminolojik kullanımındaki veriler kısmen tutarsızlık teşkil etse de; bu araştırma, kavramsal ve kategorik süreç haritalama metodu yöntemiyle dil bilincinin ikinci dil edinim sürecine olumlu etkisi olduğunu göstermiştir.

*Corresponding Author: edan201@yahoo.com

^a Dr., Indiana University of PA, <https://orcid.org/0000-0001-6937-5925>

Introduction

The function of language awareness (LA) in second language (L2) acquisition has been widely debated (Astuti, 2020; Andrews & Lin, 2017; Balyasnikova & Ufimtseva; Cenoz et al., 2017; Fairclough, 2014). Yet, researchers did not agree whether language awareness precede language development (Kennedy & Trofimovich, 2010, Leonet et al., 2020), or whether it is an integral and inseparable side of language acquisition (Jessner, 2008, Gui et al., 2020). There is no doubt that the LA is a complex term to be clarified (Francis, 2020; Garrett & Cots, 2017; Konderak, 2016), and the term often contextually stayed ambiguous due to plurality of voices. Researchers either used the term LA to state multiple linguistic concepts or referred to a wide spectrum of ideas that prevented semantic clarity. In the light of this idea, raising awareness for a second language versus gaining consciousness on second language acquisition can be perceived in two distinctive contexts. In fact, a learner can experience awareness on what s/he already knows in terms of an awakening process, whereas gaining consciousness within the second language acquisition context can refer to activities that are related to creating new knowledge (James, 1992, Weaver, 2020, Walker, 2020).

Accordingly, it is necessary to look at how some researchers referred to the term LA based on a philosophical approach that is restricted by a single academic discipline, while others preferred to use a much broader term that could mean multiple semantic entities. Berry (2005) specifically revealed that different interpretations of the same term for LA are used in both applied linguistics and in LA fields. Notably, another complexity of the term LA was also indicated in Berry (2005), Fortune (2005), and Svalberg's (2005) research studies, where they discussed how meaning of the term metalanguage differs from one study to another. Berry (2005) investigated the concept of metalanguage on the basis of the "definitions of the concept and different approaches to it, its scope and the domains in which it plays a role, related terms, its relationship to LA, as well as the variety of dimensions in which it features" (p. 3). What's more, Berry (2005) revealed that the term metalanguage does not explicitly reflect the meaning as it is used in the literature of applied linguistics. Instead, he indicated that there was a need to map out a research agenda in order to establish the essence and value of the term in applied linguistics (Berry, 2005). Thus, this study delves into the data relationships of the term LA regarding terminologies being used in applied linguistics research area in order to explore possible categorical relationships.

Statement of Research Methodology

Research studies on LA have plenty of logical evidence to support empirical relationships across shared studies on LA; however, the use of the terminology for expressing the concept of LA creates confusion to see direct thematic relationships. In this research study, the correlations between the use of these terminologies are connected for a possible process model. Furthermore, this study hypothesizes: (1) clarification is needed to relate linguistic terminology that is related to LA in order to explore the concept of LA from a more empirical perspective; (2) major significant areas that impact LA or metalinguistic awareness should be explored. In an attempt to investigate these hypotheses, this study intends to answer the following research question: In what ways does language awareness interact with second language learning? The findings of this research study may have possible social and pedagogical implications that would shed light on future studies that focuses on LA as a movement rather than a concept.

Findings

Evaluation, Synthesis and Discussion

Recent research articles that focused on LA reveals that language learners become critiques of their own learning process because of self-discovery. This self-consciousness state results in making better choices in developing language learning strategies. The terminology of LA refers to a general spectrum as indicated above. On the other hand, it should be remarked that metalinguistic awareness and LA share the same qualities as both refer to a consciousness level in all language related tasks (See Figure 1).



Figure 1. *The relationship between metalinguistic awareness and language awareness*

The question arises here with this relationship is whether there are subcategories of metalinguistic awareness or LA that a language learner experiences during a language learning process? The answer to this question is complicated because former research studies did not make a distinction because of inconclusive data. This is not to deny that Berry (2005) categorized the term metalanguage into two categories as reflexive and non-reflexive (See Figure 2).

