NESİBE AYDIN EĞİTİM KURUMLARI EĞİTİM VE GELECEK DERGİSİ

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Nesibe Aydın Eğitim Kurumları tarafından hazırlanan *Eğitim ve Gelecek Dergisi*'nin yirmi beşinci sayısı yayımlandı. Dergimizin yirmi beşinci sayısında yer alan çalışmaları siz değerli okurlarımıza sunuyoruz.

Esila Samur ve Sema Altun Yalçın tarafından hazırlanan *"Montessori Yaklaşımı Temelli Stem Etkinliklerinin Okul Öncesi Öğrencilerinin Akademik Benlik Saygıları Üzerine Etkisi"* başlıklı çalışmada nitel ve nicel verilerin bir arada kullanıldığı yöntemlerden biri olan karma yöntem kullanılmıştır. Araştırma örneklemini ana okulunda eğitim-öğretim gören 63 okul öncesi öğrencisi oluşturmaktadır. Araştırmada elde edilen bulgulara göre, akademik benlik saygısı ölçeği ön-son test puanları arasında anlamlı bir farklılık gösterdiği belirlenmiştir. Ayrıca uygulanan Montessori yaklaşımı temeli STEM etkinliklerinin okul öncesi öğrencilerinin; sosyal ve duygusal gelişimi, bilişsel gelişimi, motor gelişimi, dil gelişimi ve özbakım becerileri üzerinde pozitif yönde gelişimler gösterildiği tespit edilmiştir.

Ebru Ocakçı ve Osman Samancı tarafından hazırlanan *"İlkokul Öğrencileri için "Sosyal Bilgiler Dersine Katılım Ölçeği"nin Geliştirilmesi"* başlıklı çalışmada, katılımın Sosyal Bilgiler dersi için kritik bir öneme sahip olmasına rağmen alanyazında Sosyal Bilgiler özelinde geliştirilen bir katılım ölçeğine rastlanmadığı belirtilmiş ve toplam 730 ilkokul 4. sınıf öğrencisiyle çalışılmıştır. Yapılan analizlerin sonunda 12 madde ve 2 alt boyuttan oluşan güvenilir ve geçerli bir ölçme aracı elde edilmiştir.

Hasan Gökçe, Zeliha Gökçe, Oktay Bektaş ve Aslı Saylan Kırmızıgül tarafından hazırlanan *"Ortaokul Öğrencilerinin Robotik Kodlama Algıları"* başlıklı çalışmada, nitel araştırma yönteminin durum çalışması deseni kullanılmıştır. Araştırma Kayseri ilinin bir ilçesinde öğrenim görmekte olan 76 ortaokul öğrencisi ile yürütülmüştür. Veri toplama aracı olarak dokuz adet açık uçlu sorudan oluşan anket kullanılmıştır. Araştırmanın sonunda; öğrencilerin robot kavramını teknoloji ile ilişkilendirdiği, öğrencilerin daha önce bir robotla karşılaşmadıkları, bir robot tasarlamak istedikleri, kodlama kavramını ise komut verme olarak ifade ettikleri ve kodlama eğitimi almak istedikleri belirlenmiştir.

Hilal Çalışır ve Nermin Karabacak tarafından hazırlanan *"Acil Çevrimiçi Öğretim ve COVID-19: Öğretmenlerin Bilgisayar Teknolojilerini Kullanımı ve Entegrasyonu"* başlıklı çalışmada betimsel tarama modeli kullanılmıştır. Araştırmanın çalışma grubunu Rize ilindeki Millî Eğitim Bakanlığına bağlı resmi ilkokullarda çalışan 464 sınıf öğretmeni oluşturmaktadır. Elde edilen verilere göre; öğretmenlerin teknolojiyi kullanma düzeylerinin kıdeme göre farklılaşmamasına karşın teknolojiyi derslerine entegre edebilmede düzeylerin farklılaştığı, öğretmenlerin bilişim teknolojilerini kullanma ve derslerine entegre edebilme düzeylerinin, teknolojiyle ilgili hizmet içi eğitim alma ve öğrenim durumuna göre farklılaşmadığı sonucuna ulaşılmıştır.

Musab Çağın, Sezen Çimen Polat, Özlem Orhan, Ebru Çetin, Mekki Abdioğlu, İmdat Yarım ve Halil İbrahim Cicioğlu tarafından hazırlanan *"ÇAĞIN El ve Ayak Reaksiyon Testleri Protokolünün Güvenirlik ve Geçerlilik Çalışması"* başlıklı çalışmaya, aktif olarak futbol oynayan 18 yaş altı 60 ve 18 yaş üstü 60 olmak üzere toplam 120 sporcu katılmıştır. Araştırmaya katılan sporculara ÇAĞIN El ve Ayak Reaksiyon Testleri 2 hafta arayla FitLight Trainer ve BlazePod cihazları kullanılarak 3 kez uygulanmıştır. Yapılan analizlerin sonunda ÇAĞIN El ve Ayak Reaksiyon Testlerinin geçerlilik ve güvenirliliğinin çok yüksek (r= 0,70-0,90) olduğu tespit edilmiştir.

Sonat Başpınar ve Ajda Şenol Sakin tarafından hazırlanan *"Sınıf Ortamında Nitelikli Çalgı Eğitimi: Öğretmen ve Akademisyen Bakış Açıları"* başlıklı çalışmada genel eğitim kapsamında gerçekleştirilen müzik derslerinde nitelikli çalgı eğitimi verilebilmesi için gereklilikler ve nitelikli çalgı eğitiminin göstergeleri belirlenmeye çalışılmıştır. Nitel araştırma yöntemlerinden fenomenolojik yaklaşımın benimsendiği bu araştırmada çalışma grubu genel müzik eğitiminde görev yapan müzik öğretmenleri ve üniversitelerde öğretmenlik uygulaması derslerinde aktif görev alan akademisyenlerden oluşmuştur. Elde edilen bulgular ışığında müzik öğretmeni ve akademisyenlerin sınıf ortamında nitelikli çalgı eğitiminin gerçekleşebilmesi için uygun ortam, yeterli ders saati, gerekli çalgıların sağlanması, doğru bir yöntemin uygulanması ve çalınan eserlerin konser, dinleti vb. etkinliklerle bireysel ya da grup olarak paylaşılması gerektiğini düşündükleri sonucuna ulaşılmıştır.

Gülnihal Gül ve Gizem Arıcı tarafından hazırlanan *"Koro Çalışmalarının Göçmen Öğrencilerin Entegrasyon Sürecine Katkısı"* başlıklı çalışmada nitel araştırma yöntemlerinden eylem araştırması deseni ve örneklem grubu olarak amaçlı örneklem türlerinden benzeşik (homojen) örnekleme yöntemi kullanılmıştır. Çalışma grubuna açık uçlu 12 sorudan oluşan görüşme formu ve üç soruluk kişisel bilgi formu uygulanmıştır. Görüşmeler sonucunda elde edilen verilerin çözümlenmesinde içerik analizi tekniğinden yararlanılmıştır. Bu çalışmadan elde edilen bulgular doğrultusunda okullarda gerçekleştirilen koro çalışmalarının göçmen öğrencilerin aidiyet duygularına ve bulundukları sosyal çevrede kabul görmelerine katkı sağladığı tespit edilmiştir. Ayrıca okullarda gerçekleştirilen koro çalışmalarının öğrencilerde özgüveni, kişisel ve ruhsal gelişimi destekleyen olumlu duygular yarattığı belirlenmiştir.

Eğitim ve Gelecek Dergisi olarak gösterdiğiniz ilgi ve değerli katkılarınız için teşekkür ediyorum.

Gelecek sayıda buluşmak üzere…

Prof. Dr. Erten GÖKÇE

Eğitim ve Gelecek Dergisi Baş Editörü

Editorial

The twenty fifth issue of *Journal of Education and Future* prepared by Nesibe Aydın Education Institutions is published. We present the studies in the twenty fifth issue of JEF to our valuable readers.

In the article titled *"The Effect of Montessori Approach-Based Stem Activities on the Academic Self-Respect of Preschool Students"*, which is prepared by **Esila Samur and Sema Altun Yalçın**, the mixed method, which is one of the methods in qualitative and quantitative data are used together. The participants consisted of 63 preschool pupils studying in kindergarten. It was determined that there was a significant difference between the pre-and post-test scores of the academic self-esteem scale. According to the data obtained, the Montessori approach was based on the STEM activities of the preschool pupils; data analysis revealed that there were positive developments in social and emotional development, cognitive development, motor development, language development and self-care skills.

In the article titled *"Development of the "Social Studies Course Engagement Scale" for Elementary School Students"*, which is prepared by **Ebru Ocakçı and Osman Samancı**, it is pointed that despite the critical importance of the engagement for the social studies course, no engagement scales developed specifically for the social studies course were found in the literature. A total of 730 4th grade elementary school students were included in the development of the scale. In the end of the analyses a reliable and valid measurement tool consisting of 12 items and 2 sub-dimensions was created.

In the article titled *"Robotic Coding Perceptions of Middle School Students"*, which is prepared by **Hasan Gökçe, Zeliha Gökçe, Oktay Bektaş and Aslı Saylan Kırmızıgül**, the case study design of the qualitative research method was used. The research was carried out with 76 middle school students studying in a district of Kayseri province. A questionnaire consisting of nine open-ended questions was used as a data collection tool. The research concluded that the students associated the concept of the robot with technology, the students had never encountered a robot before, they wanted to design a robot, the concept of coding was expressed as giving commands, and they wanted to receive coding training.

In the article titled *"Emergency Online Teaching and COVID-19: Teachers' Use and Integration of Computer Technologies"*, which is prepared by **Hilal Çalışır and Nermin Karabacak**, a descriptive survey model was used. The study group for the research comprised 464 class teachers employed in official primary schools linked to the Ministry of National Education in Rize province. According to the results, it is determined that the use of computer technology by teachers and levels of ability to integrate into lessons did not differ according to receiving in-service training related to technology and educational status. Teachers' use of technology and levels of ability to integrate into lessons differed according to the hours of lessons given using technology.

A total of 120 players, 60 under the age of 18 and 60 over the age of 18 who were actively playing soccer, participated in the article titled *"Development of the "Reliability and Validity of ÇAĞIN Hand and Foot Reaction Tests Protocol"*, which is prepared by **Musab Çağın, Sezen Çimen Polat, Özlem Orhan, Ebru Çetin, Mekki Abdioğlu, İmdat Yarım and Halil İrahim Cicioğlu**. ÇAĞIN Hand and Foot Reaction Tests were applied to the athletes participating in the study 3 times with 2-week intervals using FitLight Trainer and BlazePod devices. In the light of the findings, it was determined that the validity and reliability of ÇAĞIN Hand and Foot Reaction Tests were very high (r= 0.70-0.90).

The article titled *"Quality Instrumental Education in Classroom Environment: Perspectives of Teachers and Academicians"*, which is prepared by **Sonat Başpınar and Ajda Şenol Sakin**, attempted to identify the requirements and indicators of quality instrument education to provide quality instrument training in music lessons offered within the scope of general education. In this study, in which the phenomenological approach, one of the qualitative research methods, was adopted, the study group was composed of music teachers working in general music education and academicians who took an active role in teaching practice courses at universities. In the light of the findings obtained in the present study, it was concluded that music teachers and academicians believe that for quality instrument education to take place in the classroom environment, an appropriate environment, sufficient lesson hours, and essential instruments should be provided, the correct methodology should be applied.

In the article titled *"Contribution of Choir Practices to the Integration Process of Immigrant Students"*, which is prepared by **Gülnihal Gül and Gizem Arıcı**, action research, one of the qualitative research methods, was used as the research design and homogeneous sampling method. It is one of the purposeful sampling types, as the sample group. A questionnaire form consisting of 12 open-ended questions and a demographic information form with three questions were applied to the study group. Content analysis was used to analyze the interviewdata. In line with the findings obtained in this study, it was found that the choir practices implemented in schools contributed to the sense of belonging of immigrant students and their recognition in their social environment. The choir practices generated positive emotions that supported students' self-confidence, personal and spiritual development.

Thanks for your interest and valuable contributions for *Journal of Education and Future*.

Look forward to meeting in the next issue…

Prof. Dr. Erten GÖKÇE
Editor in Chief of
Journal of Education and Future

The Effect of Montessori Approach-Based Stem Activities on the Academic Self-Respect of Preschool Students[*]

Esila Samur[**]   **Sema Altun Yalçın[***]**

Abstract

This research aims to explore the effect of Montessori approach-based STEM activities on preschool pupils' academic self-esteem. The mixed method, which is one of the methods in qualitative and quantitative data are used together in the research. The participants consisted of 63 preschool pupils studying in kindergarten. In the research, the analysis of quantitative data was obtained by statistical methods, and the analysis of qualitative data was obtained by content analysis. As a result of the findings obtained at the end of the research, it was determined that there was a significant difference between the pre-and post-test scores of the academic self-esteem scale. According to the data obtained from the development observation form, the Montessori approach was based on the STEM activities of the preschool pupils; data analysis revealed that there were positive developments in social and emotional development, cognitive development, motor development, language development and self-care skills. According to analysis of the semi-structured teacher interview, the preschool pupils in the study have improved problem solving skills; they can use the desired material with the desired feature and quality, and they act in a more balanced and coordinated manner. Their communication with their peers has also improved, they can remember previous information by focusing their attention, and their psychomotor skills have increased.

Keywords: Academic self-respect, Montessori approach, preschool student, Stem training.

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[**] *Corresponding Author:* PhD Student, Erzincan Binali Yıldırım University, Faculty of Education, Department of Science Teaching, Erzincan, Turkey. E-mail: esilasummer24@gmail.com, https://orcid.org/ 0000-0002-2927-318X.
[***] Prof. Dr., Erzincan Binali Yıldırım University, Faculty of Education, Department of Science Teaching, Erzincan, Turkey. E-mail: sayalcin@erzincan.edu.tr, https://orcid.org/ 0000-0001-6349-2231.

Montessori Yaklaşımı Temelli Stem Etkinliklerinin Okul Öncesi Öğrencilerinin Akademik Benlik Saygıları Üzerine Etkisi[*]

Esila Samur[**]　　　　**Sema Altun Yalçın**[***]

Öz

Bu araştırma, Montessori yaklaşımı temelli STEM etkinliklerinin okul öncesi öğrencilerinin akademik benlik saygıları üzerindeki etkisini araştırmayı amaçlamaktadır. Araştırmada nitel ve nicel verilerin bir arada kullanıldığı yöntemlerden biri olan karma yöntem kullanılmıştır. Araştırma örneklemini ana okulunda eğitim-öğretim gören 63 okul öncesi öğrencisi oluşturmaktadır. Araştırma içerisinde nicel verilerin analizi istatistiki yöntemlerle, nitel verilerin analizi içerik analiziyle elde edilmiştir. Araştırmada elde edilen bulgulara göre, akademik benlik saygısı ölçeği ön-son test puanları arasında anlamlı bir farklılık gösterdiği belirlenmiştir. Gelişim gözlem formundan elde edilen verilere göre uygulanan Montessori yaklaşımı temeli STEM etkinliklerinin okul öncesi öğrencilerinin; sosyal ve duygusal gelişimi, bilişsel gelişimi, motor gelişimi, dil gelişimi ve özbakım becerileri üzerinde pozitif yönde gelişimler gösterildiği tespit edilmiştir. Yarı yapılandırılmış öğretmen görüşme formundan okul öncesi öğrencilerinin; problem çözme becerilerinin geliştiğini, istenilen malzemeyi istenilen özellikte ve nitelikte kullanabildiklerini, daha dengeli ve koordineli hareketlerde bulunduklarını, akranları ile olan iletişimlerinin geliştiğini, dikkatlerini toplayarak daha önceki bilgileri hatırlayabildiklerini ve psikomotor becerilerinin arttığını tespit edilmiştir.

Anahtar Sözcükler: Akademik benlik saygısı, Montessori yaklaşımı, okul öncesi öğrencisi, Stem eğitimi.

[**] *Sorumlu Yazar:* Doktora öğrencisi, Erzincan Binali Yıldırım Üniversitesi Eğitim Fakültesi, Fen Bilimleri Öğretmenliği, Matematik ve Fen Bilimleri Anabilim Dalı, Erzincan, Türkiye. E-posta: esilasummer24@gmail.com, https://orcid.org/0000-0002-2927-318X.
[***] Prof. Dr., Erzincan Binali Yıldırım Üniversitesi Eğitim Fakültesi, Fen Bilimleri Öğretmenliği, Matematik ve Fen Bilimleri Anabilim Dalı, Erzincan, Türkiye. E-posta: sayalcin@erzincan.edu.tr, https://orcid.org/ 0000-0001-6349-2231.

Introduction

STEM brings a holistic viewpoint on science, technology, engineering, and mathematics. Providing qualified science and mathematics education with STEM training to individuals in developed countries and ensuring guidance in the flexible curricula development process are the desired goals (Çolakoğlu and Gökben, 2017; Özcan and Koca, 2019). Based on STEM training, it is argued that it should be started in the preschool period for pupils to adopt the concepts of creativity, curiosity, critical thinking and cooperation (Uğraş, 2017). The STEM training given in the preschool period is expected to enable the child to make innovations that will add significance to daily life by combining the main concepts of mathematics and science with engineering and technology. In addition, the language development, school readiness and social development of the child can be supported with STEM training (Günşen et al., 2019). It is of great significance to begin STEM training during the preschool period for individuals so that they can acquire these skills more easily (Kelley and Knowles, 2016). This emerging situation brings out a new idea that applying STEM activities based on the Montessori method provides greater benefit in the education of a child in the preschool period (Çakır, 2018).

The most significant feature of education based on the Montessori method is that it is child-centred. In the educational environment, children should be allowed to move freely and comfortably. Maria Montessori asserts there can be no independence without freedom. Therefore, she has formed the basis of the education model on the term "freedom" (Durakoğlu, 2010). The children, who participate actively, gain the freedom to choose, and thus, they choose the materials they will use and decide what to do and how to do it (Kaza, 2021). The Montessori education approach, which takes the freedom and discovers concepts in the centre, apart from these concepts, contributes even to the creativity, communication and problem-solving skills of children. Another aim of this approach is not only to transfer information to the child but also to the child's willingness to learn. Montessori education is an approach that emphasizes helping the child without pressure or coercion, expressing what s/he wants easily, and self-confidence, esteem and independence skills (Güler, 2021; Uçar, 2019).

STEM and Montessori education form a whole, and the first letter of the word shortened as STEM refers to the word "Science." Science is the focal point that exists in the curricula of "Montessori Child House" by Maria Montessori. In a classical preschool classroom, game-based sensory experiences that focus on the disciplines of mathematics and reading are provided to the children. The pupils are allowed to create patterns, work on handwriting, and participate in group story time by introducing them to the letters and numbers. In the Montessori classes, zoology, botanic and physical curriculum, namely science, are introduced to pupils.; Children learn the shapes of leaves and the animal world and begin to identify the classes of fish, mammals, reptiles and amphibians. They divide the living and non-living organisms into categories among themselves by acquiring knowledge related to water, air and soil. Pupils learn detailed information about the concepts by growing up with the Montessori curriculum (Fher, 2020). For this reason, it can be stated that STEM and Montessori education serves common purposes. At this point, providing integrated education with the Montessori approach, which is based on the activities carried out in the field of STEM in the preschool period, will provide easy and permanent learning. In the studies related to the Montessori approach, it has been suggested that the Montessori approach is more effective than traditional educational programs in improving children's creativity, relationships with teachers and peers, motivation and reasoning skills (Keçioğlu, 2015).

Montessori emphasizes that one of the most significant values of humans is "personality." According to her, the development of the personality as a whole throughout the education process is more important than learning (Veli, 2020). One of the elements that constitute personality is the concept of self. Self refers to the individual's expressing thoughts related to who the individual is, what it means, what s/he can do, and how s/he will adapt to the environment s/he lives in (Uzunoğlu, 2019). The earlier these qualifications are gained by the individuals, the easier they will make their choices at this point. There are various sub-dimensions of the concept of self. One of these dimensions is the academic concept of self (Ocak and Sarlık, 2016). Academic self-concept is explained as an individual's ability to improve on how talented he or she is compared to other individuals, in the case of a certain academic effort (Arseven, 1986). The beginning of academic process begins with preschool education. The skills of mathematics and literacy in the preschool period are called "early academic skills." Acquiring early academic skills for children in the preschool period is a preliminary preparation for acquiring academic

skills in their future school life. In addition, acquiring early academic skills sets the basis for raising successful, self-controlled, entrepreneurial, researchers, individuals who can use their talents and express their feelings and thoughts easily (Ocak and Sarlık, 2016). The interaction between children and the environment, examining the environment carefully and adapting effectively to changes are ensured by academic self-esteem. Academic self-concept is defined as how the child regards his/her learning ability among other classmates (Warash and Markstrom, 2001). Shavelson and Bolus, (1982) investigated self-esteem as a holistic approach and divided it into two under the heading of "Global Self-esteem". These headings are "Academic Self-esteem" and "Non-academic Self-esteem". Academic Self-esteem is evaluated under five sub-dimensions. These are Turkish, Mathematics, Science, Social Sciences and Others. Can (2015) has determined in his research that pupils with high achievement levels also had high academic self-esteem and learning levels. It was emphasized in this study that the effect of academic self-esteem on achievement was higher than the effect of achievement on academic self-esteem. Cevher and Buluş (2006) have referred that acquiring academic self-esteem in the preschool period is significantbecause, gaining academic self-esteem to the individual in the preschool period, and bringing the level of academic success to higher levels is critical in raising individuals with a high desire to learn and strong communication skills in the social environment (Karaca et al., 2016). Integrating Montessori and STEM training, which serves the same purposes as supporting the development of academic self-esteem, and giving it at an early age is important in terms of raising the individuals who research, question, analyze, produce, create solutions to problems, and who are creative, have high academic success, have strong communication with their environment, and who are self-confident, successful in basic sciences and have knowledge (Altun Yalçın and Çakır, 2020). At that point, applying the STEM activities based on Montessori approach in the preschool period is of great significance in terms of developing academic self-esteem for the children.

This study aims to investigate the effect of STEM activities planned based on the Montessori approach on preschool pupils' academic self-esteem.

Method

Research Design

In this research, we used a mixed method which consists using the qualitative and quantitative data together to investigate the effect of the STEM activities based on Montessori approach of preschool pupils on their academic self-esteem. The mixed method is called the method in which both quantitative and qualitative data are used to comprehend the study problems better by the researcher (Creswell, 2007). In this study, mixed method and sequential explanatory mixed research design were used since the quantitative research was dominant (Creswell, 2008).

Research Sample

The population of this study was determined as 4-5-year-old children attending preschool in schools where Montessori approach-based STEM activities were not implemented.

The research sample consisted of 63 preschool pupils from two different state schools within the scope of the Ministry of National Education in the fall term of the 2019-2020 academic year. In identifying the sample, it was determined that the Montessori approach-based STEM activities had not been applied in these schools before. In this research, the purposive sampling method among the non-random sampling methods was used and current classroom forms were not changed (Büyüköztrük et al., 2008).

Necessary permissions for the quantitative data collection tool that was applied in the research were obtained from the entitled authors. In addition, necessary references were made to the authors within the scientific framework. The participants were informed before the activities to be implemented. Necessary permissions were obtained from the participants by means of the informed consent form. Ethics committee permission was obtained from Erzincan Binali Yıldırım University Human Research Ethics Committee, dated 28/09/2020, number 03.