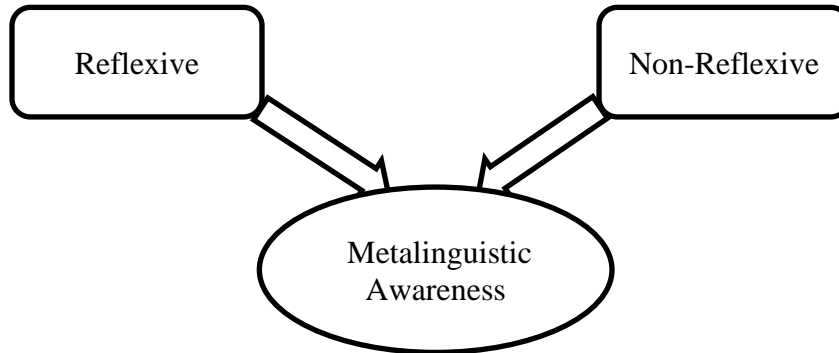


Figure 2. *The components of metalinguistic awareness*

According to his research study, reflexive metalinguistic awareness uses language itself like a tool in a reflective manner, whereas non-reflexive way of looking at language is by questioning “one language (e.g. English) as a metalanguage to describe another language (e.g. French) (p.7).” In other words, reflexive metalinguistic awareness is all about self-discovery and analysis, while non-reflexive metalinguistic awareness is using an object language to make the target language more meaningful or explicit. The latter one approaches languages systematically, and obviously attempts to improve effective learning strategies consciously. Additionally, it should be noted that the reflexive aspect of metalinguistic awareness is central to this study. Thus, the term “consciousness” that results from self-discovery at simultaneous instances gradually turns into “language awareness” or “metalinguistic awareness” over time.

Perhaps the most obvious example of this is the process of interlanguage awareness. In his research study, Fortune (2005) indicated that consciousness raising activities help learners to realize target language features by obtaining interlanguage awareness. His research study compared two former research studies using the same linguistic tool with two different sets of participants as intermediate and advanced learners. A mixed group of advanced English learners (Italian, Arabic, Spanish, Korean, Japanese, and Georgian) were involved in dictogloss activities. Then, the students took notes while a short text was read aloud to them twice at a normal speed in the target language. Next, pairs of students wrote grammatically accurate texts within the same context by avoiding the use of the same syntactic forms or lexical items. Fortune (2005) stated that: “The examination of transcripts of learner interactions provided evidence that metalanguage can play a facilitative role in focusing attention and deciding on which form to use” (p.21). To put it simply, metalanguage occurs when the learner focuses on which forms is accurate among many other alternatives because of a language learner’s conscious awareness state (See Figure 3). By this definition, the question arises here is whether language learners can self-correct their own linguistic errors by activating their metalanguage?

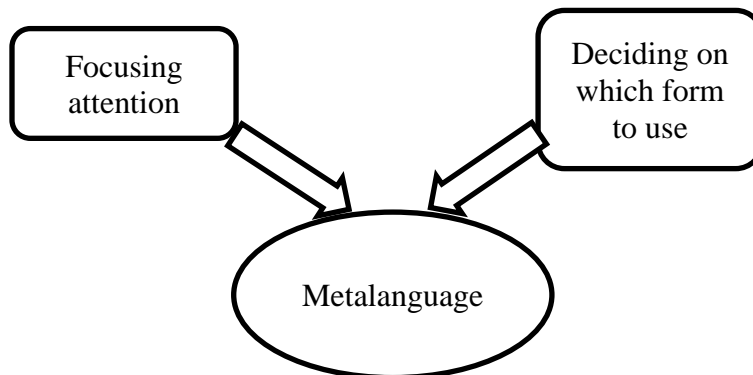


Figure 3. *Metalanguage: A language learner’s conscious awareness state*

Bouffard and Sarkar (2008) investigated whether young children are capable of correcting their own errors by gaining LA. Language tasks used in this research study were specifically designed for improving LA. Through communication on error correction, repair and self-analysis, students were expected to correct their non-target like utterances in classroom based activities. It was specified in this research study that learners used purposeful learning strategies to figure out how target language worked, and they developed an understanding for their first language transfer errors. The results of this research study pointed out that even young children are capable of noticing and correcting their errors as a result of gaining LA. This finding maps out that metalinguistic awareness can be both fostered and achieved through effective communication on error correction within the wider intellectual and pedagogical context of metalinguistic awareness regardless of the learners' maturity level (See Figure 4)

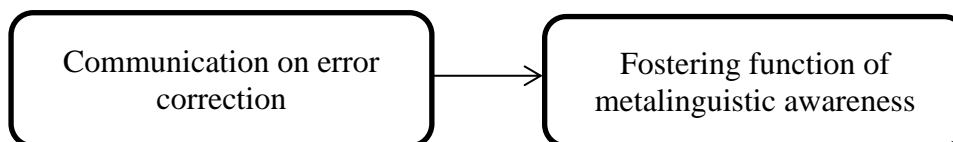


Figure 4. *Fostering function of metalinguistic awareness*

In another research study that also focused on error correction, Lasagabaster and Sierra (2005) stated that error correction has been debated for so long, and there has been a controversy among researchers on how to correct errors and what possible outcomes error correction is entitled to. Their research study investigated whether students use their prior learning strategies as a result of effective error corrections in a classroom environment. The results of their research study indicated that simply correcting students' errors had no positive impact on students' learning. On the other hand, this research reflected that communication between students and teachers about error corrections made teachers realize what sort of pedagogical implications in error correction techniques were useful in fostering students' metalinguistic awareness (See Figure 5).



Figure 5. *The effect of language awareness on error correction*

Specifically, it was stated in Lasagabaster and Sierra's (2005) research study that the most efficient forms of error correction took place when expanded time and longer explanation were devoted to constructing metalinguistic awareness. This finding draws the attention to the fact that questions whether error correction strategies by activating LA are also effective on oral language skills?

Yiakoumetti et al. (2005) researched whether explicit knowledge sourced by LA had an influence on students' linguistic performance and language attitudes. The focus was on bidialectal students' adaptation to Standard Greek by reducing the Cypriot dialectical interferences. A language learning program was developed to use LA as a learning strategy. The results of this study showed that LA improved students' language attitudes by enhancing their linguistic production in the standard language. As a result, their oral production of standard variety improved, and Cypriot dialectical interferences were reduced in ways that led to improvement in the target variety of this language (See Figure 6).

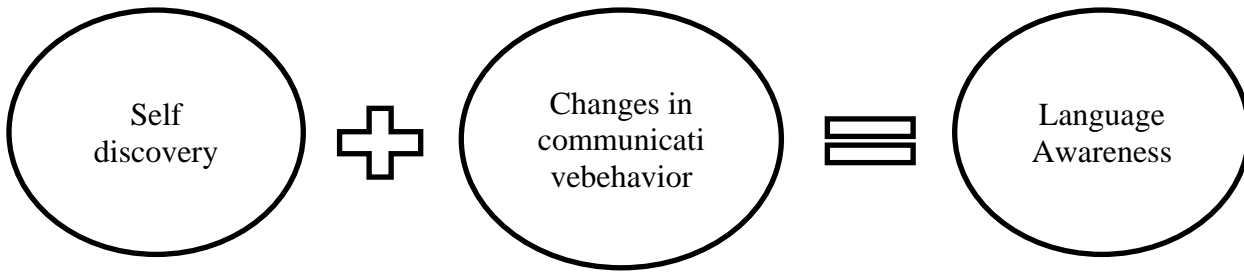


Figure 6. *The components of language awareness*

In a similar research study, Kennedy and Trofimovich (2010) explored the interaction between L2 learners' LA and the quality of their L2 pronunciation in terms of accentedness, comprehensibility and fluency. The participants were involved in a language program where suprasegmental aspects of pronunciation were the focus of instruction for thirteen weeks, and dialogue journal entries were used as an indicator of self-expression. The analysis of students' pronunciation revealed that language learning, as a meaningful context, resulted in better pronunciation skills that were closely related to LA. Accordingly, Verdugo (2006) investigated the relationship between intonation of a foreign language and the impact of LA on perceptive and productive processes of Spanish-native language learners. The researcher considered the complexity of the notion awareness when it comes to pronunciation as prosodic features of a target language, and such a detection of quality needed thorough examination. In Verdugo's (2006) research study, a computer assisted methodology was used to determine learners' awareness of speech through form and meaning. In addition to this strategy, this research study also focused on the extent of prosodic features when controlled by spontaneous utterances. Both a pretest and a posttest were used to analyze two different groups of learners. The utterances of the participants were analyzed by four native English speakers. The results of these tests revealed that participants in the experiment group experienced improvement in prosodic performance in addition to gaining intonation awareness. Above mentioned research studies suggest that LA improves awareness for improving pronunciation skills of L2 learners (See Figure 7). Does it also affect L2 learners' writing skills?