Research Instruments and Procedures

Data Collection Tool: The Academic Self-esteem scale, which was developed by Cevher and Buluş (2006) and appropriate to the evaluation process of the Montessori approach-based STEM activities was performed in collecting the quantitative data in the research. In the research, since the number of independent variables was odd the single-group pre-test post-test model was used, which is one of the single-factor design and single-group experimental designs (Karasar, 2013). In the application process of the research, a pre-test was performed on a single group without any training. Then, Montessori approach-based STEM activities were implemented and a post-test was administered to the same group using the same measurement tools. Analyzes regarding the dependent variable were made by looking at the differences between the pre-and post-test.

In collecting the qualitative data, the "Ministry of National Education Preschool Education Curriculum (2013) Development Observation Form" and "Semi-structured Teacher Interview Form" were used.

Data Analysis

The quantitative data were analyzed through SPSS. A normality assumption test was administered by "Kolmogorov-Smirnow test." By considering the skewness coefficient of all the measurements and the histogram graphs, the Kolmogorov-Smirnow suitability was checked. The data obtained from the Kolmogorov-Smirnow test are accepted as they demonstrated normal distribution when the data group was $p>0.05$ (Can, 2016). The Kolmogorov-Smirnow values of the academic self-esteem scale were 0.200 for the pre-test, and 0.062 for the post-test ($p>0.05$, Can, 2016). The skewness coefficient of the academic self-esteem scale was -0.258 for the pre-test and -0.632 for the post-test, and the kurtosis coefficient was: 0.161 for the pre-test and -0.096 for the post-test. As a result of the emerging values and graph measurements, since the kurtosis and skewness values were calculated between +1.96 and -1.96, it indicated a normal distribution (Can, 2016). A paired samples t-test was applied to find out if there was a meaningful difference between the pre-test and post-test scores of the academic self-esteem scale applied to the sample group.

Content analysis method was employed in analysing the qualitative data. First, the codes and categories were produced based on the data. Next, for the validity and reliability of the analysis, we got the opinions of two different experts and later combined them. In the analysis of the qualitative data, the Miles and Huberman's (1994) reliability formula was used and the reliability was found as 89.7%. If the reliability value between the coders is above 80%, it indicates that it is reliable (Miles and Huberman, 1994).

Findings

In this study, the effect of STEM activities based on the Montessori approach on preschool pupils' academic self-esteem was investigated. For this purpose, different measurement tools were used as quantitatively and qualitatively. The statistical analyses of the quantitative data were carried out through a paired samples t-test. On the other hand, content analysis was applied to the analysis of the qualitative data.

Findings and Comments on the First Sub-Problem

A paired samples t-test was used to find out if there was a meaningful difference between the pre-test and post-test scores in terms of the academic self-esteem of the sample group in which STEM activities based on the Montessori approach were implemented in the research. The academic self-esteem pre-test and post-test scores related to the first sub-problem in the paired samples t-test results are presented in Table 1.

Table 1
Academic Self-Respect Scale Paired Samples T-Test Results

Measurements	N	Mean	Ss	T	Sd	p
Pre-test	62	85.032	15.461	-4.536	61	.000
Post-test	62	89.693	16.525			

p<0,05

A statistically significant difference was observed between the pre-implementation score average ($\bar{x}$ Pre-test = 85.032) and the post-application score average ($\bar{x}$ Post-test =89.693) in the results of the test, which is indicated in Table 1 (t62: -4.536, p< 0.05; Can, 2016). Thanks to this statistically significant difference, it can be expressed that the STEM activities based on the Montessori approach improve the academic self-esteem of preschool pupils.

Findings from the MoNE Development-Observation Form

Within the scope of the research, the "Ministry of National Education Preschool Education Curriculum (2013) Development Observation Form" was used to observe what kind of effects the development of the sample group in which Montessori approach-based STEM activities were applied. The results of the content analysis in terms of motor development were presented in Table 2.

Table 2

Motor Development

Category	Code Name	Frequency (f)	Rate (%)
Coordination	Coordinated	1	0.8
	Bodily coordination	1	0.8
	Balanced	2	1.7
	Hand-eye coordination	3	2.6
	Gives shape to the material	5	4.3
	Removes objects	11	9.5
	Attaches objects	11	9.5
	Object control	20	17.3
Skill	Big muscle	2	1.7
Movement	Pulls	1	0.8
	Pushes	1	0.8
	Rhythmic	1	0.8
	Stands on a single foot	1	0.8
	Runs	2	1.7
	Skips	2	1.7
	Jumps	3	2.6
	Cuts	4	3.4
	Active	11	9.5
Total		115	98.9%

The categories, codes, frequencies and rates of motor development obtained from the Development and Observation Form are presented. In the Coordination category, pupils' observations are presented in relation to coordination and balance skills. The preschool teacher claimed that their pupils could easily perform movements that required balance, walk in a straight line easily, and successfully achieve physical coordination after the activities. In the skill category, teacher's statements were related to the effects on pre-schoolers muscle development. The teacher claimed that the preschool pupils' psychomotor skills developed after the activities, they could easily use scissors and give shape to soft materials. In the category of movement, there were expressions related to how the pre-schoolers' movement development changed and developed. It included teacher's statements showing how the influence of the activities on the movement development of preschool children changed and developed.

Table 3
Cognitive Development

Category	Code Name	Frequency(f)	Rate (%)
Product creation methods and techniques	Cause- effect	6	4.6
	Learn	9	7.03
	Part – whole	20	15.6
	Produces problem	20	15.6
	Solves problem	21	16.4
Cognitive activities	Focuses	1	0.7
	Says colours	1	0.7
	Knows numbers	2	1.5
	Recalling	2	1.5
	Perception	2	1.5
	Grouping	5	3.9
	Ordering	6	4.6
	Matching	9	7.03
	Observation	13	10.1
Other	Material	1	0.7
	Presence	2	1.5
	Creates a plot	3	2.3
Total		128	99.06%

The teacher reported that pupils created appropriate solutions by creating a problem situation while creating a product, established a cause-effect relationship and learned by understanding the part-whole relationship in the codes in the category of product creation methods and techniques as seen in Table 3. In the category of cognitive activities, the teacher expressed that their pupils were able to do the activities that required cognitive skills at the end of the activities. In the invention category, the preschool teacher pointed out that the activities carried out helped the pupils to create different products and to gain a different perspective. In the category 'other,' the teacher stated that the pupils counted the events in the order in which they occurred and learned the characteristics of the events or entities at the end of the activities.

Table 4
Language Development

Category	Code Name	Frequency (f)	Rate (%)
Verbal skill	Breath control	1	0.8
	Sound direction	1	0.8
	Different word	1	0.8
	Says, family members	1	0.8
	Says address	2	1.6
	Self-expression	6	4.8
	Pronunciation	7	5.6
	Word	15	12.1
	Communication	20	16.2
Empathy skills	Perception	1	0.8
	Wait for peers	1	0.8
	Eye contact	2	1.6
	Asking question	6	4.8
	Comprehending	10	8.1
	Watching	20	16.02
	Listening	21	17
Basic Communication Concepts	Spelling rules	4	3.2
Total		123	99.2%

In Table 4, in the codes belonging to the verbal category, the teacher indicated that after the activities, the pupils' communication skills improved, their language skills improved, and their verbal communication increased. After the activities in the empathy category, the teacher claimed that their pupils developed empathy, learned to listen to each other, and did not hesitate to express themselves and ask questions. In the category of basic communication concepts, the preschool teacher reported that their pupils used Turkish effectively after the activities and that they followed the rules of Turkish and spelling.

Table 5
Social and Emotional Development

Category	Code Name	Frequency(f)	Rate (%)
Environmental factors	Friend	2	1.8
	Tools and equipment	5	4.5
	Different environment	20	18.1
Behaviour	Effort	1	0.9
	Willing use	2	1.8
	Willing participation	5	4.5
	Adapting	7	6.3
	Obeying the rules	20	18.1
	Responsibility	24	21.8
Social efficacy	Task	2	1.8
Other	Physical	1	0.9
Total		110	99.92%

In Table 5, the codes in the environmental factors consisted of the statements about the pupils adapting to different environments, making friends, using the necessary equipment willingly and adapting to new events. The highest frequency among the codes was found in the code of the different environments. The preschool teacher stated that after the activities, the pupils developed friendships, initiated communication, showed adult behaviour and spontaneously started a task. In the category of Behaviour, the teacher pointed out that their pupils developed a sense of responsibility, fulfilled their responsibilities, participated voluntarily in activities, followed the rules set in different environments, and made an effort to complete the assigned tasks given at the end of the activities. In the category of social efficacy, the teacher stated that the activities had a positive impact on their pupils' social competencies positively, so that they spontaneously initiated activities, participated in activities, and became leaders in their groups. Although the pupils sometimes experienced problems in taking on the leadership role during the activity, they adapted to the group by solving their problems. In the category 'other,' the teacher reported that their pupils expressed their positive or negative feelings and described their physical characteristics.

Table 6
Self-Care Skills

Category	Code Name	Frequency (f)	Rate
Individual Competence	Self-care skills	1	2.5
	Takes off clothes	3	7.5
	Chooses his/her clothes	4	10
	Washing hand-face	4	10
	Eating	7	17.5
	Wearing clothes	7	17.5
Hygiene	Organises environment	1	2.5
	Behaviour	1	2.5
	Cleaning rules	2	5
	Appropriate	3	7.5
	Uses cleaning materials	7	17.5
Total		40	100%

In Table 6, the codes in the category of individual competence included teacher's statements about pupils being able to choose clothes suitable for changing weather, to put on and take off their clothes spontaneously, to achieve self-care skills, to wash by hand, to buy as much food as they need, and to choose the food they want. In the category of hygiene, the preschool teacher claimed that their pupils were able to choose and use cleaning materials, pay attention to cleaning rules and keep their environment clean. They also stated that their pupils' cleaning skills developed positively.

Findings from the semi-structured teacher interview form

A semi-structured teacher interview was held with a preschool teacher who attended voluntarily and taught the preschool pupils in a school in which STEM activities based on the Montessori approach were used. The interview aimed to determine the teacher's thoughts to identify the effect of STEM activities based on the Montessori approach on the academic self-esteem of preschool pupils. During the interview, the teacher was asked 6 open-ended, semi-structured questions. The teacher's written responses were obtained. The teacher's written answers were obtained.

To summarise the data obtained from the teacher interview form, it can be suggested that the STEM activities based on the Montessori approach developed the pupils' skills in making decisions, coming up with new ideas for the problems they encountered, expressing themselves easily, increasing communication with their peers, completing the tasks given easily, cooperating with their peers and developing leadership skills. In addition, the preschool teacher stated that it had a positive impact on the pupils.

Result and Discussion

According to the research conducted to measure the effect of the Montessori approach to STEM activities on preschool children's academic self-esteem, significant differences were found. According to the findings of this research, it can be stated that the applications consisting of STEM activities based on the Montessori approach developed preschool children's academic self-esteem. The studies that have been conducted to find that STEM activities based on the Montessori approach develop students' academic self-esteem support the findings of our study. Studies in this field, such as Yıldırım (2021), found that the scientific process skills of pupils who attended the Montessori preschool program between 60-72 months were positively affected at the end of the M-STEM program. It was claimed that the M-STEM program was more effective for the pupils who were new to preschool; that it would be beneficial to integrate STEM activities with the Montessori education program in the development of children's scientific process skills, especially for children who are just starting the Montessori program. Çakır (2018) found that the applications involving STEM activities based on the Montessori approach developed the pre-service teachers' problem-solving, critical thinking tendencies and creativity skills of pre-service teachers. Açıkgöz (2018) suggested that the applications, which consisted of STEM activities based on the Montessori approach, developed preschool teachers' problem-solving skills. Fher (2020) investigated the impact of STEM activities on the Montessori-based courses given to pupils in the preschool period. It was claimed that the effectiveness and participation of the pupils in the course decreased in the course where the Montessori materials were used; however, in the course integrated with the STEM activities, the pupils were more effective and willing to participate in the course. Jones (2017) expressed positive opinions about the STEM activities, that they included high technology activities in their courses, that the students also valued the development of technical skills, and that the teachers interviewed all struggled to incorporate teaching technology in a way that was compatible with the Montessori paradigm. At the end of the research, it can be interpreted that STEM activities based on the Montessori approach develop the pre-schoolers' academic self-esteem.

In terms of the qualitative data analysis of the research, it was observed that the preschool children could use the materials according to their purposes, their psychomotor skills developed and their physical coordination improved at the end of the activities. As a result of the observations, it was found that the STEM activities based on the Montessori approach had a positive effect on motor development. Beken (2009), whose findings are similar to those of this study, compared the dexterity development of a preschool child attending a MoNE state school and a child attending a private school using the Montessori method. In this study, it was found that the development of dexterity was higher in the pupils who received Montessori education. Ulutaş, Demir and Yayan (2017) applied 40 activities including

the use of psychomotor skills, to a group of pupils aged 5-6 years. At the end of the study, it was found that motor skills had increased. The development of visual and motor coordination in early childhood begins with the use of the hands and body in pointing at different objects in the visual field. The development of visual and motor coordination is one of the basic steps. Visual perception education is an education for the perception of visual stimuli and the formation of appropriate motor and cognitive responses (Durulan and Angın, 2023; Ercan and Aral, 2011). Visual perception and psychomotor training can be included under the heading 'other' when examining the sub-dimensions of academic self-esteem dealt with by Shavelson and Bolus, (1982) are examined. It can be argued that these developments in visual perception and psychomotor skills develop preschool children's academic self-esteem.

The qualitative data analysis revealed that after the activities, it was found that the preschool children were able to find appropriate solutions to the problems, establish a part-whole relationship, make classifications, establish cause-effect relationships, generate original ideas, remember the information they had learned and arrange the events in their order of occurrence. Considering the data obtained, it was found that STEM activities based on the Montessori approach had a positive effect on cognitive development. Yalçın (2020), who obtained results that supported the findings of this study, claimed that the preschool STEM activities prepared according to the focused thinking model showed that the children's creativity and problem-solving skills improved positively. Dereli (2017) suggested that the psychosocial development and problem-solving skills of children trained with the Montessori educational curriculum were higher than those trained with the MoNE curriculum. Dedeoğlu (2018) found that Montessori education increased students' cognitive development and social efficacy more than preschool students, who were educated with the MoNE curriculum. It can be interpreted that achieving the same results separately from STEM and Montessori education, applied to preschool pupils, indicates that STEM activities based on the Montessori approach increase cognitive development. Another area related to children's cognitive skills and included in the area of academic skills is mathematical skills. Their performance in basic skills such as numbers, classification, modeling and measurement, which are considered in mathematics, requires the activation of high-level cognitive skills. Children's mathematical problem-solving is also related to the use of cognitive processes (Uyanık and Alisinanoğlu, 2016; Yıldız Altan and Temel, 2022). It can be argued that by enabling the development of these skills, children's academic self-esteem improved.

In addition, as a result of the qualitative data analysis, it was observed that the preschool children increased their communication with their peers, used language for communication purposes, learned new concepts and used them in their daily life, knew the word equivalent of objects, could express their thoughts, their vocabulary increased, they could pronounce words correctly and could use Turkish with rules and correctly at the end of the activities. According to the data obtained, it was found that STEM activities based on the Montessori approach had a positive effect on language development. Supporting the findings of this study, Kayılı, Koçyiğit and Erbay (2009), who conducted a parallel study to this one, found that those who were educated with the Montessori method between the ages of 5 and 6 had higher language skills than those who received preschool education according to the MoNE curriculum. The increase in language development also affects the development of literacy. All activities related to language development in the preschool period also affect the development of future reading and writing skills (Buğan, Çorapçı, and Ada, 2022; Uyanık and Alisinanoğlu, 2016). It can be interpreted that having a "Turkish" education in the subdimensions of academic self-esteem and increasing children's language development also develops students' academic self-esteem. According to the qualitative data of the study, after the research it was found that the preschool children had a sense of responsibility, adapted to the different environmental rules they encountered, could use the object themselves, could easily express positive and negative thoughts, started a new task voluntarily and made an effort to finish the task they started, could express their feelings and cooperate.

According to the data obtained, Kuşçu, Bozdağ, and Yıldırım Doğru (2014), who obtained results that support the findings of the present study suggesting that STEM activities based on the Montessori approach enhance social and emotional development, and found that the preschool students educated with the Montessori education had higher social and emotional skills compared to the students educated with the MoNE curriculum. It was observed that the children who received the Montessori education

exhibited behaviours such as finishing the work they started, waiting their turn and taking responsibility more often than the children who received the MoNE curriculum. Koçyiğit and Kayılı (2008) found that the preschool children who were educated with the Montessori method experienced a higher development of social cooperation, interaction and independence than those who were educated with the classical MoNE curriculum. The provision of basic academic skills to children in the preschool period increases the level of readiness of children for primary education. In addition, it also provides higher academic skills in future periods (Uyanık and Kandır, 2010). At this point, social and emotional development will increase the child's academic achievement. And it can be argued that the increase in their academic achievement will also increase their academic self-esteem.

Our qualitative data also revealed that the pre-schoolers were able to dress appropriately for the weather conditions, meet their needs independently, show appropriate behaviour in case of danger, and organize their environment by leaving it clean at the end of the activities. According to the data obtained, STEM activities based on the Montessori approach were found to have positive effects on self-care skills. Supporting the findings of the study, Saki (2020), who obtained parallel results, found that psychological resilience, seeking help, assertiveness-confidence, self-regulation, peer relations, attachment, social competence, emotion control, and problem-solving skills also increased in the children who were educated with the Montessori philosophy. The Montessori philosophy was also found to enable the development of self-care skills. Self-care skills in early childhood are defined as the student's ability to meet basic needs such as cleaning, eating, sleeping, etc. The better the child learns these basic skills, the more successful they will be in other areas of development such as physical, mental, spiritual and social. However, children must first meet their basic needs, i.e., acquire some self-care skills, in order for the child to be successful in the areas of physical, mental, spiritual, and social development (Konya, 2007). This means that a child who cannot acquire self-care skills will not be successful academically. At this point, it can be argued that a child with developed self-care skills will not only achieve academic success but will also improve the child's academic self-esteem.

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Development of the "Social Studies Course Engagement Scale" for Elementary School Students[*]

Ebru Ocakcı[**]   **Osman Samancı**[***]

Abstract

In this study, it is aimed to develop the "Social Studies Course Engagement Scale" to be used for 4th grade elementary school students. Despite the critical importance of the engagement for the social studies course, no engagement scales developed specifically for the social studies course were found in the literature. A total of 730 4th grade elementary school students were included in the development of the scale. As a result of "exploratory factor analysis", a scale structure consisting of 12 items and 2 sub-dimensions was created. It was determined that the created structure explained a total variance of 51.62%. The first dimension of the scale, individual engagement, helped explain 39.90% of the total variance, while the second dimension, interaction engagement assisted in clarifying 11.72% of the total variance. As a result of "confirmatory factor analysis", it was determined that the structure of the scale was adequate. The reliability of the scale was analyzed using "Cronbach's Alpha", "McDonald's Omega" and test-retest reliability coefficients were used. Both "Cronbach's Alpha" and "McDonald's Omega" coefficients were calculated as 0.81. Test-retest reliability coefficient was calculated as 0.72. It was determined that the "Social Studies Course Engagement Scale" is a reliable and valid measurement tool.

Keywords: Social studies, course engagement, scale development, elementary education.

[**] Dr., Atatürk University, Kazim Karabekir Faculty of Education, Department of Elementary Education, Erzurum, Türkiye. E-mail: ebru.ocakci@atauni.edu.tr, https://orcid.org/0000-0003-2441-9845.

[***] Prof. Dr., Atatürk University, Kazim Karabekir Faculty of Education, Department of Elementary Education, Erzurum, Türkiye. E-mail: osamanci@atauni.edu.tr, https://orcid.org/0000-0003-3620-7604.

İlkokul Öğrencileri için
"Sosyal Bilgiler Dersine Katılım Ölçeği"nin Geliştirilmesi[*]

Ebru Ocakcı[**]   **Osman Samancı**[***]

Öz

Bu araştırmada ilkokul 4. sınıf öğrencileri için kullanılmak üzere "Sosyal Bilgiler Dersine Katılım Ölçeği"nin geliştirilmesi amaçlanmıştır. Katılımın Sosyal Bilgiler dersi için kritik bir öneme sahip olmasına rağmen alanyazında Sosyal Bilgiler özelinde geliştirilen bir katılım ölçeğine rastlanmamıştır. Ölçek geliştirme sürecinde toplam 730 ilkokul 4. sınıf öğrencisiyle çalışılmıştır. Açımlayıcı faktör analizi sonucunda 12 madde ve 2 alt boyuttan oluşan bir yapı elde edilmiştir. Elde edilen yapının toplam %51.62 varyans açıkladığı belirlenmiştir. Açıklanan varyansta ölçeğin birinci boyutu olan bireysel katılım yapıya %39.90 katkı sağlarken; ikinci boyutu olan etkileşimli katılım yapıya %11.72 katkı sağlamıştır. Yapılan doğrulayıcı faktör analizi sonucunda ölçeğin 12 madde ve 2 alt boyuttan oluşan yapısının oldukça iyi uyum verdiği belirlenmiştir. Ölçeğin güvenirliğinin incelenmesinde "Cronbach's Alpha", "McDonald's Omega" katsayılarından ve test-tekrar test güvenirliğinden yararlanılmıştır. Hem "Cronbach's Alpha" hem de "McDonald's Omega" katsayısı .81 olarak hesaplanmıştır. Test-tekrar test güvenirlik katsayısının ise .72 olduğu tespit edilmiştir. Analiz sonucunda "Sosyal Bilgiler Dersine Katılım Ölçeği"nin güvenilir ve geçerli bir ölçme aracı olduğu değerlendirilmiştir.

Anahtar Sözcükler: Sosyal bilgiler, derse katılım, ölçek geliştirme, ilkokul.

[**] Dr., Atatürk Üniversitesi, Kazım Karabekir Eğitim Fakültesi, Temel Eğitim Bölümü, Erzurum, Türkiye. E-posta: ebru.ocakci@atauni.edu.tr, https://orcid.org/0000-0003-2441-9845.

[***] Prof. Dr., Atatürk Üniversitesi, Kazım Karabekir Eğitim Fakültesi, Temel Eğitim Bölümü, Erzurum, Türkiye. E-posta: osamanci@atauni.edu.tr, https://orcid.org/0000-0003-3620-7604.

Introduction

Course engagement refers to a psychological process that involves attention and effort towards learning (Marks, 2000). Mazer (2012) highlights students' interest as one of the factors that encourage engagement and argues that cognitive and affective interest allows students to be more involved with their own education. Students' interest and their active efforts encourage them to participate more regularly with the course. In turn, this positively affects a number of variables related to the learning process. Prior research has shown the effect of course engagement on individuals' learning performance and academic achievements (Fung et al., 2018; Jiang & Peng, 2023; Maamin et al., 2022; Parsons & Taylor, 2011; Phan et al., 2016; Putwain et al., 2018; Putwain et al., 2019; Putwain & Wood, 2023). It is also argued that one of the most important predictors of adjustment to school life is engagement (Cobo-Rendon et al., 2022). Furthermore, former studies have also indicated that course engagement is correlated with other variables such as students' motivation (Froment & Gutierrez, 2022; Singh et al., 2022; Zhang et al., 2023), critical thinking (Ravandpour, 2022; Riswanto, 2022), satisfaction (Froment & Gutierrez, 2022), autonomy (Ravandpour, 2022), and self-assessment (Riswanto, 2022).

For teaching to be effective, it is necessary to determine students' levels of course engagement and to work on increasing it wherever necessary. However, observations made in the learning environment may be misleading in determining students' course engagement (Fuller et al., 2018). This is because course engagement notinvolves behaviors that can be observed during the teaching process such as raising one's hand alone (Handelsman, 2005), participating in class discussions (Mazer, 2012; Wang et al., 2014), taking notes (Lin & Huang, 2018), as well as behaviors that cannot be observed during the teaching process such as doing homework (Handelsman, 2005), repeating course notes (Lin & Huang, 2018; Mazer, 2012), and being interested in course subjects after the course takes place (Mazer, 2012). Hence, Fredricks and McColskey (2012) argue that self-report instruments can be used to detect engagement behaviors that cannot be directly observed. This is why developing reliable and valid measurement tools for this purpose would is crucial to an accurate assessment.