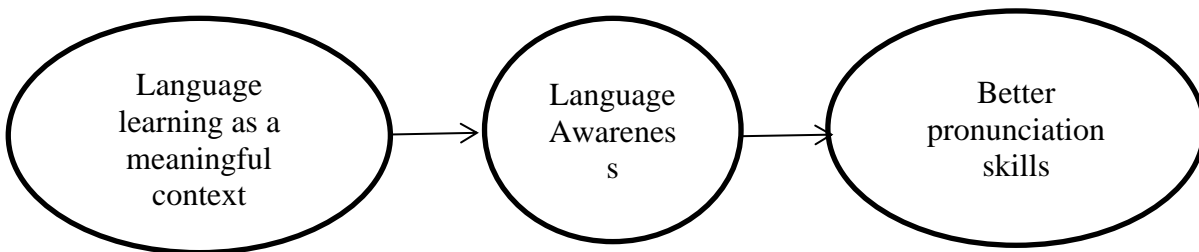


Figure 7. *The process relationship of language awareness and pronunciation*

Hebe & Storey (2006) explored the relationship between writing and writing performance improvement among 36 English as second language (ESL) students during a three month university writing program. The impact of LA was in question in their research study considering the difference between declarative knowledge and procedural knowledge construction. The participants kept reflective journals that focused on strategies to implement effective writing in short paragraphs and complete essays. At the end of the study, it was pointed out that high proficiency students performed better in their writing tasks as well as demonstrating greater awareness. The overall results of their research study showed that gaining LA resulted in enhanced writing performance in L2. In addition to Hebe & Storey's (2006) research study, Basetti (2005) also examined whether LA had impact on L2 learners' writing performance. But, Basetti (2005) had a different approach and hypothesized that L2 writers are competent in two different writing systems as a result of LA. In fact, Basetti (2005) claimed that L2 learners not only use their first language as a writing system, but they also use a target language's writing system. This research study is peculiar regarding native and target language as discrete units of different linguistic systems. It was stated in Basetti's (2005) research study that L2 writers gradually develop awareness that monolinguals are lacking because L2 writers acquire awareness by having the chance to compare and contrast two different linguistic systems. Since monolinguals do not experience to write in another writing system, they never have the chance to realize these linguistic units as part of their native language writing system. Basetti (2005) investigated these research questions: "Do English learners of

Chinese as a Foreign Language (CFL) apply their word awareness to identifying words in Chinese? Do they have a different concept of the Chinese word compared with Chinese natives?" (Basetti, 2005, pp.340). The participants were tested for their perception of word awareness in both their first and second languages. The results of this research study showed that the participants used their native language to obtain awareness in the target language's writing system. In conclusion, LA in a target language brings along proficiency in two different writing systems and results in enhanced writing performance (See Figure 8). Since performing in two different writing systems require cultural awareness, does LA have any influence on cultural issues?

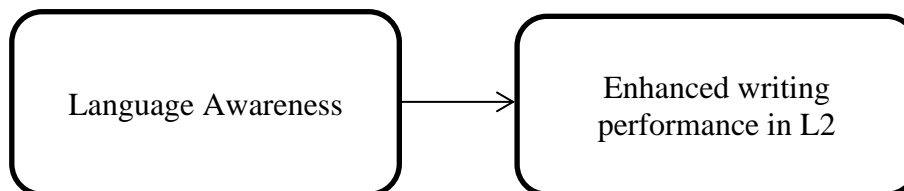


Figure 8. *Language awareness on writing performance*

In a research study conducted by Zapata (2005), the participants of 17 intermediate L2 Spanish students were required to complete a series of language tasks. The purpose was to improve students' cultural awareness towards target culture. Using LA as a classroom technique and providing learning opportunities for these students to gain a critical perspective helped students to compare their home culture to the target culture. The results of this study indicated that using LA as a classroom technique enhances students' understanding of the target culture. Similarly, based on Johnson and Nelson's (2010) research study, critical consciousness and transformation are two important indicators in a foreign language classroom with adult learners. Their research study arises the question whether adult learners obtain a perspective of transformation after studying a foreign language even if they did not become proficient in the target language. The result of these studies indicated that participants had an increased awareness of their cultural identity and diversity, and they became aware of ethnocentricity after taking a foreign language class regardless of their improvement (See Figure 9).

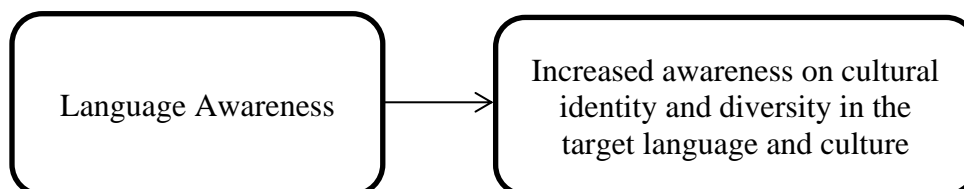


Figure 9. *The impact of language awareness on culture*

Sicola (2005) investigated LA from another interesting cultural perspective. Her study focused on how LA affected communicative behavior in first language (L1) unlike many researchers investigated L1 interference. This small scale study represented how participants interacted in their native culture and whether their communicative styles were influenced by exposure to a target culture. The results of this study demonstrated that LA functioned as an instrument that represented self-discovery about changes occurring in communicative behaviors. Thus, activating consciousness about communicative behaviors after being exposed to a target culture highlighted the issue of a reverse culture shock by suggesting pedagogical implications (See Figure 10). Consequently, the question arises here is: What other possible effects does LA have on cultural issues?