Scope of Course Engagement

The literature includes various classifications of the term "engagement" (Parsons & Taylor, 2011), of which the one made by Fredricks et al. (2004) is quite widely accepted. According to Fredricks et al. (2004), the classification of engagement encompasses three dimensions: emotional, behavioral, and cognitive. "Emotional engagement" pertains to the affective responses of students in the classroom, including feelings of interest, happiness, anxiety, or boredom. (Fredricks et al., 2004; Handelsman et al., 2005). "Behavioral engagement" involves observable behaviors such as following classroom rules, engaging in the learning process and academic tasks, paying attention and effort to learning, asking questions and participating in classroom discussions (Fredricks et al., 2004; Lin & Huang, 2018; Wang et al., 2014). "Cognitive engagement" is the third dimension, and it is the most difficult to observe. Cognitive engagement entails the psychological engagement of students, and includes the utilization of different course materials, reviewing topics that they did not understand, or trying to pinpoint the source of their mistakes (Fredricks et al., 2004; Wang et al., 2014). Mameli and Passini (2017) have analyzed course engagement in four sub-dimensions, adding the dimension of "agentic engagement" to the classification made by Fredricks et al. (2004). Agentic engagement refers to questions that asked by students during the lesson, and their opinions and feedback regarding the learning process (Reeve & Tseng, 2011). Deng et al. (2020) and Wang et al. (2016) offered an alternate fourth dimension, "social engagement", to the three-dimension classification of engagement, which consists of cognitive, affective, psychomotor engagement. Social engagement refers to students' social interactions related to the teaching content and their emotional reactions towards their peers (Wang et al., 2016).

Social Studies Course Engagement

The aim of social studies courses is to educate individuals to become current and functioning citizens who benefit both their own societies and humanity as a whole (National Council of the Social Studies [NCSS], 2010). It is the responsibility of the social studies course to educate students to be engaged citizens with the competence to make wise decisions (Farris, 2015; Thomas, 2022). Students' ability to transform into such citizens is closely correlated to the active engagement they show throughout the learning process. This is why course engagement is such a critical variable that needs more research. Research on social studies courses included in the literature examines the engagement variable through various data collection tools. There are a number of studies that utilize qualitative data collection tools such as observation and interview forms (Parsons, 2018; Saripudin et al., 2021), as well as quantitative self-report data collection instruments (Gürer & Yildirim, 2014; Schmitt, 2022; Saritepeci & Cakir, 2015). When the behaviors involved in engagement that cannot be directly observed are considered, it is thought that the self-report instruments can help illustrate what is going on behind the scenes (Fuller et al., 2018). One limitation worth noting in the existing literature is the absence of a specific engagement scale designed for the social studies course.

Measurement Tools for Course Engagement

The literature includes various measurement tools that have been developed to measure the variable of course engagement. The current research examined the ones included in the literature before the Social Studies Course Engagement Scale (SSCES) was developed (Deng vd., 2020; Finn vd., 1991; Handelsman vd., 2005; Kim and Song, 2023; Lin and Huang, 2018; Mazer, 2012; Siddiqi vd., 2022; Singh and Srivastava, 2014; Vongkulluksn vd., 2022; Wang vd., 2014; Wang vd., 2016).

According to the data presented in Figure 1, it is noteworthy that the scales aimed at elementary school students are limited in number compared to other learning levels. Further, it was observed that nearly all of the scales presented in Figure 1 were developed to examine general course engagement behaviors, while only the scale developed by Wang et al. (2016) considered engagement in "mathematics" and "science" courses. Students' engagement behaviors may differ between each lesson (Wang et al., 2014). Thus, it would be more appropriate to examine the engagement variable specifically for each course and to use items specific to the course at hand in scales to be developed (Wang et al., 2016). Considering the cognitive characteristics of elementary school students, it is thought that utilizing course-specific engagement scales in research would prevent students from experiencing confusion and reflecting their general engagement to a course-specific measurement process.

Despite the critical importance of the engagement for the social studies course and the fact that it is one of the prominent variables in the research in this field (Gürer & Yıldırım, 2014; Parsons et al., 2018; Saripudin et al., 2021; Saritepeci & Çakır, 2015; Schmitt et al., 2022), no engagement scales developed specifically for the social studies course were found in the literature. It is thought that this demonstrates a gap in the literature, and that there is a need for a measurement tool to address engagement in the context of the social studies course. The objective of this study was to create a dedicated engagement scale tailored specifically for the social studies course and evaluate its psychometric properties.

Researcher	Scale	Participants	Sub-Dimensions of Engagement
Finn et al. (1991)	The Student Participation Questionnaire	4th grade students	1. Effort 2. Initiative 3. Non-participatory behavior
Handelsman et al. (2005)	Student Course Engagement Questionnaire	Undergraduate students	1. Skills engagement 2. Emotional engagement 3. Participation/Interaction engagement 4. Performance engagement
Mazer (2012)	Student Engagement Scale	Undergraduate students	1. Silent in class behaviors 2. Oral in class behaviors 3. Thinking about course content 4. Out of class behaviors
Wang et al. (2014)	The Classroom Engagement Inventory	4th-12th grade students	1. Affective Engagement 2. Behavioral Engagement 3. Cognitive Engagement 4. Disengagement
Singh and Srivastava (2014)	Student Engagement Scale	Postgraduate students	1. Sense of belonging 2. Individual engagement 3. Collaborative engagement 4. Management skill
Lin and Huang (2018)	Student Course Engagement Scale	Undergraduate students	1. Skills engagement 2. Emotional engagement 3. Performance engagement 4. Interaction engagement 5. Attitude engagement
Wang et al. (2016)	Student and Teacher Report Math and Science Engagement Scales	Middle school and high school	1. Cognitive engagement 2. Behavioral engagement 3. Emotional engagement 4. Social engagement
Deng et al. (2020)	MOOC Engagement Scale	Unspecified	1. Cognitive engagement 2. Behavioral engagement 3. Emotional engagement 4. Social engagement
Siddiqi et al. (2022)	Student Engagement Scale	Undergraduate students	1. Class atmosphere 2. Facilities provided in the campus 3. Course work 4. Identical social stata within the classroom 5. Personality and competence of teacher 6. Policies applied within the classroom
Vongkulluksn et al. (2022)	Cognitive Engagement with Technology	9th to 12th grade students	1. Retrieving 2. Processing 3. Generating
Kim and Song (2023)	Agentic Engagement Scale	Unspecified	1. Agentic support requests 2. Agentic learning strategies 3. Agentic learning construction

Figure 1. *Measurement Tools for Course Engagement*

Method

Research Model

This study on the development of the SSCES for 4th grade students was conducted through a survey design. The main purpose of this design is to examine the characteristics, attitudes, beliefs, behaviors, and thoughts of a particular community (Gay et al., 2012). Research based on the survey design can be conducted cross-sectionally or longitudinally (Fraenkel et al., 2012). In the present study, a cross-sectional survey design was used and data from different study groups was collected at various stages of the scale development process. The research was carried out within the scope of the TUBİTAK project carried out between December 1, 2020, and December 1, 2021. Data collection studies of the research were completed in 2021.

Participants

A total of 730 4th grade students were included in the development of the SSCES. Schumacker and Lomax (2004) discussed in their study the importance of conducting "exploratory factor analysis" (EFA) and "confirmatory factor analysis" (CFA) with various data sets during scale development processes. In the current study, data were collected from four different study groups. Respectively 50 students for the pilot application, 419 students for the EFA, 210 students for the CFA, and 51 students for the reliability analysis. Detailed information about the study groups is presented in Figure 2.
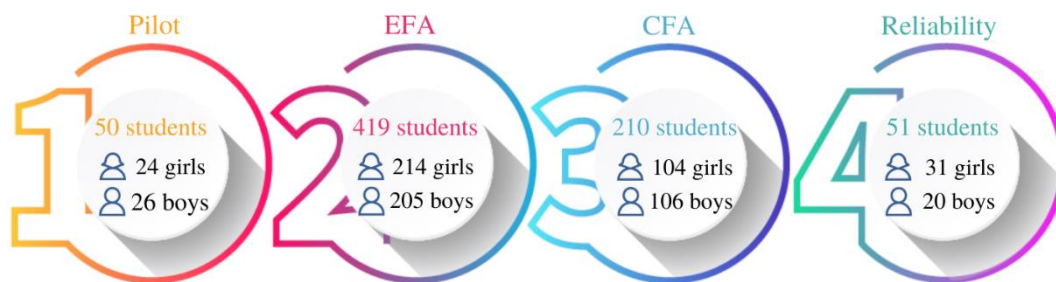
Figure 2. *Distribution of Study Groups*

It has been argued that scale development processes that include 100 participants have poor adequacy, ones that include 200 participants have fair adequacy, ones that include 300 participants have good adequacy, ones that include 500 participants have very good adequacy, and ones that include 1000 or more participants have excellent adequacy (Comrey & Lee, 1992; Field, 2009). The fact that this study included 730 elementary school students indicates that adequacy is very good.

Scale Development Process

The scale development steps recommended by Develis (2012), and Carpenter (2018) were adopted during the development of the SSCES. Taking into account the eight steps proposed by DeVellis (2012) and the ten steps proposed by Carpenter (2018), the following work was carried out in the scale development process:

Generate an item pool

Before creating the item pool for the SSCES during the scale development process, a literature review was conducted first as recommended (Carpenter, 2018; DeVellis, 2012). In accordance with the information obtained through the review, behaviors that indicate course engagement were identified. In addition, course engagement scales included in the literature were also examined, and scale items created by Handelsmans et al. (2005), Mazer (2012), Wang et al. (2014), Lin and Huang (2018) were utilized in the pool of items. Information regarding the scales and the scale items used are presented in Figure 3.
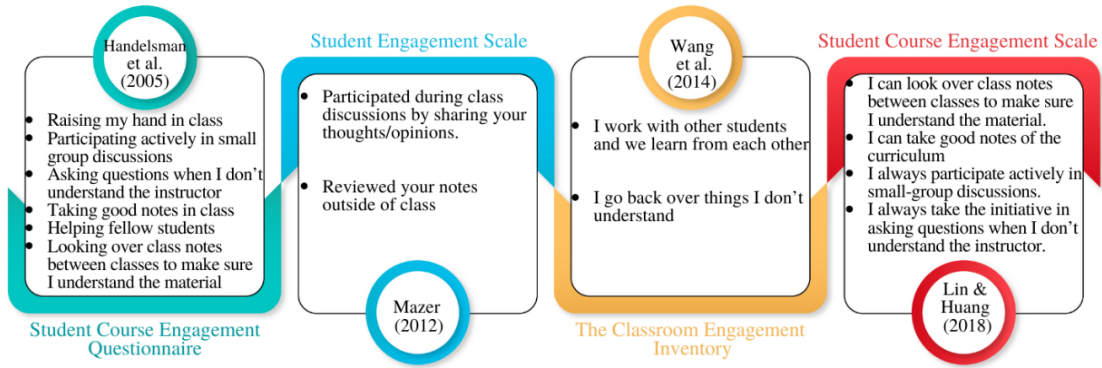
Figure 3. *Scales Used in the Creation of the Item Pool*

The scale items presented in Figure 3 were translated into Turkish and simplified to cater to the comprehension level of elementary school students. Subsequently items were rearranged to assess social studies course engagement. In order to establish the highest level of credibility the item pool created was presented to four field experts for their opinions (Carpenter, 2018; DeVellis, 2012). In line with the opinions received from field experts, new items were added to the item pool and existing items were rearranged. The process elicited an item pool consisting of a total of 40 items. The final version of the SSCES had a structure of 12 items. In this context, it is thought that the item pool of 40 items was of sufficient size (Carpenter, 2018).

Determine the format for measurement

Results of studies conducted with young age groups, it was observed that Likert-type scales made more reliable and valid measurements (İlhan et al., 2022), and that students had an easier time filling them out, tending to prefer them to alternative methods (Van Laerhoven et al., 2004). These were the reasons why a Likert-type structure was chosen for the SSCES. Considering the cognitive and affective characteristics of 4th grade students, a 4-point Likert type was created (Alan & Atalay-Kabasakal, 2020). Mellor and Moore (2014) determined that word-based Likert-type scales have higher fit compared to numeric Likert-type scales in measurements of characteristics of young age groups. For this reason, the scale was structured to contain word-based answers instead of numeric answers (Always, Often, Sometimes, Never).

Pilot application

According to Carpenter (2018), it is recommended to conduct a pilot study with a study group comprising 50-100 participants as part of the scale development process, in order to perform an initial EFA. In this study, the draft version of the SSCES consisting of 40 items was administered to a pilot group consisting of 50 4th grade students. Following the pilot application, the internal consistency coefficient of the item pool was found to be 0.89. Four items with item total correlation coefficients below 0.20 were eliminated from the item pool, while seven items with item total correlation coefficients ranging from 0.20 to 0.30 were reviewed by field experts for feedback. The seven relevant items were revised based on the input received from the field experts. After reorganizing the item pool, the factor analysis values were calculated for the remaining 36 items for preliminary assessment.

Structural validity and reliability analysis

To assess the structural validity of the scale, an EFA was conducted using the dataset obtained from the students, utilizing the SPSS package program. The EFA resulted in the creation of a scale structure consisting of 12 items and two sub-dimensions. To evaluate the model fit of the obtained structure, CFA was employed using the AMOS package program, based on data obtained from 210 4th-grade students. "Cronbach's Alpha", "McDonald's Omega" internal consistency coefficients, and test-retest reliability were utilized to assess the reliability of the SSCES. These analyses were made via SPSS package program with the data set obtained from 50 4th grade students.

Data Analysis

EFA and CFA were conducted to examine the structural validity of the SSCES. KMO and Bartlett tests were used to determine the suitability of the data set for EFA. The Promax oblique rotation technique was used in the factor analysis. According to Tabachnick and Fidell (2013), the Promax oblique rotation technique can be utilized in scale structures where the sub-dimensions are related to each other. It was ensured that the eigenvalues of the items in the scale were at least 1.00, the item factor loads were at least 0.32, and the item-total correlation coefficients were at least 0.30 (Field, 2009; Tabachnick & Fidell, 2013).

"Chi-Square Goodness of Fit Test", "Comparative Fit Index", "Tucker Lewis Index", "Incremental Fit Index", "Root Mean Square Error of Approximation", "Goodness of Fit Index", "Root Mean Square Error of Approximation", "Goodness of Fit Index", "Adjusted Goodness of Fit Index", "Root Mean Square Residual" and "Standardized Root Mean Square Residual" fit indices were used in the CFA. "Pearson Product-Moment Correlation Coefficient" was used to examine the relationship between the sub-dimensions of the scale.

While "Cronbach's Alpha" coefficient has commonly been utilized in reliability analyses, Hayes and Coutts (2020) have recommended the use of "McDonald's Omega" coefficient as an alternative. Therefore, both "Cronbach's Alpha" and "McDonald's Omega" internal consistency coefficients were employed in this study to assess the reliability of the SSCES. Four weeks after the data collection for reliability analyses, the test-retest reliability was examined by collecting data from the same study group again.

Ethical Procedures

Ethical Procedures Ethical Committee consent for current research was obtained from the Ethics Committee of Atatürk University Educational Sciences (Num:06; Date: 19.03.2020).

Results

Exploratory Factor Analysis Results

The EFA of the SSCES was conducted with the data obtained from 419 4th grade students. As a result, the KMO value was calculated as 0.924 and it was determined that the Bartlett test results were significant ($\chi2=5341.608$, p=0.00). Sample size was decided to be adequate, so the analysis was initiated (Field, 2009; Pallant, 2015). The items that had insufficient factor load values or convergent structures with different factors were identified and removed from the scale. Correlation matrix and anti-image matrix of the remaining items were examined and KMO and Bartlett tests were repeated. Scree plot table, the eigenvalues and the explained variance ratios of the items were examined to determine the number of factors, and the classifications of engagement included in the literature were taken into account (Costello & Osborne, 2005). It was observed that the breaks in the scree plot table of the final version of the scale, which consisted of 12 items, indicated a structure consisting of two factors. Findings regarding the factor structure of the scale are presented in Table 1 and Table 2.

Table 1
The Eigenvalues and Explained Variance of the Factors

Factor	Eigenvalues	of Variance%	Cumulative%
Individual Engagement	4.788	39.899	39.899
Interaction Engagement	1.406	11.717	51.616

The EFA revealed a scale structure comprising 12 items and two sub-dimensions. It was determined that the 2-factor structure of the scale accounted for a total variance of 51.62%. It was also concluded that the first dimension of the scale named "individual engagement", contributed to explaining 39.90% of the total variance, while the second dimension named "interaction engagement" contributed to explaining 11.72% of the total variance. A total variance between 40% and 60% percent is considered ideal for social science scales (Scherer et al., 1988).

Table 2
EFA Results

Item Number	Item	Item Total Correlation	Extraction	Component	
				Individual	Interaction
1	SSCE-9	.535	.513	.736	
2	SSCE-7	.568	.555	.762	
3	SSCE-21	.631	.608	.752	
4	SSCE-26	.535	.519	.742	
5	SSCE-24	.637	.588	.704	
6	SSCE-18	.528	.493	.716	
7	SSCE-10	.505	.545		.776
8	SSCE-17	.475	.517		.767
9	SSCE-33	.514	.504		.711
10	SSCE-31	.546	.501		.658
11	SSCE-28	.547	.446		.548
12	SSCE-27	.458	.405		.627

Judging from the data in Table 2, the item total correlations varied between 0.46 and 0.64. Field (2009) advised that the item total correlations be 0.30 or above to prove the relationship of each item in the scale with the entirety of the scale. The extraction values presented in Table 2 indicated that all the remaining items should be included in the structure of the scale. Also, items' factor loads in the scale varied between 0.55 and 0.78. Tabachnick and Fidell (2013) suggest that item factor loads should be at least 0.32 or above. Comrey and Lee (1992) narrow the definition further, classifying factor loads over 0.71 as excellent, factor loads over 0.63 as very good and factor loads over 0.55 as good. This means that the item factor loads of the scale are fairly adequate.

Although not presented in the Table 2 it was also found that the values in the communalities varied between 0.41 and 0.61, indicating that each item explained more than 40% variance. Costello and Osborne (2005) deem communalities between 0.40 and 0.70 to be adequate for social sciences scale development studies. Each item included in the SSCES seemed to contribute to the structure of the scale and explain an adequate percentage of variance.

The relationship between the sub-dimensions of the scale was examined via Pearson Product-Moment Correlation Coefficient. As a prerequisite for the correlation analysis, the normality of the distribution of scores obtained from the scale was examined. The results are presented in Table 3.

Table 3
Correlation Between Sub-Dimensions

	Individual Engagement	Interaction Engagement	Social Studies Course Engagement
Individual Engagement	1	.469**	.869**
Interaction Engagement	.469**	1	.845**
Social Studies Course Engagement	.869**	.845**	1

Table 3 shows that there was a moderately significant (R=0.469, p<0.05) correlation between the "Individual Engagement" and "Interaction Engagement" sub-dimensions of the SSCES. The obtained correlation coefficients also indicated that there was no multidimensionality problem between the sub-dimensions of the scale. A very significant (R=0.869, p<0.05) correlation was determined between the "Individual Engagement" sub-dimension and the entirety of the scale, and there was a very significant (R=0.845, p<0.05) correlation between the "Interaction Engagement" sub-dimension and the entirety of the scale.

Confirmatory Factor Analysis Results

A different study group consisting of 210 4th grade students was formed to obtain data in order to conduct a CFA for the SSCES. The model fit of the 12 items and the 2-factor structure identified through the EFA was examined via CFA. Based on the compliance indices obtained with the analysis, it was determined that the model fit of the scale was adequate ($\chi2$= 69.624, sd=53, p=0.06, $\chi2$/df=1.314). The fit index values were calculated as CFI=0.96, TLI=0.95, IFI=0.96, RMSEA=0.039, GFI=0.95, AGFI=0.92, RMR=0.048 and SRMR=0.053.

Table 4
Model Fit Indices of CFA

Indices	Criteria		Findings	Result
	Perfect Fit	Acceptable Fit		
χ^2/df	≤ 3	≤ 4-5	1.314	"Perfect"
CFI	≥ .95	≥ .90	.96	"Perfect"
TLI	≥ .95	≥ .90	.95	"Perfect"
IFI	≥ .95	≥ .90	.96	"Perfect"
RMSEA	≤ .05	≤ .08	.039	"Perfect"
GFI	≥ .90	≥ .85	.95	"Perfect"
AGFI	≥ .90	≥ .85	.92	"Perfect"
RMR	≤ .05	≤ .08	.048	"Perfect"
SRMR	≤ .05	≤ .08	.053	"Acceptable"

In accordance with the fit indices presented in Table 4, 12 items and the 2-factor structure appeared to have a very good fit and structural validity was achieved (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2013). The 2-dimensional scale structure was confirmed to have adequate model fit as a result of the CFA. Scale structure is presented in Figure 4.

Upon reviewing Figure 4, which illustrates the two-dimensional structure of the SSCES, it is evident that the standardized factor loadings for the individual engagement dimension range from 0.52 to 0.68. Also, factor loads for the interaction engagement dimension are between 0.34 and 0.71. It was found that the model fit of the scale was adequate.
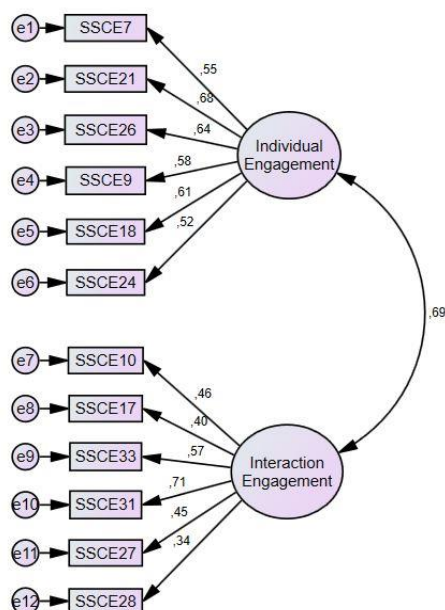
Figure 4. *Model Structure*

Reliability Analysis Results

A different study group consisting of 51 4th graders was formed to obtain data in order to conduct a reliability analysis for the SSCES. "Cronbach's Alpha" and "McDonald's Omega" coefficients are presented in Table 5.

Table 5
Reliability Analysis Results

	Cronbach's Alpha	McDonald's Omega
Individual Engagement	.82	.82
Interaction Engagement	.71	.71
Social Studies Course Engagement (total)	.81	.81

According to the analysis findings, the reliability coefficient of the "individual engagement" sub-dimension of the scale was 0.82, while the reliability coefficient of the "interaction engagement" sub-dimension was 0.71, and the reliability coefficient of the entirety of the scale was established to be 0.81. Consequently, the SSCES has adequate reliability for scores of both the sub-dimensions and the entirety of the scale (DeVellis, 2012; Fraenkel et al., 2012). The scale was repeated four weeks after the reliability analyses with the 51 4th grade students that participated in the reliability analyses. According to the findings obtained from the test-retest analysis, the correlation coefficient between the two applications was 0.72. As a result, the SSCES was determined to have an adequate test-retest reliability.