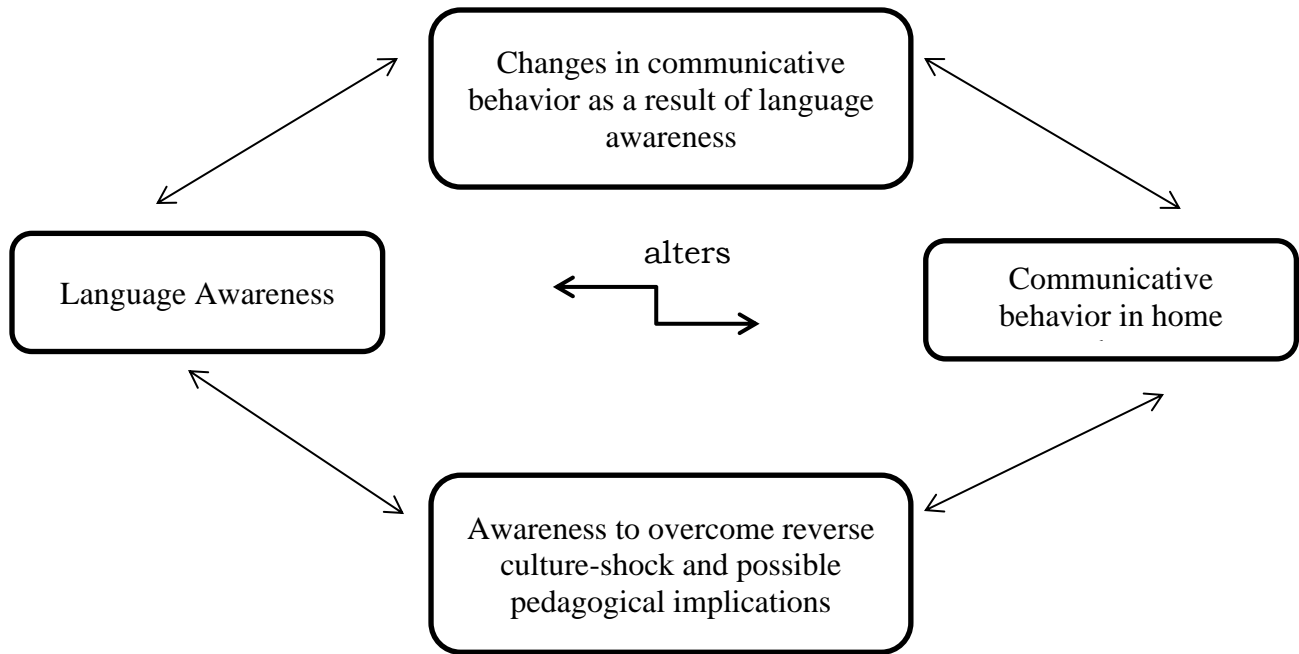


Figure 10. *The cycle of language awareness towards cultural modification*

Marr (2005) described “language shock” as an important part of culture shock and investigated whether there was a way to gain sociolinguistic awareness about language in a target culture. The data derived from participants’ questionnaires in Marr’s research study (2005) suggested that building sociolinguistic awareness takes time; however, there can be pedagogical implementations to prevent language and culture shock by creating a friendlier learning environment. Additionally, this research study also suggested that preparing students on what to expect from the target culture occurs as a result of LA. Therefore, the growth of language awareness not only closely tied to other aspects such as language shock that is nested within a culture shock, but language awareness could also lead to a wider transformation at a sociological level (See Figure 11).

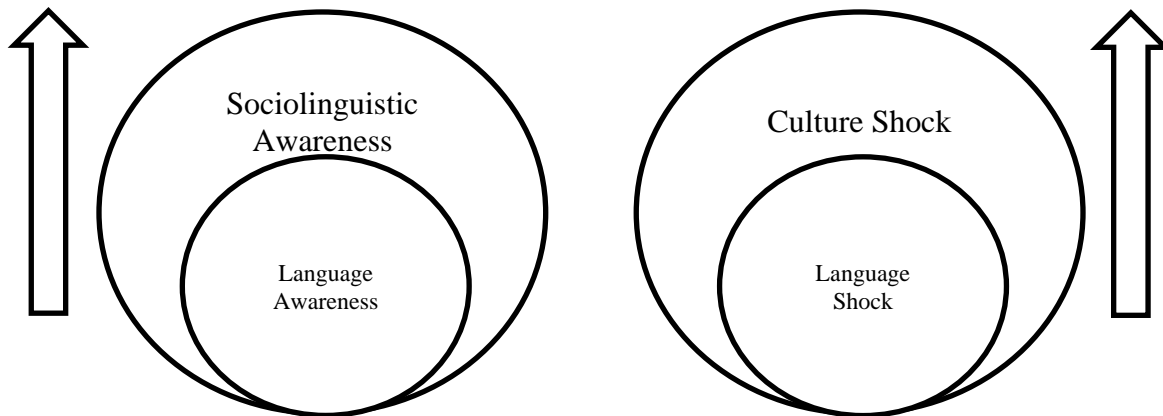


Figure 11. *The complex growth of language awareness after a culture shock*

Accordingly, Zhou (2009) showed the importance of having LA when there is an unrealistic expectation from a language program. Failure to fulfill unrealistic expectations can result in disappointment on behalf of language learners, and in fact will result in failure for future success. In Zhou’s (2009) research study, the participants were asked to describe their learning goals in detail before they start a particular language program for two years. Even though learners had the motivation, they did not have a sense to develop strategies to improve their L2. The results

of this study suggested that teachers should think of strategies to raise LA for achievable and unachievable goals. In addition, teachers should guide their students so that they would be able to realize weaknesses in their language learning process, and they should choose context based activities to achieve their learning goals. Thus, the degree of purposeful and positive learning goals bring along language awareness related success (See Figure 12). Another interesting question comes to mind here is: “Is there a way to measure the extent of LA during second language acquisition?”

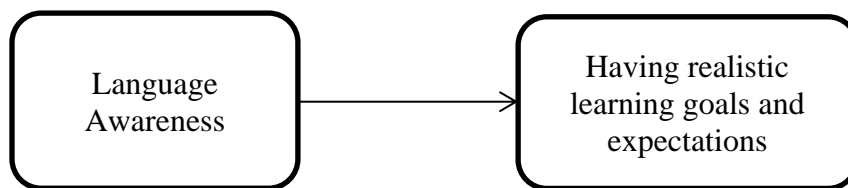


Figure 12. *The purpose of language awareness*

Ammar et al. (2010) investigated the extent of awareness of L2 learners’ question formation ability and how this awareness interacted with their L2 performance. A grammaticality judgment test was applied, and interviews were conducted. The results indicated that most of the students were unaware of the differences in their L1 (French) and L2 (English). On the other hand, a positive correlation was supported the evidence that students’ awareness of L1/L2 question formation increased their ability to judge form questions of both yes/no and Wh- in English as a result of activating their metalinguistic awareness. The following questions were investigated in this study:

- (1) What evidence is there of French L1 influence on students’ ability to judge and to form questions in L2 English?
- (2) Are students aware of differences between the formation of English and French questions?
- (3) What is the relationship between learners’ awareness of L1/L2 differences and their success in judging or constructing L2 English questions? (Ammar, Lightbown, & Spada, 2010, pp. 133).

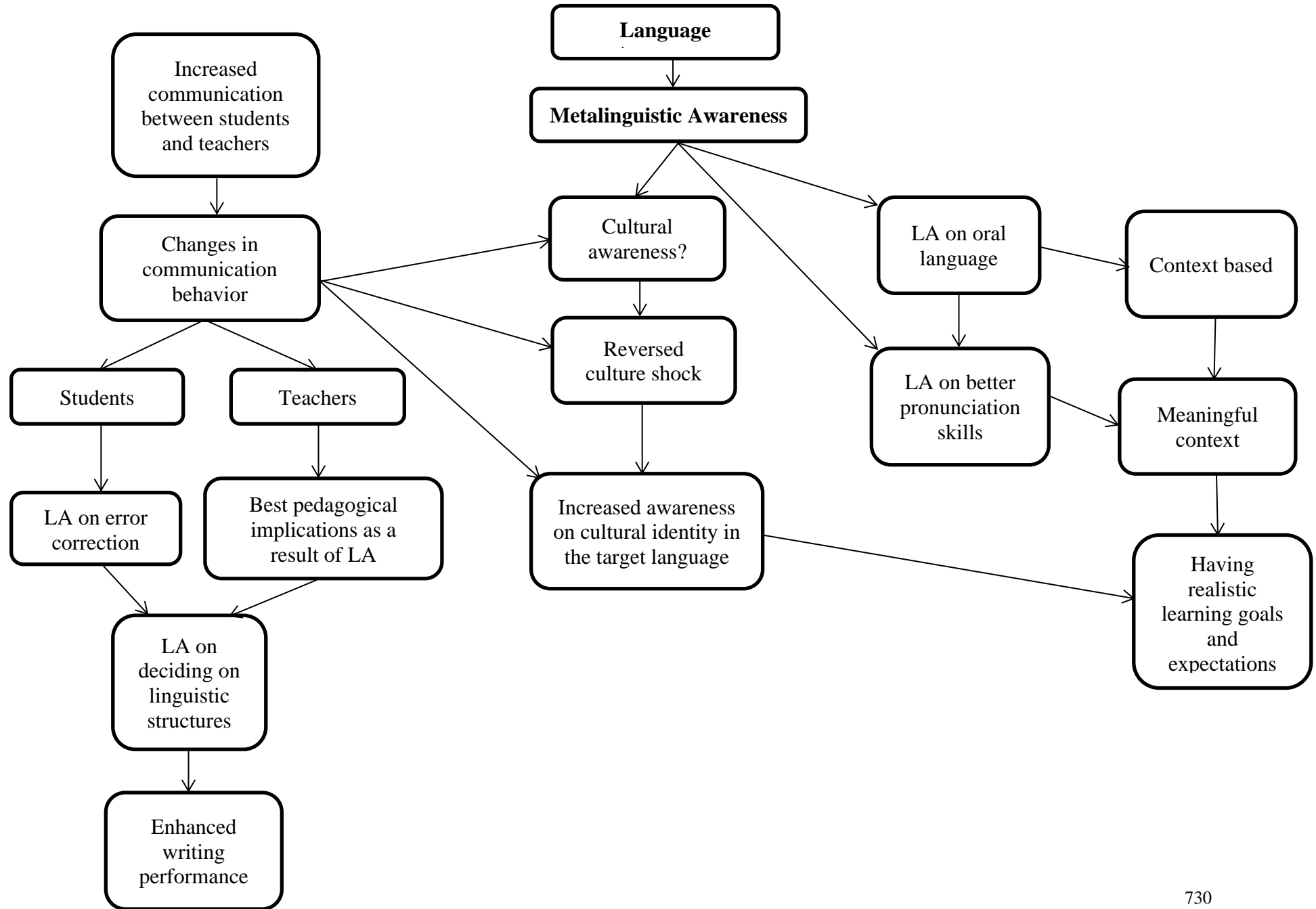
Ammar et al. (2010) referred to two indicators that facilitated both L2 acquisition and performance. According to Ammar et al. (2010) students should be aware of the differences between L1 and L2 linguistic features noting that there is neither a need nor a possibility to cover all grammatical differences of this sort. Ammar et al. (2010) also indicated that continuous and explicit instruction would help students to become automatized after gaining LA. Consequently, meaningful classroom practices should be in place in order to lead self-discovery and success in language classrooms to increase the level of LA.