Discussion

In this research, the development of the SSCES specifically designed for elementary school students was undertaken, and the scale's reliability and validity were examined. The study employed a survey model and involved a total of 730 4th grade students. Through the application of EFA, a 2-factor structure comprising 12 items was derived. It was found that this 2-factor structure accounted for a cumulative variance of 51.62%. The scale appeared to explain an ideal percentage of total variance (Scherer et al, 1988). Based on the CFA it was determined that the version of the scale consisting of 2 sub-dimensions and 12 items had and adequate model fit (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2013). When the correlation status between the sub-dimensions was examined, it was determined that there was a moderately significant correlation between the two sub-dimensions of the scale. Reliability analyses conducted that both the internal consistency and the test-retest coefficients of the scale were adequate. The process elicited a reliable and valid measurement tool that can be used to examine the engagement of 4th grade students towards the social studies course.

The classification of engagement that is widely accepted in the literature consists of three dimensions: "cognitive", "affective" and "behavioral" engagement (Deng vd., 2020; Fredricks et al., 2004; Wang vd., 2014; Wang vd., 2016). In the current study, unlike the literature, the Social Studies Course Engagement Scale had a two-dimensional structure regarding course engagement. Students' individual engagement behaviors during the learning process were examined through the first dimension, while their engagement behaviors that involve interaction with their teachers and friends were examined through the second dimension. It is thought that this two-dimensional structure regarding engagement is correlated with the nature of the social studies course.

The first sub-dimension of the SSCES was named "Individual Engagement". Individual engagement refers to students' individual efforts towards learning inside and outside of the classroom. Ryu and Lombardi (2015) consider individual engagement as a process that involves assuming roles and responsibilities regarding learning. Upon considering the aims of this social studies course, it is observed that individual engagement is closely correlated with the overall aims. Students' individual engagement in the social studies course, meaning assuming their own learning responsibilities, is an important step in their learning to become engaged individuals.

The second sub-dimension of the SSCES was named "Interaction Engagement". Interaction engagement refers to the engagement behaviors of students regarding interacting with their peers and teachers during the lesson. The social studies course aims to teach individuals to work in cooperation with individuals with different cultural backgrounds, while respecting these different cultural backgrounds (Mindes, 2014). Interaction engagement is based on individuals sharing their thoughts with

other individuals while respecting these individuals and working in cooperation and helpfulness. In conclusion, interactive engagement is a dimension of engagement that serves ultimate aims for the social studies course.

Appendix I

Social Studies Course Engagement Scale		Never	Sometimes	Often	Always
Individual Engagement	1. I take notes of what I learn during the social studies class.	Never	Sometimes	Often	Always
	2. I review the subjects I learned in the social studies course after the class.	Never	Sometimes	Often	Always
	3. After the social studies class, I study subjects that I did not understand during the class.	Never	Sometimes	Often	Always
	4. I study social studies regularly every day.	Never	Sometimes	Often	Always
	5. I prepare for the social studies class by reading about the subject beforehand.	Never	Sometimes	Often	Always
	6. I keep being interested in subjects I learned in the social studies course even after the class.	Never	Sometimes	Often	Always
Interaction Engagement	7. When I don't understand a social studies subject, I ask my teacher questions about the subject.	Never	Sometimes	Often	Always
	8. I ask my teacher for help when I need it in the social studies class.	Never	Sometimes	Often	Always
	9. I like to help my friends in the social studies class	Never	Sometimes	Often	Always
	10. I like to share my thoughts about social studies subjects with my friends.	Never	Sometimes	Often	Always
	11. I like to participate in course conversations in the social studies class.	Never	Sometimes	Often	Always
	12. I raise my hand in the social studies class.	Never	Sometimes	Often	Always

Appendix II

Sosyal Bilgiler Dersine Katılım Ölçeği		Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
Bireysel Katılım	1. Sosyal Bilgiler dersi sırasında öğrendiklerimi not alırım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	2. Sosyal Bilgiler dersinde öğrendiğim konuları dersten sonra tekrar ederim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	3. Sosyal Bilgiler dersinden sonra derste anlamadığım konulara çalışırım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	4. Her gün düzenli olarak Sosyal Bilgiler dersine çalışırım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	5. Sosyal Bilgiler dersinden önce konuyu okuyarak hazırlık yaparım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	6. Sosyal Bilgiler dersinden sonra da derste öğrendiğim konularla ilgilenirim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
Etkileşimli Katılım	7. Sosyal Bilgiler dersinde anlatılanları anlamadığımda öğretmenime sorarım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	8. Sosyal Bilgiler dersinde ihtiyacım olduğunda öğretmenimden yardım isterim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	9. Sosyal Bilgiler dersinde arkadaşlarıma yardımcı olmak isterim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	10. Sosyal Bilgiler konularıyla ilgili düşüncelerimi arkadaşlarımla paylaşmak isterim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	11. Sosyal Bilgiler dersinde ders içi konuşmalara katılmak isterim.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman
	12. Sosyal Bilgiler dersinde parmak kaldırırım.	Hiçbir Zaman	Bazen	Çoğu Zaman	Her Zaman

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Robotic Coding Perceptions of Middle School Students

Hasan Gökçe[*]   **Zeliha Gökçe**[**]

Oktay Bektaş[***]   **Aslı Saylan Kırmızıgül**[****]

Abstract

This study aims to determine middle school students' perceptions of robotic coding. For this purpose, the case study design of the qualitative research method was used in the research. The research was carried out with 76 middle school students studying in a district of Kayseri province. A questionnaire consisting of nine open-ended questions was used as a data collection tool. The questions were asked to the participants in the online environment. The data were analyzed by content analysis, which is one of the qualitative data analysis types. In this direction, codes and categories related to the data were determined. The findings of the research are explained through direct quotations. The research concluded that the students associated the concept of the robot with technology, the students had never encountered a robot before, they wanted to design a robot, the concept of coding was expressed as giving commands, and they wanted to receive coding training. Based on these results, we recommended expanding robotic coding training.

Keywords: Coding, middle school students, perception, robotic.

[*]*Corresponding Author:* Dr., Ministry of Education, Kayseri, Türkiye. E-mail: hasangokce3838@gmail.com, https://orcid.org/0000-0002-1518-2295.

[**] Expert, Kayseri, Türkiye. E-mail: zelihab.3837@gmail.com, https://orcid.org/0000-0003-0640-1879.

[***]Prof. Dr., Erciyes University, Faculty of Education, Department of Science Education, Kayseri, Türkiye. E-mail: obektas@erciyes.edu.tr, https://orcid.org/0000-0002-2562-2864.

[****] Assoc. Prof. Dr., Erciyes University, Faculty of Education, Department of Science Education, Kayseri, Türkiye. E-mail: aslisaylan@erciyes.edu.tr, https://orcid.org/0000-0001-5678-8050.

Ortaokul Öğrencilerinin Robotik Kodlama Algıları[*]

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Hasan Gökçe[*] **Zeliha Gökçe**[**]
Oktay Bektaş[***] **Aslı Saylan Kırmızıgül**[****]

Öz

Bu araştırmada ortaokul öğrencilerinin robotik kodlamaya ilişkin algılarını belirlemek amaçlanmıştır. Bu amaç doğrultusunda araştırmada nitel araştırma yönteminin durum çalışması deseni kullanılmıştır. Araştırma Kayseri ilinin bir ilçesinde öğrenim görmekte olan 76 ortaokul öğrencisi ile yürütülmüştür. Veri toplama aracı olarak dokuz adet açık uçlu sorudan oluşan anket kullanılmıştır. Katılımcılara çevrimiçi ortamda sunulan anket sorularından elde edilen veriler nitel veri analizi çeşitlerinden olan içerik analizi ile çözümlenmiştir. Bu doğrultuda verilere ilişkin kod ve kategoriler belirlenmiştir. Araştırmanın bulguları doğrudan alıntılar yoluyla açıklanmıştır. Araştırmada; öğrencilerin robot kavramını teknoloji ile ilişkilendirdiği, öğrencilerin daha önce bir robotla karşılaşmadıkları, bir robot tasarlamak istedikleri, kodlama kavramını ise komut verme olarak ifade ettikleri ve kodlama eğitimi almak istedikleri gibi sonuçlara ulaşılmıştır. Bu sonuçlardan yola çıkılarak robotik kodlama eğitimlerinin yaygınlaştırılması önerilebilir.

Anahtar Sözcükler: Kodlama, ortaokul öğrencileri, algı, robotik.

[*]*Sorumlu Yazar:* Dr., Millî Eğitim Bakanlığı, Kayseri, Türkiye. E posta: hasangokce3838@gmail.com, https://orcid.org/0000-0002-1518-2295.
[**] Uzman, Kayseri, Türkiye. E posta: zelihab.3837@gmail.com, https://orcid.org/0000-0003-0640-1879.
[***]Prof. Dr., Erciyes Üniversitesi, Eğitim Fakültesi, Fen Bilgisi Eğitimi Bölümü, Kayseri, Türkiye. E posta: obektas@erciyes.edu.tr, https://orcid.org/0000-0002-2562-2864.
[****] Doç. Dr., Erciyes Üniversitesi, Eğitim Fakültesi, Fen Bilgisi Eğitimi Bölümü, Kayseri, Türkiye. E posta: aslisaylan@erciyes.edu.tr, https://orcid.org/0000-0001-5678-8050.

Introduction

Rapid developments in technology have led to changes every field, including the field of education. Along with these changes, the importance of information has increased, and methods of information access, sharing, and production have simultaneously changed. . One of the innovations brought by developments in technology is robotics technology. Robotic technologies, which are encountered in almost every aspect of daily life, have been included in educational environments to facilitate learning.

The use of robotic technologies in educational environments can occur in two ways. The first method involves the teaching of robotic technology itself as a learning object. The second and most important is the use of robotic technologies as a tool in the teaching of subjects. In this respect, robotic technologies should be used as a guide and tool for learning in the educational process (Alimisis, 2012; Altin & Pedasta, 2013). In this process, robotic activities provide opportunities for students to discover and apply knowledge to find solutions to the problems they may encounter in daily life. They also provide an environment for students to use scientific methods such as testing hypotheses, problem-solving, and learning through discovery, and to increase their imagination (Barak & Assal, 2016; Ching et al., 2019; Elkin et al., 2016; Isnaini et al., 2020; Taylor & Baek, 2017). Robotics helps to embody abstract concepts and present them in a visual form (Thanyaphongphat et al., 2020). Additionally, it provides a practical and interesting environment for the acquisition of basic electronics knowledge that students may encounter in daily life (Sullivan & Bers, 2016).

An increase in the importance given to robotics also increases the importance given to coding. Coding, which is defined as telling a robot what to do, is not just defined with robots, and can also be defined as communicating with tools such as computers, applications, and phones (Ozer Sanal & Erdem, 2017). Considering that in today's technology, each machine and electronic device carries a brain within itself, it will be of great benefit to the public in terms of managing and robotizing these brains by giving commands from outside, teaching this to students, producing the technologies of the future, and increasing their tendency towards scientific processes (Goksoy & Yilmaz, 2018).

Theoretical framework

The educational environment offered with robotic coding has the potential to enable students to not only readily access information but also to take an active part in the process (Jung et al., 2019). For this reason, robotic learning environments have been strongly associated with constructivist learning theory since the middle of the 20th century (Barak & Assal, 2016; Kucuk & Sisman, 2018).

The concepts of "active participation" and "learning by doing and experiencing" provided by constructivist educational environments also form the foundation of the educational environment realized with robotic coding (Cakir, 2019). In this respect, while constructivist educational environments facilitate the learning of robotic coding, the use of robotic coding in educational environments also supports the constructivist philosophy as it enables learning by doing. In other words, constructivist philosophy and robotic coding activities used in educational environments can be thought of as an intertwined system of wheels (Figure 1).
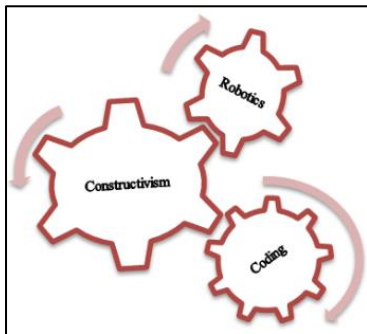
Figure 1. *Robotic Coding and Constructivist Approach*

Literature review

Cakir (2019) examined the relationship between robotic coding and academic achievement. Additionally, previously conducted studies have examined various topics such as attitudes towards robotic coding (Avci et al., 2021; Kaloti-Hallak, 2014; Sumer et al., 2019; Welch and Huffman, 2011), motivation (Peng et al., 2020), problem-solving skills (Cakir et al., 2021; Ciftci & Bildiren, 2019), scientific process skills (Cakir, 2019), self-efficacy (Banzato & Tosato, 2017; Guleryuz, 2019; Kasalak & Altun, 2020), and creative thinking skills (Cakir et al., 2021; Jamali, 2019; Noh & Lee, 2019).

Similar to the current research, Yayla Eskici et al. (2020), aiming to investigate the effect of robotic coding on students' mental images, asked two open-ended questions in their study they conducted with eight middle school students. In their study, they concluded that robotics coding had a positive effect on students' mental images. In their study, Ceylan and Gundogdu (2018) aimed to determine the perceptions of school principals, information technology teachers, students, and parents on coding. As a result of the study, it was concluded that the participants had different perceptions and that they did not have a complete understanding and awareness of the concept of coding. Timur et al. (2021) examined students' images using the draw-tell technique. As a result of the research, it was seen that students generally drew robots that were humanoid and had lifelike characteristics.

Numerous studies in the literature have investigated the perceptions of teachers (Butuner & Dundar, 2018; Ceylan & Gundogdu, 2018; Goksoy & Yilmaz, 2018; Ugur Erdogmus, 2021), preschool (Bozkurt Polat & Kabadayi, 2021), primary (Timur et al., 2021) and secondary school students (Ceylan & Gundogdu, 2018; Yayla Eskici et al., 2020) towards robotics coding. At the middle school level, Ceylan & Gündoğdu (2018) determined the perceptions of students who had received coding education in previous years and those who were currently receiving it. For this purpose, the authors conducted interviews consisting of open-ended questions with five students. Similarly, Yayla Eskici et al. (2020) worked with eight students with basic coding knowledge and revealed student perceptions through student drawings. The current study revealed the perceptions of middle school students who did not receive education regarding robotic coding. Therefore, the authors revealed students' perceptions before they acquired knowledge and experience. In this respect, this study is unique because the perceptions of students who have not received robotic coding education will shed light on robotic coding education planners as they are free from experience and prejudice. From this perspective, a robotic coding education planned through the consideration of the perceptions of students who have not received robotic coding education will be a pioneer in raising creative students.

In the current research, nine open-ended questions were asked to 76 students. In this respect, this study aims to investigate student perceptions in a more comprehensive and detailed manner. Considering the advantages offered by robotics and coding to students and educational environments, it is important to deal with students' perceptions of these concepts in-depth and comprehensively. This research aims to reveal the perceptions of students regarding robotics and coding and to reveal their thoughts. Subsequently, support will be provided in the planning and continuation of training to be held in the future, taking the perceptions of the students into account. To this end, the research question was determined as follows:

1) What are the perceptions of middle school students regarding robotic coding?

Method

Research Design

In this study, the case study design of the qualitative research method was utilized. A case study aims to obtain in-depth information, describe the situation in question, or create themes through interviews, observations, documents, or reports about a determined situation at a certain time (Merriam, 2009).

Research Sample

This study was conducted with 76 students (11-14 years old) selected voluntarily, studying at 16 public middle schools in Kayseri in the fall semester of the 2021-2022 academic year. Convenience sampling was used to determine the participants included in the study group. Convenience sampling is the sampling method conducted through the determination of the individuals suitable for the research task at hand (Fraenkel et al., 2012).

In the study, the confidentiality of the participants' information was given importance and the participants were represented with the letter "P". Participants P18, P22, P28, P52, P57, P67, and P70 stated that they have previously received robotic coding training.

Research Instruments

In this study, a questionnaire consisting of open-ended questions, one of the data collection tools commonly used in case studies, was utilized (Johnson & Christensen, 2019). The questions in the questionnaires aimed to determine the perceptions of the students regarding robotic coding. The questions were prepared by the researchers based on the results of a literature review (Ceylan & Gundogdu, 2018; Yayla Eskici et al., 2020). The questionnaire, which was first prepared as a draft, was examined by an expert science educator and a Turkish teacher, followed by a finalization process in which the necessary arrangements were made. The questions in the questionnaire have been given below:

1) What comes to mind when you think of a robot?
2) Have you ever seen a robot in your life? If yes, where did you see it? What were the characteristics of the robot?
3) Would you like to design a robot? Why?
4) If you were to design a robot, what would be the characteristics of the robot you designed?
5) What would you need to design a robot?
6) What comes to mind when you think of coding?
7) Would you like to take coding training?
8) What do you need to be able to code?
9) Would you like to work in a profession that will require you to code in the future?

Validity and reliability

The validity and reliability studies are detailed in Table 1 under the headings of internal validity, external validity, internal reliability, and external reliability.

Table 1

Precautions Regarding Validity and Reliability

Validity-Reliability	Definition	Measures taken
Internal Validity	The consistent progress of the entire research process in research and the clear expression of this consistency (Yildirim & Simsek, 2016). It is recommended to include participant confirmation and expert opinion to ensure internal validity. Additionally, data-sources, investigators, methods, and theory triangulation can be done (Merriam, 2009).	● The opinions of an expert science educator and a Turkish teacher were taken for the questionnaire to be used in the research. ● Four researchers involved in the study participated in the data collection and analysis processes. (Investigator triangulation) ● The direct opinions of the participants were included in the findings section. ● After the analysis, participant confirmation was carried out by asking the participants whether the findings of the study accurately reflected their thoughts. ● Meaningless and irrelevant expressions were not included in the content analysis.

External Validity	The research results are generalizable (Fraenkel et al., 2012; Yildirim & Simsek, 2016).	• The steps performed in the research are explained in detail. • Participant confidentiality was protected by giving codes to the participants.
Internal Reliability	Different researchers obtaining similar results with the same data (Fraenkel et al., 2012; Yildirim & Simsek, 2016).	• Findings are presented as they are, without comment. • The purpose and result of the research are clearly stated.
External Reliability	Whether or not data similar to research data can be obtained in environments similar to that of the research (Fraenkel et al., 2012; Yildirim & Simsek, 2016).	• The findings, conclusion, and discussion sections of the research are explained clearly and comprehensibly. • The findings of the research were explained in line with the expert opinions.

Data Analysis

The data was analyzed through content analysis. The data was defined by the researchers and codes were determined to summarize the responses of the participants. Similar codes were grouped under categories that summarized the questions at hand. Additionally, the data was examined by the four researchers, and the final codes were determined by reaching a consensus with them. The percentage of agreement of the codes as determined by the four researchers was calculated according to Miles and Huberman's (2015) formula. For the content analysis to be reliable, it is necessary to provide a consensus rate of 80% among the coding of the researchers (Miles & Huberman, 2015; Patton, 2002). Since the percentage of the agreement between the four coders was found to be 85% in the study, the findings obtained were reliable.

<div align="center">

Results

</div>

In this section, the data was categorized and listed in tables. Each table contains the codes for a category. Additionally, direct quotations of the participants for each code are also included in the tables.

Table 2
Findings Regarding the Category of "Associations to the Concept of Robot"

Codes	f	%	Sample statements
Technology	29	38.16	P43: *"Machines that make human life easier by developing with technology."*
Machine	24	31.58	P9: *"Machines that make our job easier."*
Assistant	24	31.58	P21: *"Technological tool made by people to make our lives easier."*
Artificial intelligence	15	19.74	P35: *"Artificial intelligence made to make things easier"*
Invention	6	7.90	P38: *"All of the inventions that aid human affairs or human health"*
Scientific and Technological Research Council of Turkey (TUBITAK)	1	1.32	P2: *"Scientific and Technological Research Council of Turkey (TUBITAK)"*
Toy	1	1.32	P65: *"Toy that moves all over"*
Science	1	1.32	P75: *"Science"*

When Table 2 is examined, it can be observed that the students mostly associated the concept of the robot with the concepts of technology, machines, and assistants. Moreover, many students associated it with the concept of artificial intelligence.

Table 3
Findings Regarding the Category of "Encountering with the Robot"

Codes	f	%	Sample statements
No	57	75.00	P69: *"No, I haven't seen."* P74: *"No"*
Yes	19	25.00	P22: *"Yes. I saw it when I attended coding training. He was making small movements when commanded."*

Most of the students have not encountered a robot before (Table 3). Students who stated that they had seen a robot before, on the other hand, stated that they generally saw it on television and in educational environments.

Table 4
Findings Regarding the Category of "Desire to Design a Robot"

Codes	f	%	Sample statements
Being beneficial to humanity	28	36.84	P3: *"Yes, I would like, because it's nice to make people's lives easier."*
Individual benefit	25	32.90	P63: *"Yes, I would like to design a robot, but I would usually use the robot I designed to make my daily life easier."*
Curiosity	8	10.53	P48: *"Yes, because I find robots interesting and I would love to study them."*
Being beneficial to the country	5	6.58	P38: *"Yes, because I would like to contribute to our country and the whole world."*
Interest	5	6.58	P19: *"Yes. I like to fix things."*
Being happy	4	5.26	P1: *"Yes, I would be happy when it walks."*
Being beneficial to the nature	2	2.63	P57: *"Yes. Because most importantly, I would like to make a robot to pollute the environment and nature less."*
Making difference	2	2.63	P44: *"Yes, because I would like to design in a different way other than everyone else, be one of the highlights, and share my knowledge."*
I do not want to design a robot	2	2.63	P68: *"I do not want to design robots because I am afraid of robots."*
Experiment	1	1.32	P30: *"To make experiments."*

Students generally wanted to design a robot (Table 4). The general reason for this desire was the thought that the robots they designed would benefit humanity and themselves. Additionally, it can be seen that students' curiosity about robots is also effective in their desire to design them.

Table 5
Findings Regarding the Category of "Features of Robot Designs"

Codes	f	%	Sample statements
Showing human characteristics	47	61.84	P1: *"It should walk, talk and play ball."* P12: *"I would like to design a robot that teaches me like a teacher."* P17: *"It would talk to people and understand them."* P19: *"The robot would do the things we do like a human, there would be two of us."* P34: *"I would like to make a design that can fly, walk and swim."*
Serving humanity	14	18.42	P75: *"I would like to design a robot that will meet the needs of people with disabilities."*
Doing any kind of business	13	17.11	P23: *"A robot that can speak and understand all the languages of the world, can make all kinds of drawings, is stronger than humans, can always recognize the person in front of it, can take pictures whenever we want, answer incoming calls, has a video player, and can drive a vehicle."*
Defense	5	7	P57: *"A militarily strong robot, can think analytically, can make the job of our soldiers easier, and neutralize the enemy as soon as possible. It would have domestic and national materials that are strong like steel, flexible like pasta, highly mobile."*

Detection	4	5.26	P46: *"I wish it could detect a person."*
Protecting nature	4	5.26	P8: *"Cleanliness, self-defense and being kind to animals"*
Being waterproof	4	5.26	P15: *"To be waterproof, to talk, to be smart, to be able to answer my question."*
Artificial intelligence	3	3.95	P11: *"It would have artificial intelligence."*
Repairing	2	2.63	P54: *"Must be able to repair the car and be waterproof."*
Being not scary	1	1.32	P68: *"Doing people's work, being tolerant, being not scary"*
Storing information	1	1.32	P39: *"I would like to design a robot that can store information."*
Being customized	1	1.32	P5: *"It could talk and it could be customized"*
Imitating	1	1.32	P10: *"It would have an imitation feature."*
Auto-sleep	1	1.32	P74: *"Auto-sleep and waterproofing"*
Having a screen	1	1.32	P55: *"I would like it to have a screen."*

When Table 5 is examined, it can be seen that the robots would generally exhibit human features such as speaking, swimming, walking, and sensing. Additionally, according to many students, serving humanity and doing all kinds of work are features of robots.