Statement of Conclusion

This research study attempted to answer whether language awareness (LA) interact with second language (L2) learning or not. Each research study that was conceptually explored in this research study investigated the concept of LA in an attempt to clarify in what contexts LA interacts with L2 acquisition. It should be noted that the concept of “metalinguistic awareness” was treated as the linguistically equivalent of the concept “language awareness.” The published articles that referred to LA as part of a linguistic terminology was specifically chosen to detect commonalities as well as contrasting qualities in order to answer the research questions of this present research study. Even though the overall data were inconclusive due to lack of consistency in terminological use of the term LA, the following categorical relationships (See Figure 13) were found after each related linguistic category was associated to the concept of LA.

- LA is widely used as the equivalent version of metalinguistic awareness (Bastian et al., 2017).
- Increased level of communication that occurs as a result of LA help students with error correction, and helps teachers to choose the best pedagogical implications for their students (Amjadiparvar & Zarrin, 2019; Lasagabaster & Sierra, 2005; Yiakoumetti et al., 2005; Sicola, 2005).
- The cultural implication of LA reverses culture shock, and increases awareness on cultural identity in the target language (Zapata, 2005; Johnson & Nelson, 2010, Sicola, 2005; Marr, 2005).
- LA has a positive impact on oral language skills (Derwing, 2017; Kotarcic & Swiggers, 2020), and results in better pronunciation skills (Kennedy & Trofimovich, 2010; Verdugo, 2006).

- LA creates consciousness on deciding which forms to use instead of others and enhances language learners' writing performance (Basetti, 2005; Fortune, 2005; Bouffard & Sarkar, 2008; Lasagabaster & Sierra, 2005).
- LA transforms language acquisition process into a context-based language environment where learners have realistic learning goals and expectations (Ammar et al., 2010; Oliveira, A. L., & Ançã)



References

- Amjadiparvar, A., & Zarrin, G. (2019). The relationship between EFL learners' level of language awareness and their motivation and achievement. *The Journal of Language Learning and Teaching*, 9(2), 37-48.
- Ammar, A., Lightbown, P. & Spada, N. (2010). Awareness of L1/L2 differences: Does it matter? *Language Awareness*, 19(2), 129-146.
- Andrews, S., & Lin, A. M. (2017). Language awareness and teacher development. In P. Garrett & J. M. Cots (Eds.), *The Routledge handbook of language awareness* (pp. 57-74). Routledge.
- Astuti, C. W. (2020). Language awareness: Language use and reasons for code-switching. *LLT Journal: A Journal on Language and Language Teaching*, 23(1), 116-130.
- Balyasnikova, O. V., & Ufimtseva, N. V. (2020). XXX "Conflictogenic zones" of language consciousness in intercultural communication. *Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Seriiã 2, Æazykoznanie*, 19(1), 28.
- Basetti, B. (2005). Effects of writing systems on second language awareness: Word awareness in English learners of Chinese as a foreign language. In V. Cook & B. Basetti (Eds.), *Second language writing systems* (pp. 335-356). Retrieved from <http://eprints.bbk.ac.uk/530/1/basetti.pdf>
- Bastian, M., Lérique, S., Adam, V., Franklin, M. S., Schooler, J. W., & Sackur, J. (2017). Language facilitates introspection: Verbal mind-wandering has privileged access to consciousness. *Consciousness and Cognition*, 49, 86-97.
- Berry, R. (2005). Making the most of metalanguage. *Language Awareness*, 15(1), 3-20.
- Bouffard, L. A., & Sarkar, M. (2008). Training 8-year-old French immersion students in metalinguistic analysis: an innovation in form-focused pedagogy. *Language Awareness*, 17(1), 3-24.
- Cenoz, J., Gorter, D., & May, S. (Eds.). (2017). *Language awareness and multilingualism*. Cham, Switzerland: Springer.
- Derwing, T. M. (2017). The role of phonological awareness in language learning. In P. Garrett & J. M. Cots (Eds.), *The Routledge handbook of language awareness* (pp. 339-353). Routledge.
- Fairclough, N. (2014). *Critical language awareness*. Routledge.
- Fortune, A. (2005). Learners' use of metalanguage in collaborative form-focused L2 output tasks. *Language Awareness*, 14(1), 21-38.
- Francis, N. (2020). Literacy and the language awareness hypothesis. *Writing Systems Research*, 11(2), 1-12.
- Garrett, P., & Cots, J. M. (Eds.). (2017). *The Routledge handbook of language awareness*. Routledge.
- Gui, P., Jiang, Y., Zang, D., Qi, Z., Tan, J., Tanigawa, H., Jiang, J., Wen, Y., Xu, L., Zhao, J., Mao, Y., Poo, M. M., Ding, N., Dehaene, S., Wu, X., & Wang, L. (2020). Assessing the depth of language processing in patients with disorders of consciousness. *Nature neuroscience*, 23(6), 761-770.
- Hebe, W. M., & Storey, P. (2006). Knowing and doing in the ESL writing class. *Language Awareness*, 15(4), 283-300.
- James, C. (1992). *Awareness, consciousness and language contrast*. In C. Mair and M. Markus (Eds.), *New departures in contrastive linguistics*. Innsbrucker Beiträge zur Kulturwissenschaft (pp.183-98).