Table 6

Findings Regarding the Category of "Needs in Robot Design"

Codes	f	%	Sample statements
Technological tool	51	67.11	P3: *"Example of technological tools: tablet."* P31: *"Battery, cable, electricity, aluminum, button."*
Metal	19	25.00	P20: *"Things like metal and solder."*
Cable	15	19.74	P31: *"Cable, sensor, processor, motion motors."*
Robotic coding	9	11.84	P57: *"Imagination, a coding program, motion sensor, powerful processor, waterproof frame."*
Knowledge	7	9.21	P53: *"Artificial intelligence, knowledge, equipment."*
Electricity	5	6.58	P42: *"Metal, battery, motor, electricity, circuit components."*
Artificial intelligence	5	6.58	P11: *"Artificial intelligence."*
Unclear	5	6.58	P61: *"I would need some things."*
Creative thinking	4	5.26	P68: *"I would need tools and human intelligence."*
Money	3	3.95	P1: *"Money, knowledge."*
Expert	2	2.63	P10: *"To someone who understands computer systems, to the mechanical engineers, etc."*
Employee	2	2.63	P72: *"Money, employee, some technological tools"*
Laboratory	1	1.32	P73: *"Money, employee, construction tools, atelier, laboratory"*

Table 6 indicates that students generally need technological tools to design a robot. Moreover, metal parts and cables are also needed.

Table 7

Findings Regarding the Category of "Associations to the Concept of Coding"

Codes	f	%	Sample statements
Giving commands	25	32.90	P16: *"To command something"*
Technology	15	19.74	P72: *"Computer science comes to my mind."*
Software	12	15.79	P13: *"Software"*
Robotic materials	9	11.84	P8: *"Main material inside the robot."*
Numbers	10	13.16	P42: *"Making a code with numbers."*
Password	8	10.53	P10: *"Encryption with numbers"*
Knowledge	1	1.32	P33: *"Knowledge required to build a robot."*
Applications	1	1.32	P6: *"Applications"*
Detection	1	1.32	P56: *"Applications"*

When Table 7 is examined, it can be seen that the students mostly associated the concept of coding with the concept of giving commands. On the other hand, it can be seen that many students associated coding with technology and software concepts.

Table 8
Findings Regarding the Category of "Desire to Getting Coding Education"

Codes	f	%	Sample statements
Yes	73	96.05	P23: *"I would like it very badly. I am very curious what it is like."*
No	3	3.95	P7: *"No."*

When Table 8 is examined, it can be seen that most of the students want to receive coding training, and only three students do not want to receive coding training.

Table 9
Findings Regarding the Category of "Needs for Coding"

Codes	f	%	Sample statements
Computer	45	59.21	P5: *"Computer and software."*
Electronic device	15	19.74	P52: *"First of all, I need to know the software and coding, then I need a device that can do the coding."*
Software tools	13	17.11	P34: *"Computer and software codes."*
Education	12	15.79	P43: *"Coding program, a good computer, and coding education."*
Expert	3	3.95	P2: *"A few supplementary materials and experts in their field."*
Mechanical system	3	3.95	P38: *"I would need a computer, electronic circuit, and mechanical systems."*
Internet	3	3.95	P72: *"Computer and internet"*
Tablet	3	3.95	P20: *"I would need a tablet."*
Unclear	3	3.95	P44: *"I don't know, I haven't done robotic coding before."*
Numbers and figures	2	2.63	P55: *"We need numbers and figures."*
Keyboard	2	2.63	P6: *"Computer and keyboard"*
Supplementary material	1	1.32	P2: *"A few helpful materials and an expert in his/her field."*
Cable	1	1.32	P4: *"Computer, cable, something to do coding."*
Telephone	1	1.32	P29: *"Technology (computer, tablet, telephone)"*
Algorithm	1	1.32	P13: *"Algorithm"*
Sensor	1	1.32	P28: *"A robot for robotic coding, or a device with a system that can receive the signal of my command, and a controller to give the commands."*

When Table 9 is examined, it can be seen students most need a computer to code. Additionally, students also stated that they need electronic devices, software tools, and training.

Table 10
Findings Regarding the Category of "Thoughts on Working in a Profession That Requires Coding"

Codes	f	%	Sample statements
Yes	60	78.95	P18: *"I would like to, one of my dream professions is computer engineering"*
No	14	18.42	P17: *"I want to be a pilot and fly an airplane."* P32: *"No because I want to be a doctor."*
Undecided	2	2.63	P49: *"It may or may not be…"*

Most of the students want to work in a profession that will require coding in the future (Table 10). Students who do not want to work in a profession that requires coding are interested in and willing to different professions.

Discussion, Conclusion and Recommendations

Discussion

The study aims to investigate the middle school students' perceptions of robotic coding. This research draws attention to several important findings. First of all, based on the content analysis results, most of the students stated that they have never encountered a robot before. Only a quarter of the participants stated that they had seen a robot on television or in educational settings before.

However, robots are becoming commonplace in our daily lives (Lum, 2020; Winfield et al., 2021) despite the fact very few robots look like humans. Thus, the participants may not be aware of the robots they encounter in daily life.

The results revealed that students mostly associated the concept of robots with the concepts of technology, machine, and assistant. This finding is parallel to those of the literature. In the study conducted by Cetintas & Avcu (2017) in which they examined the metaphorical perceptions of high school students regarding the concept of robotics, "technology" was the most used metaphor. Moreover, in the same study, metaphors were categorized into conceptual categories of their common features, and one of the three most common categories was "assistant". In parallel to the findings obtained in the current study, Korkmaz et al. (2014) found that one of the most frequently used metaphors for robotics by high school students were the machines in their studies.

According to the results, it can be seen that almost all of the students want to design a robot. The reason for this is that they think that the robots they design would benefit humanity and themselves. This result coincides with the results of Guleryuz's (2019) study inspecting the opinions of secondary school students about robotic coding were investigated stating that the students believe that their living standards will increase as a result of robotic coding, and it will contribute to their future lives.

Students mostly stated that they would need technological tools to design a robot. Moreover, some students said they need metal pieces and cables. As is known, even ready-made robotics kits include cables and metal parts (i.e., LEGO® NXT Mindstorms, etc.). Considering that it is inevitable to use technological tools while designing robots, the findings are meaningful. For example, to code with a set such as Arduino, add-ons such as inputs, sensors, lights and displays are needed (Kondaveeti et al., 2021).

In the study, it can be seen that the middle school students usually imagined that the robots they would design would have human and living features such as speaking, flying, swimming, walking, and sensing. Similarly, in the study conducted by Timur et al. (2021), it was found that the majority of primary school students added human and living features such as faces and hands to the robots they drew. It was reported by the researchers that anthropomorphism, which is defined as the loading of human and living features into inanimate objects, is frequently seen in young children, and that anthropomorphism mostly decreases as individuals grow older (Byrne et al., 2009; Kallery & Psillos, 2004; Kattmann, 2008; cited by Timur et al., 2021). Cetintas and Avcu (2017) also found that "human features" is one of the metaphors used by high school students for the concept of robotics. Accordingly, the finding obtained in the current study appears to be widespread.

The results revealed that the students mostly associated coding with the concept of commands. In addition to this, many students associated coding with the concepts of technology and software. In Cakir et al.'s (2021) study, it was found that gifted middle school students often included the concepts of science and technology, command, and software while defining coding. This result is parallel with the literature. Coding is defined as "the process of writing a *command* sequence to get a computer system to act" or "the process of creating *software* that automatically fulfills a specific purpose, using a coding language and tool." (Sayin & Seferoglu, 2016). Therefore, students put their fingers on the right points while describing coding.

According to the results, students mostly stated that they would need a computer to be able to code. Some students also said that they need electronic devices, software tools, and training. Likewise, the results revealed that almost all of the students want to receive coding education, and only three students do not want to receive an education on this subject. Parallel to this result, it can be seen that most of the participants want to work in a profession that will require coding in the future. Students who do not want to work in a profession that requires coding stated that they are interested and willing to work in different professions. There are three trends in the use of robotics in the field of education around the world: 1) Robotics as a learning goal, 2) robotics as a teaching aid, and 3) robotics as a learning tool. Robotics as a learning objective includes acquiring knowledge and skills required for careers in computer science, engineering, artificial intelligence, and robotics, especially at the university level. The use of robotics as a teaching aid includes the use of robotic technologies in order to assist the teacher. Finally, the use of robotics as a learning tool includes the utilization of robotics to

ensure effective learning and to increase students' motivation (Eguchi, 2012). The sooner students are introduced to robotic coding, the stronger their motivation will be to pursue careers in fields such as science, technology, mathematics, and engineering. This will undoubtedly have a long-term positive impact on the country's economy.

Conclusion

This study aimed to reveal the mental perceptions of students aged 11-14 regarding robotics and coding. The questionnaire consisting of nine open-ended questions prepared for this purpose were given to 76 students online and the data were analyzed by content analysis. In line with the findings obtained, it was concluded that students mostly associated the concept of robots with technology, machines, and assistants, that they have an interest and desire for robotics and coding, and that they expect robots to demonstrate living features. Moreover, it was observed that the students mostly associated coding with the concept of giving commands.

Recommendations

In the light of the findings, some suggestions were provided for educators and researchers who may perform studies on similar subjects in the future:

1) Considering the students imagine that the robots they will design will show human and living features, activities to introduce students to robotic applications other than humanoid robots, visits to the workshops of the relevant departments of universities and institutions and organizations working in the field of robotics can be organized.

2) In addition, designing robots that display human and liveliness characteristics in parallel with students' perceptions in the early stages of their training in robotic coding can increase students' interest and motivation.

3) This study can be repeated with different age groups. Additionally, different methods and techniques such as the draw-and-explain method could be used to collect data.

4) Research similar to this study could be conducted with students with and without knowledge regarding robotic coding. Subsequently, differences between student perceptions could be compared.

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Emergency Online Teaching and COVID-19:
Teachers' Use and Integration of Computer Technologies[*]

Hilal Çalışır[*]   Nermin Karabacak[**]

Abstract

The aim of the research was to determine the use of computer technologies and the status of integration into lessons during online teaching by class teachers during the COVID-19 pandemic. The research used a descriptive survey model. The study group for the research comprised 464 class teachers employed in official primary schools linked to the Ministry of National Education in Rize province. Two scales were used in the research; the Technology Integration Self-Efficacy Scale and the Teachers' Information and Communication Technologies Integration Approach Scale. Data were analyzed with the t test, ANOVA and correlation test. Male teachers were determined to have higher use of computer technologies and higher levels of ability to integrate it into lessons compared to female teachers. Though there was no difference in use of technology levels of teachers, their levels of ability to integrate technology into lessons differed according to seniority. The use of computer technology by teachers and levels of ability to integrate into lessons did not differ according to receiving in-service training related to technology and educational status. Teachers' use of technology and levels of ability to integrate into lessons differed according to the hours of lessons given using technology. As the levels of use of education technology by class teachers increased, their levels of ability to integrate computer technology into lessons also increased.

Keywords: Online teaching, technology integration, class teacher, Covid 19.

Acil Çevrimiçi Öğretim ve COVID-19: Öğretmenlerin Bilgisayar Teknolojilerini Kullanımı ve Entegrasyonu[*]

Makale Türü	Başvuru Tarihi	Kabul Tarihi
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Hilal Çalışır[**] **Nermin Karabacak**[**]

Öz

Bu araştırmanın amacı Covid 19 sürecinde görev yapan sınıf öğretmenlerinin çevrimiçi öğretimde bilişim teknolojilerini kullanım ve derslerine entegrasyonlarının ne durumda olduğunu belirlemektir. Araştırmada betimsel tarama modeli kullanılmıştır. Araştırmanın çalışma grubunu Rize ilindeki Millî Eğitim Bakanlığına bağlı resmi ilkokullarda çalışan 464 sınıf öğretmeni oluşturmaktadır. Araştırmada Öğretmenlerin Teknoloji Entegrasyonuna Yönelik Öz-Yeterlik Algıları ve Öğretmenlerin BİT Entegrasyon Yaklaşımları ölçeği kullanılmıştır. Veriler t testi, Anova ve Korelasyon testi analizleri kullanılarak analiz edilmiştir. Erkek öğretmenlerin, kadın öğretmenlere göre bilişim teknolojilerini kullanım ve derslerine entegre edebilme düzeylerinin daha yüksek olduğu belirlenmiştir. Öğretmenlerin teknolojiyi kullanım düzeyleri kıdeme göre farklılaşmamasına karşın teknolojiyi derslerine entegre edebilme düzeyleri farklılaşmaktadır. Öğretmenlerin bilişim teknolojilerini kullanma ve derslerine entegre edebilme düzeyleri, teknolojiyle ilgili hizmet içi eğitim alma ve öğrenim durumuna göre farklılaşmamaktadır. Öğretmenlerin teknolojiyi kullanma ve derslerine entegre edebilme düzeyleri, teknoloji kullanarak ders anlatma saatine göre farklılaşmaktadır. Sınıf öğretmenlerinin eğitim teknolojileri kullanım düzeyleri arttıkça BİT derslerine entegre edebilme düzeyleri de artmaktadır.

Anahtar Sözcükler: Online eğitim, teknoloji entegrasyonu, sınıf öğretmeni, Covid 19.

[*] Millî Eğitim Bakanlığı, Sınıf Öğretmeni, Rize, Turkey. E-posta: hilal_calisir20@erdogan.edu.tr, https://orcid.org/0000-0002-1977-0617.

[**] *Sorumlu Yazar:* Doç. Dr., Recep Tayyip Erdoğan Üniversitesi, Eğitim Fakültesi, Eğitim Bilimleri Bölümü, Rize, Türkiye. E-posta: nermin.karabacak@erdogan.edu.tr, https://orcid.org/0000-0001-5231-1730.

Introduction

The need for class teachers to be versatile and equipped to use technology in education to cultivate children who will be able to cope with changing problems in the 21st century was revealed in all dimensions by the experience of mandatory distance education during the COVID-19 pandemic. This unexpected process caught all stakeholders including the Ministry of National Education (MoNE), education managers, school administrators, teachers, parents and students unprepared. Firstly, it was observed that teachers, with key placement in the compulsory distance education process, did not have the infrastructure to manage this process in a short duration.

Due to the COVID-19 pandemic, education stopped in 195 countries, including Türkiye (Eğitim Reformu Girişimi (ERG), 2020). Due to the pandemic, primary schools, middle schools, high schools, and higher education institutions in Türkiye stopped face-to-face education for two weeks from 16-30 March. While other countries around the world made the decision to continue with distance education, equivalent to these developments, in Türkiye MoNE decided to continue education for primary schools, middle schools and high schools with the national distance education platform called Education Computer Network (ECN) and through television channels run by Türkiye Radio Television (TRT). This was implemented on 23 March 2020). Through ECN on TRT, 10 different lessons for primary and middle school levels and 22 different lessons for high school level were completed with TV support (Can, 2020; MoNE, 2020a). The distance education process ended on 19 June 2020 (Eğitim-Sen, 2020; TEDMEM, 2020). A summer school program was completed from 27 June-28 August 2020. It was announced that the 2020-2021 academic year would end on June 18, 2021, and that summer programs and after-school programs would be offered to compensate for the learning loss that took place as a result of COVID-19. However, attending these additional learning opportunities would be optional, not mandatory. It was announced that schools would open on 31 August 2020. However, in practice schools opened with online education on 21 September 2020 in stages and in accordance with social distancing rules. From 2 November, the transition to face-to-face education began in stages. The mid-term break was from 16-20 November and then MoNE announced that online education would continue from 20 November to 4 January 2021 (MoNE, 2020a). Finally, the first semester of the 2020-2021 educational year was extended to 22 January 2021 (MoNE, 2020b). As can be seen from the announcements, education for students could not be completed face-to-face but was performed with distance education using ECN due to the pandemic.

Linked to the COVID-19 pandemic, 18 million students in Türkiye and 1.5 billion students around the world were caught unprepared and had to continue their education at home; hence, studies about problems experienced within a short duration locally in Türkiye and around the world were performed. These studies in the literature about the topic revealed that problems were experienced by administrators, teachers, students, and parents during distance education (Can, 2020; Doğan ve Koçak, 2020; Giannini ve Lewis, 2020; Hilli, 2020; TEDMEM, 2020; UNICEF, 2020). These problems experienced linked to mandatory distance education included teachers and students requiring psychological support due to being away from school for long durations and spending long periods of time at home, teachers not being able to receive in-service training about the use of technology due to being caught unprepared by the pandemic, inadequacy in students accessing education services according to socioeconomic level, parents requiring support about the use of technology to assist their children, and deficiencies in methods, techniques and materials that teachers could use for distance education.

Research by Burke and Dempsey (2020) revealed that the inadequacy of technology integration by teachers during distance education was identified by many studies. In their research, Bakioğlu and Çevik (2020) identified that teachers were anxious during the distance education process and felt they were inadequate. Research in the literature revealed that class teachers of children in the concrete operations stage of basic education experienced problems with mandatory distance education during the COVID-19 pandemic. Research identified inadequacy in class teachers' preparation for online education, inadequacy of online and offline material content, inadequacy in producing new content using computer technologies and inadequacy in technology integration during mandatory distance education (Baran and Sadık, 2021; İncetaş ve Kaf, 2022). Yıldırım (2020) stated that the majority of class teachers did not have adequate knowledge and experience about distance education due to

habituation to face-to-face education and had difficulty due to not having adequate technological integration. Due to inadequacy about using computer technologies and integration with lessons in online teaching among class teachers employed in distance education during the COVID-19 pandemic, Can (2020) identified that students in the first stages did not have their social interaction needs met. Fidan (2020) identified that in spite of internal motivation of students coming to the fore in distance education, primary school teachers did not sufficiently motivate students.

Leading the main factors in problems during mandatory distance education, teachers' inability to use computer technologies and integrate it with lessons during online teaching, inadequacy in technology use and lack of technology integration or inadequacy in technology integration continue to be problems as identified by research in the literature. In this context, the need for class teachers to be equipped technologically to be able to reach their students and continue to guide them is an important problem. In the context of these explanations based on the literature, there is a need to investigate the technology integration of class teachers in online education for them to be able to better manage the COVID-19 pandemic and to strengthen their technological abilities. The aim of this research was to investigate the use of computer technologies during online teaching by class teachers employed during COVID-19 and the status of integration into lessons. In line with this basic aim, answers to the following questions were sought;

1) What was the distribution of use of technology by class teachers employed during the COVID-19 pandemic?

2) What was the distribution of integration of technology into lessons among class teachers employed during the COVID-19 pandemic?

3) Is there a relationship between levels of use of computer technologies and level of ability to integrate technology into lessons for class teachers employed during the COVID-19 pandemic?

Method

The research was designed with the quantitative method. The quantitative pattern may objectively observe cases and events, measure them, and represent them numerically. Quantitative research is numerical research where observations and measurements may be repeated and are performed objectively. The research was designed according to the relational screening model. The relational research dimension of the study investigated the technology use and integration during online education of class teachers employed during the COVID-19 pandemic in Rize province in terms of some variables. The aim here was to determine the presence or degree of variation between two or more variables and to obtain clues related to cause-outcome (Creswell, 2012).

Research Sample

According to information obtained from Rize Provincial Directorate of National Education through official communications, there were a total of 93 primary schools in Rize provincial center and counties during the 2020-2021 educational year. A total of 861 class teachers were employed in these primary schools. Due to the accessibility of the whole universe for the research, sampling of the whole universe was performed. With the aim of collecting data at times when mandatory distance education was performed during the COVID-19 pandemic, online forms were prepared for class teachers. The online forms were shared with the schools through official channels. In this process, returns for participation of class teachers in the online data collection process did not occur and the data collection process was not successful. As a result, data collection was postponed until face-to-face education began again. Research data were collected during the 2021 fall semester. A total of 800 printed forms were sent to all primary schools in Rize; however, due to difficulties reaching class teachers due to COVID-19, opinions from a total of 464 teachers were obtained as data for the research. Table 1 gives the demographic characteristics of the sample group in the research.

Table 1
The Information Related Sample Group Demographic Characteristics

Variable		f	%
School Placement Type	City	385	83.0
	Town	79	17.0
Gender	Female	341	73.5
	Male	123	26.5
Education Status	Undergraduate	411	88.6
	Master	53	11.4
Professional Experience	1-5 year	50	10.8
	6-10 year	77	16.6
	11-15 year	109	23.5
	16-20 year	89	19.2
	21 year and above	139	30.0
Weekly Technology Using Time	Never use	39	8.4
	1-2 hour	108	23.3
	3-5 hour	128	27.6
	6-10 hour	34	7.3
	11 hour and above	155	33.4
TISES Status of Receiving In-Service Trainig	Yes	274	59.1
	No	190	40.9

Research Instruments and Procedures

With the aim of collecting data in this research;

1) The "Technology Integration Self-Efficacy Scale" (TISES) developed by Wang, Ertmer, and Newby (2004) and adapted to Turkish by Ünal (2013) was used. The scale comprises 19 items. The scale has five-point Likert rating and includes two subscales of self-efficacy in making others use computer technologies (OCT) and self-efficacy in use of computer technology (UCT). The reliability coefficient for the Turkish sample was .94 according to Ünal (2013), with reliability coefficient of .88 for the UCT self-efficacy subscale and .92 for the OCT self-efficacy subscale.

2) The "Teachers' Information and Communication Technologies (ICT) Integration Approach Scale" (TCIAS) was developed by Tezci (2016) to determine teachers' approaches to use of technology in class based on TYPE I and TYPE II by Maddux and Johnson (2005) and the cultural integration theory of Yuen (2000). The scale comprises 20 items. The scale has five-point Likert rating and includes three subscales of traditional integration, cognitive constructivist integration and sociocultural integration. The scale had general reliability coefficient for the Turkish sample of .80 according to Tezci (2013) with reliability coefficients of .87 for the traditional integration subscale, .86 for the cognitive constructivist integration subscale and .78 for the sociocultural integration subscale.

Data Analysis

Quantitative data were analyzed using descriptive statistics. Additionally, ANOVA, t test and Pearson moment multiplication correlation were used to determine group points.

Ethical Procedures

Ethical Procedures Ethical Committee consent for current research was obtained from the Ethics Committee of Recep Tayyip Erdoğan University (Num: 216876; Date: 21/01/2022).

Results

The descriptive results related to use of technology and levels of ability to integrate it into lessons of class teachers are given in Table 2.

Table 2

Use of Technology and Levels of Ability to Integrate it into Lessons of Class Teachers

Scale	Subscales	n	x̄	sd
TISES	Making others use computer technology	464	50.15	9.36
	Use of computer technology		22.87	4.17
TCIAS	Traditional integration		31.35	5.17
	Cognitive Constructivist Integration	464	22.73	6.03
	Sociocultural integration		14.92	4.81

In Table 2, the lowest mean points for the Technology Integration Self-Efficacy Scale (x̄=22.87, sd=4.17) of teachers was for the use of computer technology, with highest points (x̄=50.15, sd=9.36) for the making others use computer technology. According to these results, the self-efficacy about technology integration of participants was at lowest levels for the use of computer technology subscale, while it was at highest levels for the making others use computer technology subscale. The lowest mean points for the Teachers' ICT Integration Approach Scale (x̄=14.92, sd=4.81) were for the sociocultural integration subscale, with highest points (x̄=31.35, sd=5.17) for the traditional integration subscale. According to these results, participants had lowest level of ICT integration approach for the sociocultural integration subscale, with highest levels for the traditional integration subscale.

The differentiation according to gender of use of technology and levels of ability to integrate technology into lessons of class teachers is given in Table 3.

Table 3

According to Gender of Use of Technology and Levels of Ability to Integrate Technology into Lessons of Teachers

Scale	Subscales	Gender	N	x	ss	t	sd	p
TISES	Use of computer technology	Woman	341	22.2	4.40	-5.615	462	.000*
		Man	123	24.6	2.75			
	Making others use computer technology	Woman	341	48.8	9.92	-5.305	462	.000*
		Man	123	53.8	6.26			
TCIAS	Traditional integration	Woman	341	30.9	5.33	-2.831	462	.005*
		Man	123	32.4	4.55			
	Cognitive constructivist integration	Woman	341	21.9	5.97	-4.543	462	.000*
		Man	123	24.8	5.72			
	Sociocultural integration	Woman	341	14.3	4.71	-4.085	462	.000*
		Man	123	16.4	4.78			

According to independent t test results in Table 3, teachers had different levels of use of technology according to gender [t (462)= -5.615, p< .05]. Male teachers (x̄=24.6) had more positive attitudes toward using computer technologies compared to female teachers (x̄=22.2). There was a significant difference in perceptions related to making others use computer technology [t (462) = -5.305, p< .05]. Male teachers (x̄=53.8) had more positive attitudes toward traditional integration compared to female teachers (x̄=48.8).

There was a significant difference in perceptions about traditional integration according to gender for teachers' ability to integrate technology into lessons [t (462) =-2.831, p<.05]. Male teachers (x̄=32.4) had more positive attitudes to traditional integration compared to female teachers (x̄=30.9). For perceptions about cognitive constructivist integration, there was a significant difference according to gender [t (462) = -4.543, p< .05]. Male teachers (x̄=24.8) had more positive attitudes to cognitive constructivist integration compared to female teachers (x̄=21.9). There was a significant difference according to gender for perceptions about sociocultural integration [t (462) = -4.085, p< .05]. Male

teachers ($\bar{x}$=16.4) had more positive attitudes to sociocultural integration compared to female teachers ($\bar{x}$=14.3).

The differentiation of use of technology and levels of ability to integrate it into lessons of class teachers according to seniority is given in Table 4.

Table 4
Teachers According to Seniority Use of Technology and Levels of Ability to Integrate it into Lessons

Scale	Subscales	Variance Source	KT	sd	KO	f	p
TISES	Use of computer technology	Between groups	123.372	4	30.843	1.785	.131
		Within groups	7930.126	459	17.277		
		Total	8053.498	463			
	Making others use computer technology	Between groups	685.825	4	171.456	1.970	.098
		Within groups	39940.31	459	89.016		
		Total	40626.14	463			
TCIAS	Traditional integration	Between groups	242.192	4	60.548	2.285	.059
		Within groups	12160.13	459	26.493		
		Total	12402.33	463			
	Cognitive Constructivist Integration	Between groups	462.431	4	115.608	3.235	.012*
		Within groups	16403.49	459	35.737		
		Total	16865.92	463			
	Sociocultural integration	Between groups	265.020	4	66.255	2.902	.022*
		Within groups	10480.49	459	22.833		
		Total	10745.51	463			

According to ANOVA results in Table 4, there was no statistically significant differentiation for the use of computer technology [$F_{(4, 459)} = 1.785$, p> .05] and making others use computer technology [$F_{(4, 459)} = 1.970$, p> .05] subscales according to the seniority variable for use of technology levels of teachers.

The ability of teachers to integrate technology into lessons did not differ in a statistically significant way according to seniority for the traditional integration [$F_{(4,459)} = 2.285$, p> .05] subscale. There were statistically significant differences for the cognitive constructivist integration [$F_{(4,459)} = 3.235$, p< .05] and sociocultural integration [$F_{(4,459)} = 2.902$, p< .05] subscales.

The differentiation of class teachers' use of technology and ability to integrate it into lessons with receiving in-service training related to technology is given in Table 5.

Table 5
The Differentiation of Teachers' use of Technology and Ability to Integrate it into Lessons with Receiving In-Service Training Related to Technology

Scale	Subscales	Variance Source	KT	sd	KO	f	p
TISES	Use of computer technology	Between groups	5.951	1	5.951	.342	.559
		Within groups	8047.546	462	17.419		
		Total	8053.498	463			
	Making others use computer technology	Between groups	137.205	1	137.205	1.566	.211
		Within groups	40488.93	462	87.638		
		Total	40626.14	463			
TCIAS	Traditional integration	Between groups	20.164	1	20.164	.752	.386
		Within groups	12382.16	462	26.801		
		Total	12402.33	463			
	Cognitive constructivist integration	Between groups	1.758	1	1.758	.048	.826
		Within groups	16864.16	462	36.503		
		Total	16865.92	463			
	Sociocultural integration	Between groups	26.064	1	26.064	1.123	.290
		Within groups	10719.44	462	23.202		
		Total	10745.51	463			

According to the ANOVA results in Table 5, teachers' levels of use of technology did not statistically significantly differ for the use of computer technologies [F (4,462) = .342, p> .05] or making others use computer technologies [F (4,462) = 1.566, p> .05] according to the variable about receiving in-service training related to technology.

Teachers' level of ability to integrate technology into lessons did not statistically significantly differ for traditional integration [F (4,462) = .752, p> .05], cognitive constructivist integration [F (4,462) = .048, p> .05] and sociocultural integration [F (4,462) = 1.123, p> .05] in terms of receiving in-service training related to technology.

The differentiation in use of technology and levels of ability to integrate it into lessons of teachers according to hours of lessons given using technology is given in Table 6.

Table 6

The Differentiation in use of Technology and Levels of Ability to Integrate it into Teachers According to Hours of Lessons Given Using Technology

Scale	Subscale	Variance Source	KT	sd	KO	f	P
TISES	Making others use computer technology	Between groups	822.076	4	205.519		
		Within groups	39804.06	459	86.719	2.370	.052
		Total	40626.14	463			
	Use of computer technology	Between groups	321.782	4	80.446		
		Within groups	7731.715	459	16.845	4.776	.001*
		Total	8053.498	463			
TCIAS	Traditional integration	Between groups	43.817	4	10.954		
		Within groups	12358.51	459	26.925	.407	.804
		Total	12402.33	463			
	Cognitive constructivist integration	Between groups	476.798	4	119.200		
		Within groups	16389.12	459	35.706	3.338	.010*
		Total	16865.92	463			
	Sociocultural integration	Between groups	339.078	4	84.769		
		Within groups	10406.43	459	22.672	3.739	.005*
		Total	10745.51	463			

According to the ANOVA results in Table 6, teachers' level of use of technology did not statistically significantly differ for the making others use computer technologies [F (4,459) = 2.370, p> .05] subscale according to the hours of lessons given using technology. According to the ANOVA results, teacher's use of computer technology [F (4,459) = 4.776, p< .05] subscale had a statistically significant difference in terms of the hours of lessons given using technology variable.

The levels of teachers' ability to integrate technology into lessons did not statistically significantly differ for the traditional integration [F (4,459) = .407, p> .05] subscale according to the hours of lessons given using technology. According to the ANOVA results, the cognitive constructivist integration [F (4,459) = 3.338, p< .05] and sociocultural integration [F (4,459) = 3.739, p< .05] subscales had statistically significant differences in terms of the hours of lessons using technology of teachers.

The differentiation of class teachers' use of technology and levels of ability to integrate it into lessons according to educational status is given in Table 7.

Table 7

The Differentiation of Teachers' Use of Technology and Levels of Ability to Integrate it into Lessons According to Educational Status

Scale	Subscale	Variance Source	KT	sd	KO	f	p
TISES	Making others use computer technology	Between groups	261.930	1	261.930	2.998	.084
		Within groups	40364.21	462	87.368		
		Total	40626.14	463			
	Use of computer technology	Between groups	10.067	1	10.067	.578	.447
		Within groups	8043.431	462	17.410		
		Total	8053.498	463			
TCIAS	Traditional integration	Between groups	28.920	1	28.920	1.080	.299
		Within groups	12373.41	462	26.782		
		Total	12402.33	463			
	Cognitive constructivist integration	Between groups	29.263	1	29.263	.803	.371
		Within groups	16836.66	462	36.443		
		Total	16865.92	463			
	Sociocultural integration	Between groups	62.382	1	62.382	2.698	.101
		Within groups	10683.13	462	23.124		
		Total	10745.51	463			

According to the ANOVA results in Table 7, for teachers' levels of technology use, making others use computer technology [$F_{(4,462)}$ = 2.998, p> .05] and use of computer technology [$F_{(4,462)}$ = .578, p> .05] subscales did not statistically significantly differ according to the educational status variable.

For teachers' level of ability to integrate technology into lessons, traditional integration [$F_{(4,462)}$ = 1.080, p> .05], cognitive constructivist integration [$F_{(4,462)}$ = .803, p> .05] and sociocultural integration [$F_{(4,462)}$ = 2.698, p> .05] subscales did not statistically significantly differ according to the educational status variable.

To understand whether there was a correlation between the technology integration self-efficacy and teachers' ICT integration approaches investigated within the scope of the research, the Pearson correlation analysis from the parametric tests was performed. The results of the analysis are summarized in Table 8.

Table 8

Correlation Between Variables

		Teachers' ICT integration approaches
Teachers' level of use of education technologies	r	.629**
	P	.000
	N	464

When Table 8 is investigated, there was a significant correlation determined between the scale determining class teachers' level of use of education technologies and the scale measuring the ICT integration approaches of teachers (r=0.63, p<0.05). Accordingly, as the levels of use of educational technologies increased among teachers, their approaches to computer technology integration also increased.

Discussion and Conclusion

The results of the research determined that class teachers working during the COVID-19 pandemic had levels of use of technology and ability to integrate technology into lessons above the average. Though most class teachers working in primary schools have good levels of use of technology, it can be said that their ability to integrate technology into lessons is slightly lower. The inadequacy of teachers in using technology and their ability to integrate it into lessons was identified in many studies (Burke ve Dempsey, 2020; Yılmaz, 2019; Tezci, 2016; Turgut ve Başarmak, 2016). Research by Balanskat, Blamire and Kefala (2006) emphasized that teachers did not have sufficient skills about the use of

computer technologies and lacked interest in integrating technology into lessons. A study by İşman (2002) revealed that teachers did not see themselves as adequate for technology integration. Research by Bolat etal., (2020) identified that teachers did not adequately complete technology integration. Çırak and Demir (2014) identified that teachers were not aware of software related to their field, and required professional development about the topics of technology, pedagogy and content interactions in their research investigating the competencies required by class teachers to integrate technology into lessons. The results of studies by Arslan and Şumuer (2020) and Mohan et al. (2020) revealed that teachers had difficulty producing digital content linked to inadequate digital content during the mandatory distance education process. This situation revealed in the literature continued during COVID-19 and most research about the mandatory distance education process in Türkiye revealed that teachers were inadequate in terms of technology use and integration into lessons.

The results of the research revealed that male teachers had higher levels of computer technology use and ability to integrate it into lessons compared to female teachers. Results of research by Turgut and Başarmak (2019) are directly similar to these results and found that male teachers had higher levels of technology use and ability to integrate it into lessons. Contrary to these results, studies by Atlı and Mazman-Akar (2019) and Kaya (2017) revealed that generally self-efficacy perceptions about technology integration with integration approaches for information and communication technology of teachers did not differ according to gender.

The research results revealed that though the levels of use of technology by teachers did not differ according to seniority, their levels of ability to integrate technology into lessons did. Research by Orhan and Tekin (2019) and Turgut and Başarmak (2019) revealed that use of technology level did not differ according to professional seniority. Contrary to the results of these studies, research by Bolat etal., (2020) identified that teachers with professional seniority of twenty-one years or longer had lower levels of computer technology use and ability to integrate it into lessons compared to teachers with lower seniority. As seniority increased, the levels of computer technology use fell and the ability to integrate it into levels did not change. A study by Kaya (2017) observed that the use of technology in education by class teachers differed according to professional seniority and having computer certification. Russell et al. (2003) stated that young teachers were more comfortable using technology at higher levels, while experienced teachers were more successful at integrating technology into lessons. The results of research in the literature revealed that young teachers use more information and communication technologies during the education-teaching process compared to senior teachers, and they feel more competent about integrating technology into lessons (Kaya, 2017). A study by Atlı and Mazman-Akar (2019) identified that senior teachers were not more interested in the use of technology in classes.

The results of the research revealed that class teachers use of computer technology and level of ability to integrate it into lessons did not differ according to receiving in-service training related to technology and educational status. Research by Yılmaz and Üredi (2016) identified that teachers with doctorates actively used technology compared to teachers who were undergraduates. The results of a study by Atlı and Mazman-Akar (2019) revealed that the tendency of class teachers to use technology in lessons did not differ according to seeing themselves as competent about computer technologies and participation in in-service training related to computer technologies. Güneş and Özerbaş (2015) identified that the levels of use of education technology by class teachers did not differ according to participation in in-service training. The results of research by Topuz and Göktaş (2015) revealed that in-service training related to computer technologies did not achieve its aims, remained as theory and did not convert to practice and did not meet the needs of teachers. Research by Çalışkan (2017) identified that though teachers received in-service training about technology use, as a result of observations a limited number of teachers used technology and that the technology use did not extend beyond interactive blackboards. In this context, it can be said that in-service training about technology use and integration into lessons for teachers is not sufficient and does not achieve its purpose.

The results of the research revealed that the use of technology and levels of ability to integrate it into lessons of teachers differed according to hours of lessons using technology. Research directly supporting these results were not found in the literature. A similar result to this outcome of the research was identified in research by Gürbüztürk et al. (2015) and Kaya (2017) who found that young teachers

who followed developments in technology, spent more time on computers and participated in related courses had higher levels of ability to integrate technology into the education-teaching environment.

The results of the research revealed that the use of computer technology by class teachers was at low levels for sociocultural and technology integration of information and communication technologies, while there were moderate levels for making others use computer technologies for traditional integration and technology integration of information and communication technologies. This is directly similar to research by Tezci (2016). Research by Tezci (2016) found that there was low correlation between traditional integration with cognitive constructivist integration and sociocultural integration for integration approaches to information and communication technologies by teachers. A study by Bolat etal., (2020) found that middle school teachers had highest levels for traditional integration, moderate levels for cognitive constructivist integration and lowest levels for sociocultural integration for information and communication technologies. Research in the literature shows that in the context of technology use and integration into lessons, teachers mainly use traditional integration. Research about technology use by middle school mathematic teachers identified that teachers could use the Office programs, could research on the internet but had not heard of and could not use software in mathematic teaching. The results of many studies in the literature are directly similar to the results of this research. The results of many studies in the literature revealed that teachers used technologies requiring less information in the learning-teaching process like word processing programs (Word), calculation tables (Excel), presentation programs (Powerpoint), the internet, worldwide web, email, etc. with traditional style in the use of information and communication technologies (Alghazo, 2006; Önal ve Çakır, 2016; Thomas ve Stratton, 2006). According to the results of a study by Yılmaz and Üredi (2016) about the use of technology in education by primary school teachers, teachers knew word processing programs, internet-worldwide web and email use very well, knew the physical parts of computers, operating system, calculating table programs and presentation programs at moderate levels and were inadequate in terms of database programs and developing web pages.

The results of the research revealed that as the levels of use of education technologies by class teachers increased, their levels of ability to integrate computer technologies into lessons also increased. This result of the research is directly similar to the results of a study by Bolat etal., (2020) who observed that as the levels of use of computer technologies by middle school teachers increased, their levels of ability to integrate computer technologies into lessons increased. Research by Turgut and Başarmak (2019) and Bolat etal., (2020) found that middle school teachers had high levels of technology use and ability to integrate it into lessons. A study by Gürbüztürk et al. (2015) identified that, apart from skills requiring expertise, the self-efficacy perceptions about computer and internet use of class teachers were generally high.

Recommendations

In the context of experiences around the world and in Türkiye of the problems encountered about the use of computer technologies and integration into lessons during online teaching by class teachers during the COVID-19 pandemic, it is necessary to invest in the future of education with the appropriate use of technology in teaching programs in order to strengthen the technology integration of teachers. In this context, in-service activities centered on application should be implemented for teachers to acquire technology integration. Arslan and Şendurur (2017) stated that teachers should be centered in the technology integration process and that it was necessary to question the training given repeatedly. Research by Topuz and Göktaş (2015) emphasized that training given online should definitely be applied and that in-service training should be mandatory for all teachers. If teachers have skills in using information and communication technologies, it is recommended that teachers make organizations based on student interaction taking into account the needs of students in educational environments integrated with information and communication technologies during the compulsory distance education process and face-to-face education. In this context, it is recommended that there will be benefit in reviewing educational programs as a result of digital transformations so preservice teachers will be trained in technology.

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Reliability and Validity of ÇAĞIN Hand and Foot Reaction Tests Protocol

Musab Çağın[*]   **Sezen Çimen Polat**[**]   **Özlem Orhan**[***]
Ebru Çetin[****]   **Mekki Abdioğlu**[*****]   **İmdat Yarım**[******]
Halil İbrahim Cicioğlu[*******]

Abstract

The present study aims to test the reliability and validity of ÇAĞIN Hand and Foot Reaction Tests. A total of 120 athletes, 60 under the age of 18 and 60 over the age of 18 who were actively playing soccer, participated in the study. ÇAĞIN Hand and Foot Reaction Tests were applied to the athletes participating in the study 3 times with 2-week intervals using FitLight Trainer and BlazePod devices. In order to determine the validity of the data obtained from the athletes by applying ÇAĞIN Hand and Foot Reaction Tests, two measurements made with the FitLight Trainer device at different times were compared, and in order to determine the reliability, measurements made with the FitLight Trainer and BlazePod device on different days were compared and analyzed. Paired Simple T-Test in SPSS 26.0 package program was applied to determine both validity and reliability. According to the findings obtained, the validity and reliability correlation coefficients of all 6 tests in the ÇAĞIN Hand and Foot Reaction Tests were found to be r>0.70 (p<0.05). In the light of these findings, it was determined that the validity and reliability of ÇAĞIN Hand and Foot Reaction Tests were very high (r= 0.70-0.90).

Keywords: ÇAĞIN, reaction test, reliability, validity, soccer.

[*] *Corresponding Author:* Res. Assist., Gazi University, Faculty of Sport Science, Department of Physical Education and Sports Teaching, Ankara, Turkey. E-mail: musabcagin@gazi.edu.tr, https://orcid.org/0000-0001-8882-5506.

[**] Assoc. Prof. Dr., Gazi University, Faculty of Sport Science, Department of Coaching Education, Ankara, Turkey. E-mail: sezencimen@gazi.edu.tr, https://orcid.org/0000-0002-2143-8402.

[***] Prof. Dr., Gazi University, Faculty of Sport Science, Department of Coaching Education, Ankara, Turkey. E-mail: oarslan@gazi.edu.tr, https://orcid.org/0000-0002-4047-234X.

[****] Prof. Dr., Gazi University, Faculty of Sport Science, Department of Physical Education and Sports Teaching, Ankara, Turkey. E-mail: ecetin@gazi.edu.tr, https://orcid.org/0000-0002-1545-0181.

[*****] Dr., Ankara University, Faculty of Sport Science, Department of Coaching Education, Ankara, Turkey. E-mail: mekkiabdioglu@gmail.com, https://orcid.org/0000-0003-4533-1594.

[******] Prof. Dr., Gazi University, Faculty of Sport Science, Department of Physical Education and Sports Teaching, Ankara, Turkey. E-mail: imdat@gazi.edu.tr, https://orcid.org/0000-0003-4794-129X.

[*******] Prof. Dr., Gazi University, Faculty of Sport Science, Department of Physical Education and Sports Teaching, Ankara, Turkey. E-mail: cicioglu@gazi.edu.tr, https://orcid.org/0000-0003-3905-6944.

ÇAĞIN El ve Ayak Reaksiyon Testleri Protokolünün Güvenirlik ve Geçerlilik Çalışması

Makale Türü	Başvuru Tarihi	Kabul Tarihi
Araştırma	5.11.2023	21.01.2024

Musab Çağın[*]   **Sezen Çimen Polat**[**]   **Özlem Orhan**[***]
Ebru Çetin[****]   **Mekki Abdioğlu**[*****]   **İmdat Yarım**[*****]
Halil İbrahim Cicioğlu[******]

Öz

Bu çalışmanın amacı; ÇAĞIN El ve Ayak Reaksiyon Testlerinin geçerlilik ve güvenirliğini test etmektir. Araştırmaya aktif olarak futbol oynayan 18 yaş altı 60 ve 18 yaş üstü 60 olmak üzere toplam 120 sporcu katılım göstermiştir. Araştırmaya katılan sporculara ÇAĞIN El ve Ayak Reaksiyon Testleri 2 hafta arayla FitLight Trainer ve BlazePod cihazları kullanılarak 3 kez uygulanmıştır. ÇAĞIN El ve Ayak Reaksiyon Testleri uygulanarak sporculardan elde edilen verilerin geçerliliğini tespit edebilmek için FitLight Trainer cihazı ile gerçekleştirilen iki ayrı zamanlarda yapılan ölçüm karşılaştırılmış, güvenirliğini tespit edebilmek içinse FitLight Trainer ve BlazePod cihazı ile farklı günlerde yapılan ölçümler karşılaştırılarak incelenmiştir. Hem geçerlilik hem de güvenirlilikleri tespiti için SPSS 26.0 paket programında bulunan Paired Simple T-Testi uygulanmıştır. Elde edilen bulgulara göre ÇAĞIN El ve Ayak Reaksiyon Testlerinin içerisinde bulunan 6 testin de geçerlilik ve güvenirlik korelasyon katsayılarının tamamı r>0,70 olarak bulunmuştur (p<0.05). Bu bulgular ışığında ÇAĞIN El ve Ayak Reaksiyon Testlerinin geçerlilik ve güvenirliliğinin çok yüksek (r= 0,70-0,90) olduğu tespit edilmiştir.

Anahtar Sözcükler: ÇAĞIN, reaksiyon testi, güvenirlilik, geçerlilik, futbol.

[*] *Sorumlu Yazar:* Arş. Gör., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü, Ankara, Türkiye. E-posta: musabcagin@gazi.edu.tr, https://orcid.org/0000-0001-8882-5506.

[**] Doç. Dr., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Eğitimi Bölümü, Ankara, Türkiye. E-posta: sezencimen@gazi.edu.tr, https://orcid.org/0000-0002-2143-8402.

[***] Prof. Dr., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Eğitimi Bölümü, Ankara, Türkiye. E-posta: oarslan@gazi.edu.tr, https://orcid.org/0000-0002-4047-234X.

[****] Prof. Dr., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü Ankara, Türkiye. E-posta: ecetin@gazi.edu.tr, https://orcid.org/0000-0002-1545-0181.

[*****] Dr., Ankara Üniversitesi, Spor Bilimleri Fakültesi, Antrenörlük Eğitimi Bölümü, Ankara, Türkiye. E-posta: mekkiabdioglu@gmail.com, https://orcid.org/0000-0003-4533-1594.

[******] Prof. Dr., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü Ankara, Türkiye. E-posta: imdat@gazi.edu.tr, https://orcid.org/0000-0003-4794-129X.

[*******] Prof. Dr., Gazi Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği Bölümü Ankara, Türkiye. E-posta: cicioglu@gazi.edu.tr, https://orcid.org/0000-0003-3905-6944.