- Jessner, U. (2008). A DST model of multilingualism and the role of metalinguistic awareness. *Modern Language Journal*, 92(2), 270–283.
- Johnson, S. M., & Nelson, B. M. (2010). Above and beyond the syllabus: transformation in an adult, foreign language classroom. *Language Awareness*, 19(1), 35-50.
- Kennedy, S., & Trofimovich, P. (2010). Language awareness and second language pronunciation: a classroom study. *Language Awareness*, 19(3), 171-185.
- Konderak, P. (2016). Between language and consciousness: Linguistic qualia, awareness, and cognitive models. *Studies in Logic, Grammar and Rhetoric*, 48(1), 285-302.
- Kotarcic, Ana, & Swiggers, Pierre. (2020, January). *Language and language consciousness in Aristotle*. [Presentation]. In XXXI. Internationales Kolloquium des SGdS: Sprache und Sprachbewusstsein in der Geschichte der Sprachwissenschaft, Europa-Universität, Flensburg, Germany.
- Lasagabaster D., & Sierra, J. M. (2005). Error correction: students' versus teachers' perceptions. *Language Awareness*, 14(2/3), 112-127.
- Leonet, O., Cenoz, J., & Gorter, D. (2020). Developing morphological awareness across languages: translanguaging pedagogies in third language acquisition. *Language Awareness*, 29(1), 41-59.
- Marr, T. (2005). Language and the capital: a case study of English 'language shock' among Chinese students in London. *Language Awareness*, 14(4), 239-253.
- Oliveira, A. L., & Ançã, M. H. (2009). 'I speak five languages': fostering plurilingual competence through language awareness. *Language Awareness*, 18(3-4), 403-421.
- Sicola, L. (2005). Communicative lingerings: Exploring awareness of L2 influence on L1 American expatriates after re-entry. *Language Awareness*, 14(2/3), 153-169.
- Svalberg, A. (2005). Consciousness-raising activities in some Lebanese English language classrooms: Teacher perceptions and learner engagement. *Language Awareness*, 14(2/3), 170-190.
- Verdugo, D. R. (2006). A study of intonation awareness and learning in non-native speakers of English. *Language Awareness*, 15(3), 141-159.
- Walker, C. (2020). 'To know Is to love?': Language awareness and language attitudes in a Barbadian classroom. In J. Jules & K. L. Belgrave (Eds.), *Transformative Pedagogical Perspectives on Home Language Use in Classrooms* (pp. 66-84). IGI Global.
- Weaver, M. M. (2020). *Critical Language Awareness Pedagogy in First-Year Composition: A Design-Based Research Study* [Unpublished doctoral dissertation]. Old Dominion University.
- Yiakoumetti, A., Evans, M., & Esch, E. (2005). Language awareness in a bidialectal setting: the oral performance and language attitudes of urban and rural students in Cyprus. *Language Awareness*, 14(4), 254-260.
- Zapata, G. C. (2005). Literature in L2 Spanish classes: an examination of focus-on-cultural understanding. *Language Awareness*, 14(4), 261-273.
- Zhou, A. A. (2009). What adult ESL learners say about improving grammar and vocabulary in their writing for academic purposes. *Language Awareness*, 18(1).