Introduction

The concept of reaction is expressed as the behavior given against a signal (stimulus) perceived by the organism. Reaction time refers to the time between the arrival of the signal and the behavior given to this incoming signal. In order to determine the reaction time, a warning signal is usually sent to prepare the individual and then the actual reaction signal is sent and the behavior is requested (Magill & Anderson, 2010). To give an example of this situation from short-distance running competitions; after the athlete settles into the wedge on command, the attention (set) command, which is the second stage, is given, and then the gun is fired, indicating that they should start the race, and the athletes try to exit by showing the fastest reaction. Magill categorizes reaction time into three different classes: simple reaction time, selective reaction time and discrimination reaction time (Magill & Anderson, 2010).
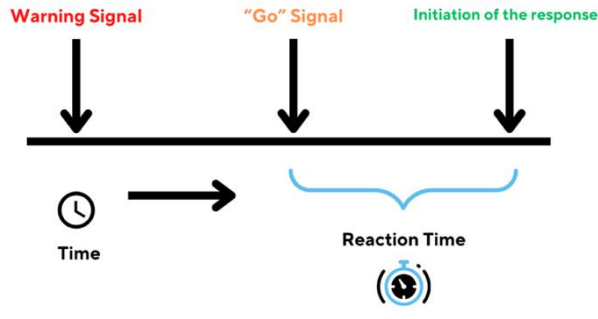
Figure 1. *Reaction Time*

Simple Reaction Time

In this reaction time, there is only one stimulus and only one response to this stimulus. This can be given as an example of a blue light on the computer screen and the subject's behavior by pressing the letter C every time the blue light is on.

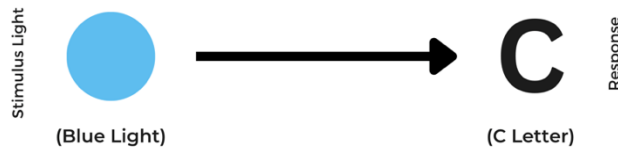**Figure 2**. *Simple Reaction Time*

Selective Reaction Time

In this type of reaction time, there is more than one stimulus and a different behavior for each stimulus. An example of this situation can be given as the subject's behavior by pressing the letter C every time the blue light turns on the computer screen, G every time the red light turns on and N every time the green light turns on.

SELECTIVE REACTION TIME
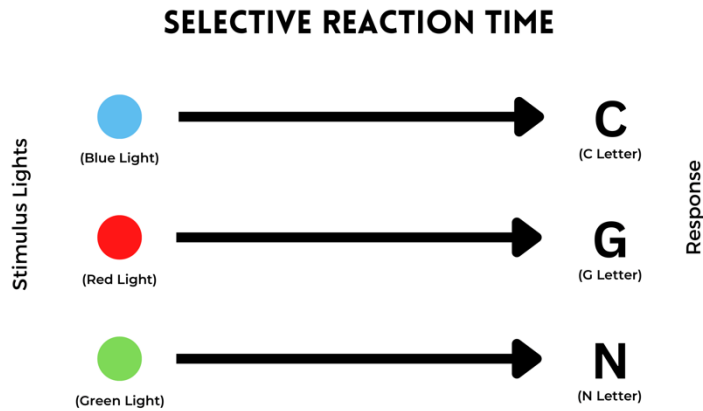
Figure 3. *Selective Reaction Time*

Discrimination Reaction Time

In this type of reaction time, there is more than one warning but only one behavior. An example of this situation is when blue, red and green colors light up on the computer screen, but only when the blue color lights up, the user acts by pressing the letter C.

DISCRIMINATION REACTION TIME
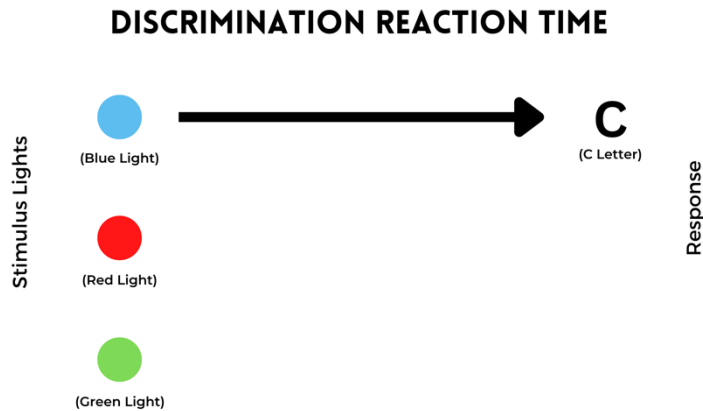
Figure 4. *Discrimination Reaction Time*

The concept of reaction is considered to be of great importance in determining sportive performance as it includes both biomotor and cognitive activations (Klotz et al., 2012; Chiu, Chen, & Muggleton, 2017). When reaction performance is examined from a biomotor perspective, it is observed that it is closely related to intermuscular and intramuscular coordination skills (Blanpied & Oksendahl, 2006). When reaction performance is examined cognitively, it is closely related to attention and decision-making skills (Noorani & Carpenter, 2016; Reigal et al., 2019). If the importance of reaction performance is examined in terms of sports branches, the goalkeeper in soccer saves the ball by reacting quickly and accurately to penalty shots, the athlete reacts faster to the exit signal in short distance running and wins the competition in milliseconds, and the athlete in taekwondo protects himself by reacting quickly to the kicks from the opponent.

When sports branches are analyzed in terms of reaction time, the type of reaction time required by each branch may differ. For example, in short-distance running, simple reaction time is known to start the run with only one stimulus (the sound of a pistol) at the exit from the wedge, in tennis, selective

reaction time is known to react separately to the balls coming from the opponent at different intensities and angles, and in volleyball, discrimination reaction time is known to be at the forefront in terms of reacting only to the balls that can fall into the line and not reacting to the balls that will go out. Considering that the currently used reaction time tests measure only simple reaction time, it is thought that there is a need for tests that measure all types of reactions in the field. Although there are light sensor meters such as FitLight Trainer (FitLight Corp, Ontario, Canada), BlazePod (Play Coyotta Ltd., Tel Aviv, Israel) and Witty-SEM (Microgate, Bolzano, Italy) that can measure all reaction times, it is not possible to compare the measurements obtained from these devices in a healthy way since there is no common reaction test protocol. In terms of standardizing both hand-foot and all reaction types with all personalized norms, it is thought that ÇAĞIN Hand and Foot Reaction Tests will increase the compatibility in reaction time measurements and usability in the field and better analysis and evaluation of the results can be made.

Problem and Sub-Problems in the Research

This research will be important for the functional evaluation of the data obtained from light sensor measurement equipment such as FitLight Trainer, BlazePod and Witty-SEM. It is aimed to create all norm values of hand and foot and all reaction tests individually and to contribute to this field for future studies. An answer to the problem question 'Is the validity and reliability of CAGIN Hand and Foot Reaction Tests high?' was also sought. In the process of answering this problem, the above question and the following sub-questions were formulated and tried to be answered.

1) Are ÇAĞIN Hand Reaction Tests highly reliable?
2) Are ÇAĞIN Foot Reaction Tests highly reliable?
3) Is the validity of ÇAĞIN Hand Reaction Tests high?
4) Is the validity of ÇAĞIN Foot Reaction Tests high?

Methods

The subjects who participated in the study were divided into 4 groups: girls under the age of 18, girls over the age of 18, boys under the age of 18 and boys over the age of 18. For the measurement of each group, one day of the week was determined and the first measurements were taken, the second measurements were taken 14 days after the first measurement and the third measurements were taken 14 days after the second measurement on the same day and time.

The measurements were carried out in April and the air temperature during the first and second measurements was between 18-21 degrees Celsius. The measurements were also carried out in normal daylight in an indoor gymnasium. Subjects were instructed not to consume any stimulant foods (tea, coffee, high-caffeine foods) until 24 hours before both the first and second measurements and not to eat anything until 3 hours before. Before the measurement, the subjects were warmed up by being asked to turn off the lights with their hands for 5 minutes and with their feet for 5 minutes. ÇAĞIN Hand and Foot Reaction Tests were performed with FitLight Trainer (FitLight Corp, Ontario, Canada) in the first measurement, with BlazePod (Play Coyotta Ltd., Tel Aviv, Israel) in the second measurement and again with FitLight Trainer (FitLight Corp, Ontario, Canada) in the third measurement.

Table 1

Mean and Standard Deviation Values of the Descriptive Characteristics of the Subjects

Age	Demographic Variables	N	X̄	S
U 18 Women	Age	30	12.03	2.042
	Height	30	152.80	8.919
	Weight	30	41.57	8.697
	Sports age	30	2.00	1.640
	Total	**30**		
U 18 Man	Age	30	13.73	1.081
	Height	30	160.63	8.838
	Weight	30	49.73	8.971
	Sports age	30	4.97	2.428
	Total	**30**		

18 + Women	Age	30	18.43	1.382
	Height	30	157.45	29.85
	Weight	30	55.27	7.119
	Sports age	30	6.07	3.403
	Total	**30**		
18 + Man	Age	30	18.27	.450
	Height	30	178.77	6.061
	Weight	30	68.63	5.524
	Sports age	30	7.73	1.893
	Total	**30**		
	All Group	**120**		

Participants

A total of 120 soccer players, 60 under the age of 18 (30 girls and 30 boys) and 60 over the age of 18 (30 girls and 30 boys), participated in the study. The sample group consisted of individuals who had a license for at least 4 years and were actively playing soccer. All athletes were in good physical condition and had no recurrent injuries in the last six months. Participants were informed about the nature of the study and were also informed that participation was voluntary and that they could withdraw at any time.

Table 2
Measurement Schedule of the Subjects

Groups	Measurement I	Measurement II	Measurement III
U 18 Women	Monday 13.00-16.00	Monday Two Weeks After Measurement I 13.00-16.00	Monday Two Weeks After Measurement II 13.00-16.00
18 + Women	Tuesday 13.00-16.00	Tuesday Two Weeks After Measurement I 13.00-16.00	Tuesday Two Weeks After Measurement II 13.00-16.00
U 18 Man	Wednesday 13.00-16.00	Wednesday Two Weeks After Measurement I 13.00-16.00	Wednesday Two Weeks After Measurement II 13.00-16.00
18 + Man	Thursday 13.00-16.00	Thursday Two Weeks After Measurement I 13.00-16.00	Thursday Two Weeks After Measurement II 13.00-16.00

Measurements

Body weight and height

The height of the subjects was measured with a stadiometer (SECA, Germany) with a precision of 0.01 m and the body weight was measured with an electronic scale (SECA, Germany) with a precision of 0.1 kg.

Measurement I	➡	FitLight Trainer
Measurement II	➡	BlazePod
Measurement III	➡	FitLight Trainer
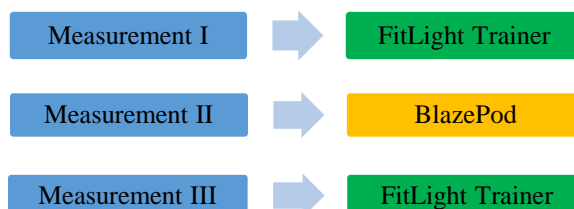
Figure 5. *Devices used for ÇAĞIN Hand and Foot Reaction Tests and measurement Sequence*

Measurement of Reaction Performances

Reaction performances of the subjects were measured with FitLight Trainer (FitLight Corp, Ontario, Canada) and BlazePod (Play Coyotta Ltd., Tel Aviv, Israel) lighted reaction meters. The stimuli to which the subjects were asked to react were sent both visually and auditorily simultaneously.

ÇAĞIN Hand and Foot Reaction Tests

ÇAĞIN Color Blindness Test

Before both the hand and foot reaction tests, the ÇAĞIN Color Blindness Test is administered to determine whether the subject is fit to take the test. The subject is randomly shown the colors yellow, red, blue and green and asked which color they are. The person who gives 2 correct answers for each color is included in the test. If the subject gives more than 1 wrong answer, they are not included in the test.
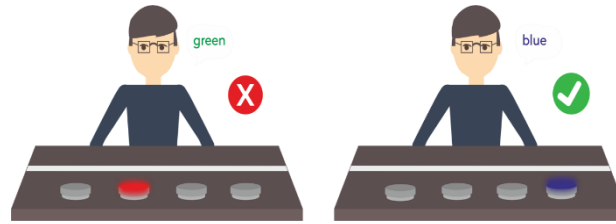
Figure 6. *ÇAĞIN Color Blindness Test*

ÇAĞIN Hand Reaction Tests

Step 1: The subject sits on a chair and raises his/her arms at shoulder level.

Figure 7: *Step 1 for ÇAĞIN Hand Reaction Test*

Step 2: Then the elbows are positioned to form a 90º angle and the distance between the two middle fingers is recorded.
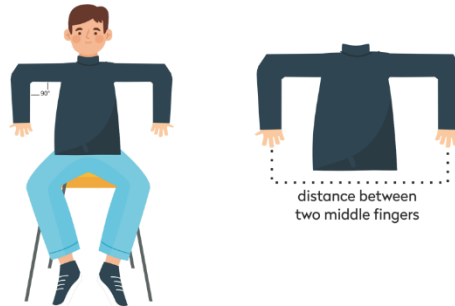
Figure 8. *Step 2 for ÇAĞIN Hand Reaction Test*

Step 3: The distance between the elbow and the middle finger is recorded by placing the elbow at the starting level of the table. The sensors are then positioned horizontally at equal intervals according to the distance between the two middle fingers and vertically according to the distance between the elbow and middle finger.
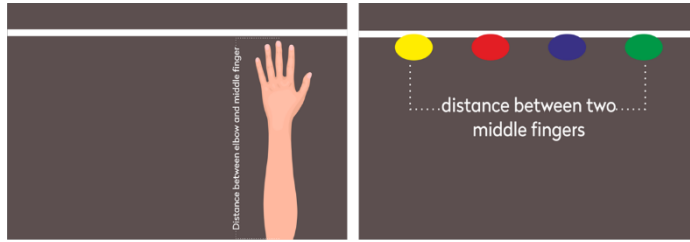
Figure 9. *Step 3 for ÇAĞIN Hand Reaction Test*

Step 4: After the distance between the elbow and the middle finger (e.g., 70 cm) is determined and the lights are positioned, a line is drawn in the middle (e.g., 35 cm) and a glass is placed close to the subject.
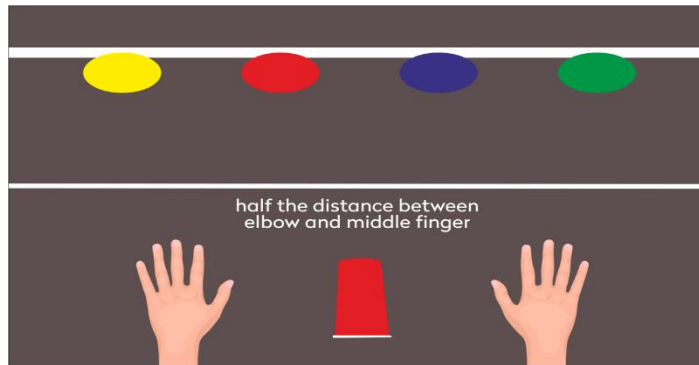
Figure 10. *Step 4 for ÇAĞIN Hand Reaction Test*

ÇAĞIN Hand Simple Reaction Test

A blue cup is placed in front of the subject and blue lights are turned on randomly from the sensors for 20 seconds. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off the blue light with the cup by taking the cup in one right and one left hand as fast as possible for 20 seconds. After each light turning off, the cup has to be touched to the part separated by a line, close to the subject. If one light is turned off and the other light is turned off without touching the rest of the line, it is noted as 1 error point. If a light is turned off repeatedly with the same hand, 1 error point is scored. The test is administered twice and the best time is taken into account. At the end of 20 seconds, the reaction time, how many lights the subject turned off and how many errors he/she made are recorded and analyzed.

Figure 11. *ÇAĞIN Hand Simple Reaction Test*

ÇAĞIN Hand Selective Reaction Test

Blue, green, red and yellow glasses are placed in front of the subject and one of these 4 lights is turned on randomly from the sensors for 20 seconds. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off the light for 20 seconds as fast as possible by picking up

the cup in the color of the light with one right and one left hand. After each light turning off, the cup has to be touched to the part separated by a line, close to the subject. If one light is turned off and the other light is turned off without touching the rest of the line, it is noted as 1 error point. If a light is turned off repeatedly with the same hand, 1 error point is scored. If a light is turned off with the wrong cup (e.g. blue light turned off with a green cup), it is scored as 1 error point. The subject is given the test twice and his/her best performance is taken into account. At the end of 20 s, the reaction time, the number of lights turned off, and the number of errors made are recorded and analyzed.

Figure 12. *ÇAĞIN Hand Selective Reaction Test*

ÇAĞIN Hand Discriminative Reaction Test

A red cup is placed in front of the subject and these 4 lights are turned on at the same time for 20 seconds randomly from the sensors. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off only the red light by picking up the red cup with the right and left hand as fast as possible for 20 seconds. After each light turning off, the cup has to be touched to the part of the line separated by a line, close to the subject, and the hand has to be changed. If one light is turned off and the other light is turned off without touching the rest of the line, it is noted as 1 error point. If a light is turned off consecutively with the same hand, 1 error point is scored. If the wrong light is turned off (other colors instead of red), 1 error point is scored. The test is administered twice and the best time is taken into account. At the end of 20 seconds, the reaction time of the subject, how many lights he/she turned off and how many errors he/she made are recorded and analyzed.

Figure 13. *ÇAĞIN Hand Discriminative Reaction Test*

ÇAĞIN Foot Reaction Tests

Step 1: The subject is seated on a chair with knees at 90º degrees and shoulder width. After the desired angle is achieved, the location of the outer part of the heels is marked. The length from the medial condyle (the hard protrusion at the end of the tibia bone) to the sole of the foot is determined.

Figure 14. *Step 1 for ÇAĞIN Foot Reaction Tests*

Step 2: A double-sided vertical line is drawn from the marked point on the outside of the heel to the distance between the medial condyle and the sole of the foot (e.g. 40 cm). A horizontal line is drawn at the end of the vertical lines and sensors are placed on this horizontal line at equal intervals. A horizontal line is drawn in the middle part of the determined length (e.g. 40 cm) (for example, if the total length is 40 cm, the middle part is determined as 20 cm) and the area is divided into two sections.

Figure 15. *Step 2 for ÇAĞIN Foot Reaction Tests*

ÇAĞIN Foot Simple Reaction Test

A blue colored rectangular paper is fixed to the middle part of the section that is close to the subject. One foot is raised above the blue colored paper and the other foot is raised high enough to break contact with the ground. The sensors are set to randomly illuminate blue light for 20 seconds. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off the blue light with one right and one left foot as fast as possible for 20 seconds. After turning off each light, the foot has to touch the blue paper in the center. If one light is turned off and the other light is turned off without touching the rest of the line, 1 error point is scored. If a light is turned off with the same foot consecutively, it is scored as 1 error point. The test is administered twice and the best time is taken into account. At the end of 20 seconds, the reaction time of the subject, the number of lights turned off and the number of errors made are recorded and analyzed.
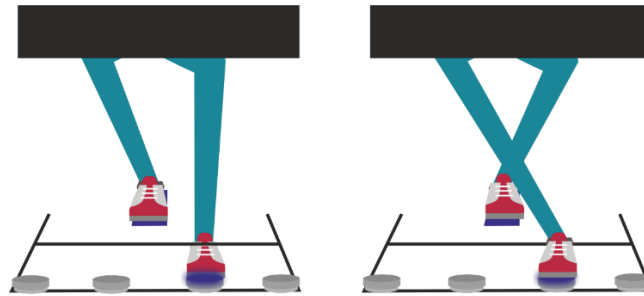
Figure 16. *ÇAĞIN Foot Simple Reaction Test*

ÇAĞIN Foot Selective Reaction Test

Rectangular papers colored blue, green, red and blue are fixed to the part close to the subject from the sections divided into two in the middle so that they are in line with the sensors. Both feet are positioned so that they are in the air at a height high enough to break contact with the ground, and when the first light turns on, the right foot goes to the paper in the lit color and the left foot to the lit color. One of these 4 lights is turned on randomly from the sensors for 20 seconds. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off the light by touching the light-colored paper with his/her right and left foot as fast as possible for 20 seconds. After turning off each light, the foot has to touch the part separated by a line, close to the subject. If one light is turned off and the other light is turned off without touching the rest of the line, it is noted as 1 error point. If a light is turned off consecutively with the same foot, 1 error point is scored. If a light is turned off incorrectly (e.g., the blue light is turned off by touching the green paper), it is scored as 1 error point. The test is

administered twice and the best performance is taken into account. At the end of 20 s, the reaction time, the number of lights turned off and the number of errors made are recorded and analyzed.
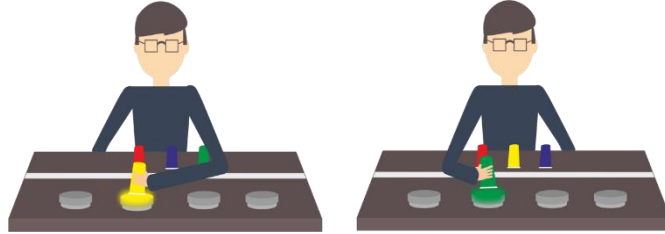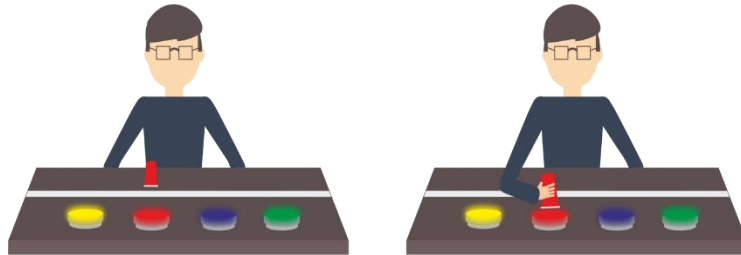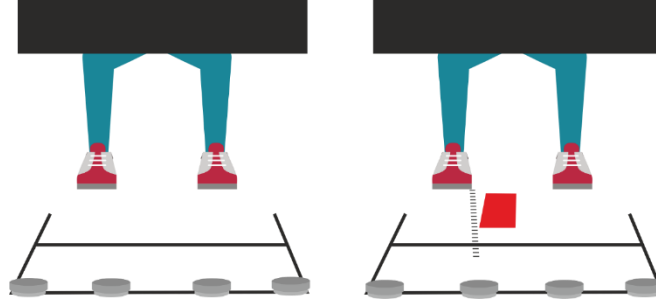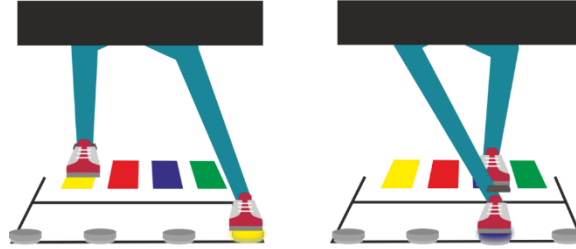

Figure 17. *ÇAĞIN Foot Selective Reaction Test*

ÇAĞIN Foot Discriminative Reaction Test

A red colored rectangular paper is fixed to the middle part of the section close to the subject. One foot is raised above the red colored paper and the other foot is raised high enough to break contact with the ground. For 20 seconds, blue, green, red, and yellow lights are turned on simultaneously from the sensors in a randomized manner. The lights are set to be turned off only by touching the lights (This device also has a close proximity turn-off mode, so only the touch turn-off mode should be turned on). The subject is asked to turn off only the red light with one right and one left foot as fast as possible for 20 seconds. After turning off each light, the foot has to touch the part of the light separated by a line, close to the subject, and the foot has to be changed. If one light is turned off and the other light is turned off without touching the rest of the line, it is noted as 1 error point. If a light is turned off with the same foot in succession, 1 error point is scored. If the wrong light is turned off (other colors instead of red), 1 error point is scored. The test is administered twice and the best time is taken into account. At the end of 20 seconds, the reaction time, the number of lights turned off and the number of errors made are recorded and analyzed.
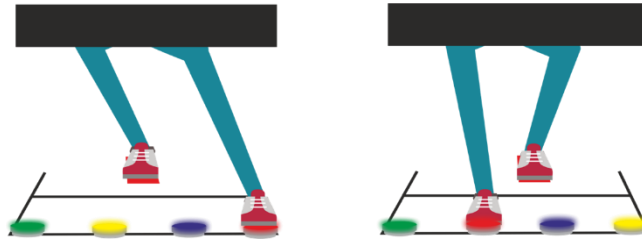
**Figure 18.** ÇAĞIN Foot Discriminative Reaction Test

Statistical Analysis of ÇAĞIN Hand and Foot Reaction Tests

ÇAĞIN Hand and Foot Reaction Tests can determine the subjects' average reaction time, total number of touches and number of errors. With these data, the subject's average reaction time, correct and incorrect reaction rate can be determined.

Mean Reaction *Time*

Automatically determined by the FitLight Trainer or BlazePod device after 20 seconds of testing (e.g. 0.444 ms).

Correct and Incorrect Reaction Rate

The ratio between the subject's total number of taps and the number of errors is taken into account. For example, if the subject touched 20 times and made 5 errors, the correct reaction rate of the subject is determined as 75% and the incorrect reaction rate is determined as 25%.

Data Analysis

The data obtained were transferred to SPSS 26.0 program and Paired-Samples T Test and descriptive statistics were applied. The validity of the ÇAĞIN Hand and Foot Reaction Tests was determined by comparing the results of the 1st and 2nd measurements made with the FitLight Trainer, and the reliability was determined by comparing the measurements made with the FitLight Trainer and BlazePod device. Statistical significance level was accepted as p<0.05. The intraclass correlation coefficients were interpreted according to the table below (Elsworthy et al., 2021; Jukic et al., 2022).

Table 3
Classification of Intraclass Correlation Coefficients

Trivial	*≤0.10*
Small	0.10-0.29
Moderate	0.30-0.49
Large	0.50-0.69
Very Large	0.70-0.89
Almost Perfect	≥0.90

Ethical Procedures

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Gazi University (Code: 2022-1470).

Results

According to the 1st and 2nd measurement comparisons of the ÇAĞIN Hand and Foot Reaction Tests performed with the FitLight Trainer (FitLight Corp, Ontario, Canada), the intraclass correlation coefficients of all tests were found to be r>0.70 and the significance level was p<0.05 in both males and females under 18 years of age and males and females over 18 years of age (Tables 4-5). In this context, the validity of ÇAĞIN Hand and Foot Reaction Tests was found to be very high (r=0.70-0.89). According to the comparisons of the measurements of ÇAĞIN Hand and Foot Reaction Tests with FitLight Trainer (FitLight Corp, Ontario, Canada) and BlazePod (Play Coyotta Ltd., Tel Aviv, Israel) devices, the intraclass correlation coefficients of all tests were found to be r>0.70 and the significance level was p<0.05 in both males and females under 18 years of age and males and females over 18 years of age (Tables 6-7). In this context, the reliability of the ÇAĞIN Hand and Foot Reaction Tests was found to be very high (r=0.70-0.89).

Table 4

Comparison of the 1st and 2nd Measurement Results of ÇAĞIN Hand and Foot Reaction Tests with FitLight Trainer Device in Soccer Players under 18 Years of Age

Age	ÇAĞIN Hand and Foot Reaction Tests Measurements (FitLight Trainer)	N	X̄ (ms)	S	r	p
U 18 Soccer Players	1. Measurement Simple Hand Reaction Time	60	.678	.168	.885	.000
	2. Measurement Simple Hand Reaction Time	60	.637	.165		
	1. Measurement Selective Hand Reaction Time	60	1.202	.183	.846	.000
	2. Measurement Selective Hand Reaction Time	60	1.149	.198		
	1. Measurement Discrimination Hand Reaction Time	60	.621	.128	.836	.000
	2. Measurement Discrimination Hand Reaction Time	60	.581	.116		
	1. Measurement Simple Foot Reaction Time	60	.785	.155	.898	.000
	2. Measurement Simple Foot Reaction Time	60	.735	.161		
	1. Measurement Selective Foot Reaction Time	60	1.277	.195	.869	.000
	2. Measurement Selective Foot Reaction Time	60	1.258	.207		
	1. Measurement Discrimination Foot Reaction Time	60	.759	.132	.809	.000
	2. Measurement Discrimination Foot Reaction Time	60	.723	.134		

Table 5

Comparison of 1st and 2nd Measurement Results of ÇAĞIN Hand and Foot Reaction Tests with FitLight Trainer Device in Soccer Players over 18 Years of Age

Age	ÇAĞIN Hand and Foot Reaction Tests Measurements (FitLight Trainer)	N	X̄ (ms)	S	r	p
18 + Soccer Players	1. Measurement Simple Hand Reaction Time	60	.594	.105	.802	.000
	2. Measurement Simple Hand Reaction Time	60	.539	.092		
	1. Measurement Selective Hand Reaction Time	60	.983	.125	.723	.000
	2. Measurement Selective Hand Reaction Time	60	.991	.140		
	1. Measurement Discrimination Hand Reaction Time	60	.557	.090	.754	.000
	2. Measurement Discrimination Hand Reaction Time	60	.550	.107		
	1. Measurement Simple Foot Reaction Time	60	.686	.109	.838	.000
	2. Measurement Simple Foot Reaction Time	60	.633	.102		
	1. Measurement Selective Foot Reaction Time	60	1.045	.128	.825	.000
	2. Measurement Selective Foot Reaction Time	60	1.014	.120		
	1. Measurement Discrimination Foot Reaction Time	60	.657	.123	.861	.000
	2. Measurement Discrimination Foot Reaction Time	60	.646	.135		

Table 6

Comparison of the Results Of ÇAĞIN Hand and Foot Reaction Tests Performed with Fitlight Trainer and Blazepod Device in Soccer Players Under 18 Years of Age

Age	ÇAĞIN Hand and Foot Reaction Tests Measurements	N	X̄ (ms)	S	r	p
U 18 Soccer Players	FitLight Trainer Simple Hand Reaction Time	60	.753	.150	.841	.000
	BlazePod Simple Hand Reaction Time	60	.699	.136		
	FitLight Trainer Selective Hand Reaction Time	60	1.330	.195	.807	.000
	BlazePod Selective Hand Reaction Time	60	1.249	.183		
	FitLight Trainer Discrimination Hand Reaction Time	60	.785	.104	.713	.000
	BlazePod Discrimination Hand Reaction Time	60	.751	.102		
	FitLight Trainer Simple Foot Reaction Time	60	.949	.172	.831	.000
	BlazePod Simple Foot Reaction Time	60	.948	.192		
	FitLight Trainer Selective Foot Reaction Time	60	1.428	.182	.833	.000
	BlazePod Selective Foot Reaction Time	60	1.382	.168		
	FitLight Trainer Discrimination Foot Reaction Time	60	.841	.109	.715	.000
	BlazePod Discrimination Foot Reaction Time	60	.822	.098		

Table 7

Comparison of the Results of ÇAĞIN Hand and Foot Reaction Tests Performed with Fitlight Trainer and Blazepod Device in Soccer Players over 18 Years of Age

Age	ÇAĞIN Hand and Foot Reaction Tests Measurements	N	X̄ (ms)	S	r	p
18 + Soccer Players	FitLight Trainer Simple Hand Reaction Tim	60	.730	.113	.770	.000
	BlazePod Simple Hand Reaction Time	60	.696	.146		
	FitLight Trainer Selective Hand Reaction Time	60	1.122	.170	.755	.000
	BlazePod Selective Hand Reaction Time	60	1.119	.163		
	FitLight Trainer Discrimination Hand Reaction Time	60	.735	.112	.796	.000
	BlazePod Discrimination Hand Reaction Time	60	.704	.127		
	FitLight Trainer Simple Foot Reaction Time	60	.888	.231	.896	.000
	BlazePod Simple Foot Reaction Time	60	.902	.246		
	FitLight Trainer Selective Foot Reaction Time	60	1.212	.177	.841	.000
	BlazePod Selective Foot Reaction Time	60	1.197	.149		
	FitLight Trainer Discrimination Foot Reaction Time	60	.786	.121	.774	.000
	BlazePod Discrimination Foot Reaction Time	60	.802	.120		

Discussion, Conclusion, and Recommendations

The purpose of the present study was to determine the reliability and validity of ÇAĞIN Hand and Foot Reaction Tests. ÇAĞIN Hand and Foot Reaction Tests determine hand simple, selective, discriminative and foot simple, selective, discriminative reaction times. In line with the findings obtained in the study, it was determined that both the validity and reliability of all of these tests were very high. Various tests are applied to determine reaction time in the field (Schmidt & Dark, 1999; Mercer et al., 2009; Günay, Tamer, & Cicioğlu, 2010; de-Oliveira et al., 2021; Prelević, Dopsaj, & Stančin, 2023). Some of these tests are computer-based using only fingers, some of them are performed using equipment such as ruler, ball, paper, etc., some of them are performed with sensors but without any standardization and only measure simple reaction time. Considering that multiple muscle groups move simultaneously in order to react in sports branches, it is not thought that computer-based reaction performances can provide healthy data at the point of determining the reaction in terms of sport. In addition, in a period when technology and measuring instruments have developed so much, it can be said that making reaction time measurements with equipment such as ruler, ball paper, etc. does not comply with the requirements of the age for scientific studies and does not reach enough targets in the field. Although there are various devices with light sensors that measure reaction time in athletes today, there is no common reaction test protocol.

Generally, in the reaction time tests performed in the field, the tests in the device where the measurement is performed are applied, but these tests cannot provide standardization according to the anthropometric characteristics of the person and only measure simple reaction time. The lack of standardization in reaction time measurements made by means of sensors can be limiting in the objective comparison of reaction time tests performed in different periods and groups. In this context, the "ÇAĞIN Hand and Foot Reaction Tests" developed in this context is in the direction of the idea that it can meet the common test protocol needed in the field by completing the mentioned deficiencies since it can be applied in different measurement devices and provides conformity and standardization according to the anthropometric characteristics of the person. In addition, in the tests used in the field, there were no reaction tests with validity and reliability in both under 18 and over 18 age groups. The fact that the reliability and validity of the ÇAĞIN Hand and Foot Reaction Tests are very high both above and below the age of 18 may indicate that the tests have a suitable format for both adolescent and professional athletes.

While determining the sample group for the validity and reliability study of the ÇAĞIN Hand and Foot Reaction Tests, various branches were examined and as a result, the soccer branch, in which both hands and feet are actively used, was preferred. The fact that the validity and reliability of the tests were very high in the soccer branch, where both hand and foot are actively used, created the opinion that ÇAĞIN Hand and Foot Reaction Tests can be easily used in all sports branches.

In conclusion, it can be said that "ÇAĞIN Hand and Foot Reaction Tests" developed by the researchers can be used as a valid and reliable test method for athletes both under and over the age of 18 in other branches, especially in soccer. It is also noteworthy that it can be a test method that can be adjusted according to the person and his/her characteristics, has high standardization and can determine more optimal performance levels in accordance with the requirements of our age in the field. The developed "ÇAĞIN Hand and Foot Reaction Tests" can be used in different sports branches, assuming that simple, selective and discrimination reaction times are important in the performance monitoring of athletes and can provide more complete and detailed data compared to other tests. Although the test battery has been developed specifically for athletes, deeper validity and reliability studies in sedentary individuals may increase the use of the test in various fields.

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Quality Instrumental Education in Classroom Environment: Perspectives of Teachers and Academicians

Sonat Başpınar[*]   Ajda Şenol Sakin[**]

Abstract

This study attempted to identify the requirements and indicators of quality instrument education to provide quality instrument training in music lessons offered within the scope of general education. In this study, in which the phenomenological approach, one of the qualitative research methods, was adopted, the study group was composed of music teachers working in general music education and academicians who took an active role in teaching practice courses at universities. There were seven music teachers and six university lecturers in the study group formed in line with this scope. Interviews were conducted with the participants who made up the study group for the quality instrument training in the classroom environment. In the light of the findings obtained in the present study, it was concluded that music teachers and academicians believe that for quality instrument education to take place in the classroom environment, an appropriate environment, sufficient lesson hours, and essential instruments should be provided, the correct methodology should be applied. The played works should be individually or as a group performed at such activities, like as concerts and auditions. In line with all these results, the things that should happen to be able to say that instrument education is qualified in the classroom environment are listed.

Keywords: Instrument education, instrument education in the classroom**,** quality instrument education, music education, general music education.

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[*] Doctorate student in the Music Education, Bursa Uludağ University, Faculty of Education, Department of Fine Arts Education, Bursa, Türkiye. E-mail: sonatbaspinar@gmail.com, 0000-0002-7348-9957.
[**] *Corresponding Author:* Assoc. Prof. Dr., Bursa Uludağ University, Faculty of Education, Department of Fine Arts Education, Bursa, Türkiye. E-mail: ajdasenol@uludag.edu.tr, 0000-0003-1870-2329.

Sınıf Ortamında Nitelikli Çalgı Eğitimi:
Öğretmen ve Akademisyen Bakış Açıları

Sonat Başpınar[*] **Ajda Şenol Sakin**[**]

Öz

Bu çalışmada genel eğitim kapsamında gerçekleştirilen müzik derslerinde nitelikli çalgı eğitimi verilebilmesi için gereklilikler ve nitelikli çalgı eğitiminin göstergeleri tespit edilmeye çalışılmıştır. Nitel araştırma yöntemlerinden olan fenomenolojik yaklaşımın benimsendiği bu araştırmada çalışma grubu genel müzik eğitiminde görev yapan müzik öğretmenleri ve üniversitelerde öğretmenlik uygulaması derslerinde aktif görev alan akademisyenlerden oluşmuştur. Bu kapsam doğrultusunda oluşturulan çalışma grubunda yedi müzik öğretmeni ve altı öğretim elemanı bulunmaktadır. Çalışma grubunu oluşturan katılımcılarla sınıf ortamında nitelikli çalgı eğitimine yönelik görüşmeler gerçekleştirilmiştir. Elde edilen bulgular ışığında müzik öğretmeni ve akademisyenlerin sınıf ortamında nitelikli çalgı eğitiminin gerçekleşebilmesi için uygun ortam, yeterli ders saati, gerekli çalgıların sağlanması, doğru bir yöntemin uygulanması ve çalınan eserlerin konser, dinleti vb. etkinliklerle bireysel ya da grup olarak paylaşılması gerektiğini düşündükleri sonucuna varılmıştır. Elde edilen veriler doğrultusunda sınıf ortamında çalgı eğitiminin nitelikli olabilmesi için bulunması gereken hususlar sıralanmıştır.

Anahtar Sözcükler: Çalgı eğitimi, sınıf ortamında çalgı eğitimi, nitelikli çalgı eğitimi, müzik eğitimi, genel müzik eğitimi.

[*] Doktora öğrencisi, Bursa Uludağ Üniversitesi, Eğitim Bilimleri Enstitüsü, Güzel Sanatlar Eğitimi Ana Bilim Dalı, Müzik Eğitimi Bilim Dalı, Bursa, Türkiye. E-posta: sonatbaspinar@gmail.com, 0000-0002-7348-9957.
[**] *Sorumlu Yazar:* Doç. Dr., Bursa Uludağ Üniversitesi, Eğitim Fakültesi, Güzel Sanatlar Eğitimi Bölümü, Müzik Eğitimi Ana Bilim Dalı, Bursa, Türkiye. E-posta: ajdasenol@uludag.edu.tr, 0000-0003-1870-2329.

Introduction

Instrument education, which is one of the components that should be attached importance in music education, has been carried out for years, based on the master-apprentice relationship, by transferring the knowledge and skills to the student individually by making use of the methods in the relevant literature (Tutu, 2001). In the process of implementing instrument education in the classroom environment, different methods and techniques are applied since more than one student is addressed, and educators mostly use their own training methods based on their experiences (Özmenteş & Taşkın, 2011). Given that each educator may have a different teaching process developed by himself/herself, "What specifies that an acceptable instrument education takes place in general music education?" and "How should instrument education be implemented in the classroom in general music education?" The answers to these questions will shed light on instrument education in the classroom environment.

Atalan (1998, p. 11) defines instrument education as follows: "Instrument education, which is one of the important areas of music education, is the process of gaining new behaviors and creating the desired changes consciously and through learning by experience based on the cognitive, sensory and psychomotor behaviors of individuals and societies consisting of individuals through instrument teaching." In Türkiye, general music education is carried out in a classroom environment with the whole class or with a group of students who choose the elective music course. Therefore, instrument training is implemented as a group, not individually. This practice has advantages as well as challenges. According to Rogers (1974), the students who took the music education in a group turned out to be superior in skills, such as hearing ability, comprehension of musical signals, sight-singing, and transposition and improvisation abilities compared to those students who took the music education individually. Shockley (1982) similarly stated that musicianship skills were acquired more naturally in a group environment. Playing music in the presence of their friends also augments students' self-confidence. Taking music lessons within a group enables the students to have the notion of "group dynamics," thus creating positive sharing and cooperative working behavior among themselves. Furthermore, the group work accelerated students' mental development and increased their motivation levels (Webber, 1958; Mehr, 1965).

When the teacher's instrument or school instrument is in question in the music lessons, what immediately come to mind are the instruments used by the teacher in such issues as increasing the attention of the student, accompanying the songs, and helping the students comprehend the musical notation (Gökalp & Şahin, 2013). As far as the historical process of general music education in our country is concerned, especially instruments, such as mandolin, recorder and melodica, are taught more intensively in the classroom environment. Besides, the instruments that students frequently play in the classroom environment, the use of more diverse instruments can increase the interest in the music lesson and make the lesson more enjoyable. However, according to Karataş and Kılıç (2017), besides the melodica, using instruments, such as baglama (Turkish traditional instrument), violin, and guitar, can also increase their interest and participation in the lesson.

The aim of instrument education carried out in the classroom environment is to offer a quality instrument education. Quality education aims to develop behaviors that will meet the needs of the individual and society comprehensively and to support the development of the individual, the people with whom the individuals interact, his/her family and the social environment s/he is a member of, so that the individuals can achieve the necessary behavioral changes that are in harmony with the society they live in, can integrate with their spiritual culture, and eventually achieve the needed behavioral change without losing its individual personality while doing all these. After the definitions of quality and quality education, the students in a quality music education process are expected to turn their skills into performance, such as being able to read music texts and play an instrument appropriately (Kabataş, 2017).

When the studies on quality instrument education are examined, the studies on individual instrument education carried out within the scope of professional music education at the undergraduate level were mostly carried out in the relevant literature (Albayrak & Bulut, 2021; Cerit, 2010; Moray, 2003; Özmenteş, 2013; Şentürk, Kapçak, and Işıksungur, 2018). It has been revealed that there are a very limited number of studies on instrument education in the classroom environment and that these

studies seem to fail to answer such questions as "How is quality instrument education in the classroom defined, and how should it be implemented?"

To fill the gap in the literature above, the present study aims to identify the academicians and music teachers' views on how quality instrument education should be implemented in the classroom environment. In line with this purpose, answers to the following questions are sought:

What are the participants' views;

1) about the necessity of instrument training in general music education?
2) about the instruments that can be used in the instrument training process within the scope of general music education?
3) on quality instrument training?
4) on the indicators of quality instrument training?
5) about the quality instrument training process?

Method

Research Model

In the present study, the phenomenological research method, one of the qualitative research models, was adopted in an attempt to identify the perceptions of music teachers regarding quality instrument education in the classroom environment. Phenomenological research, which is the philosophy and qualitative research model of today, is based on lived experiences (Merriam & Grenier, 2019). This study attempted to make sense of what quality instrument education was like and how it should be implemented in the classroom environment through the data obtained by means of interviews with the participants.

To conduct the present study, ethical approval was obtained from the Research and Publication Ethics Committee of Bursa Uludağ University, with the session dated 27 May 2022 with the session number 2022/05.

Study Group

The participants in this study consisted of music teachers and university lecturers. The study group was formed by the purposive sampling method. While forming the study group in the study, although easily accessible case sampling was adopted, some homogeneous cases were still considered. It was emphasized that the instructors were selected from among the university lecturers who were experts in general music education, who took musical special teaching methods courses, or who observed their students in this respect in teaching the practice courses for many years, or who conducted the school instrument lessons. In the selection of music teachers, elements, such as performing instrument training in the classroom and being experienced in general music education, were considered. Consequently, the study group was formed with 13 people, six academicians, and seven music teachers from different countries, who voluntarily agreed to participate in this study. Table 1 illustrates the demographic information of the study group.

Table 1

Demographic Information of the Study Group

Participants	Participant code	Title	Gender	Age	Institution	Tenure/ Year	Education status
1	MT 1	Music Teacher (MT)	Female	29	High School (HS)	5-9	Ph.D.
2	MT 2	MT	Male	43	HS	10-14	M.A.
3	MT 3	MT	Male	41	HS	10-14	Graduate
4	MT 4	MT	Female	38	HS	10-14	Graduate
5	MT 5	MT	Female	38	HS	10-14	Graduate
6	MT 6	MT	Female	31	HS	5-9	M.A.
7	MT 7	MT	Male	42	Secondary School	15+	M.A.
8	UL 1	Prof. Dr.	Male	49	Çanakkale Onsekiz Mart University	15+	Ph.D.
9	UL 2	Prof. Dr.	Female	48	Çanakkale Onsekiz Mart University Bursa	15+	Ph.D.
10	UL 3	Lecturer	Male	49	Uludağ University	15+	M.A.
11	UL 4	Lecturer	Male	49	Dokuz Eylül University	15+	M.A.
12	UL 5	Assoc.Prof.	Male	35	Gazi University Bursa	10-14	Ph.D.
13	UL 6	Dr. Lecturer	Female	63	Uludağ University	15+	Ph.D.

Data Collection Tools

Data were collected by the interview method in this study. After the literature review, a semi-structured interview form was prepared by the researchers. Correspondingly, six open-ended questions were prepared to establish the demographic information of the study group in an attempt to establish age, professional experience, gender, the institution where the participants currently worked; and another set of six questions about their educational status, their views on instrument education, quality instrument training, its requirements and the process. The interview form was finalized in consultation with an expert in music and research methods, as well as three music teachers.

Data Collection and Analysis

The data collection process in this study was carried out face to face or in written form with the music teachers and university lecturers at the time appropriate for them after the official permissions were obtained. In this study, the data obtained from the interviews were analyzed using the content analysis method and tabulated by creating themes and codes.

Consistency analysis was implemented by examining the data analyzed separately by the researchers for the validity and reliability of the identified themes and codes. The reliability formula proposed by Miles and Huberman (1994) was used to calculate the reliability (consistency) of this study. The reliability of this study was established as 79.41% as a result of the calculation. Reliability calculations over 70% were considered reliable for the study (Miles & Huberman, 1994). With the result obtained, it is possible to say that the data analysis of this study was reliable. Furthermore, to ensure the validity and reliability of the study, the participants were described in detail under the title of the study group in the method section, and their views were individually included in the results section. Moreover, the researcher triangulation method was utilized to increase the study's reliability. In the triangulation

method employed by the researchers, the collection, analysis, and interpretation of data necessitate the involvement of multiple researchers (Başkale, 2016). In this context, the data obtained in the study were analyzed by both researchers.

Results

This study aimed to identify the opinions of academicians and teachers on what constitutes quality instrumental music education in a classroom setting. To answer the question, "What should quality instrumental music education be like in a classroom environment?" interviews were conducted with participants. Regarding the necessity of instrument training in the classroom in general music education, the questions "What are your views on the necessity of providing instrument training in music lessons? Do you think it should be included within the curriculum?" were asked, and the theme "Necessity of Instrument Training" was obtained. In Figure 1, the theme, sub-themes and codes are presented.
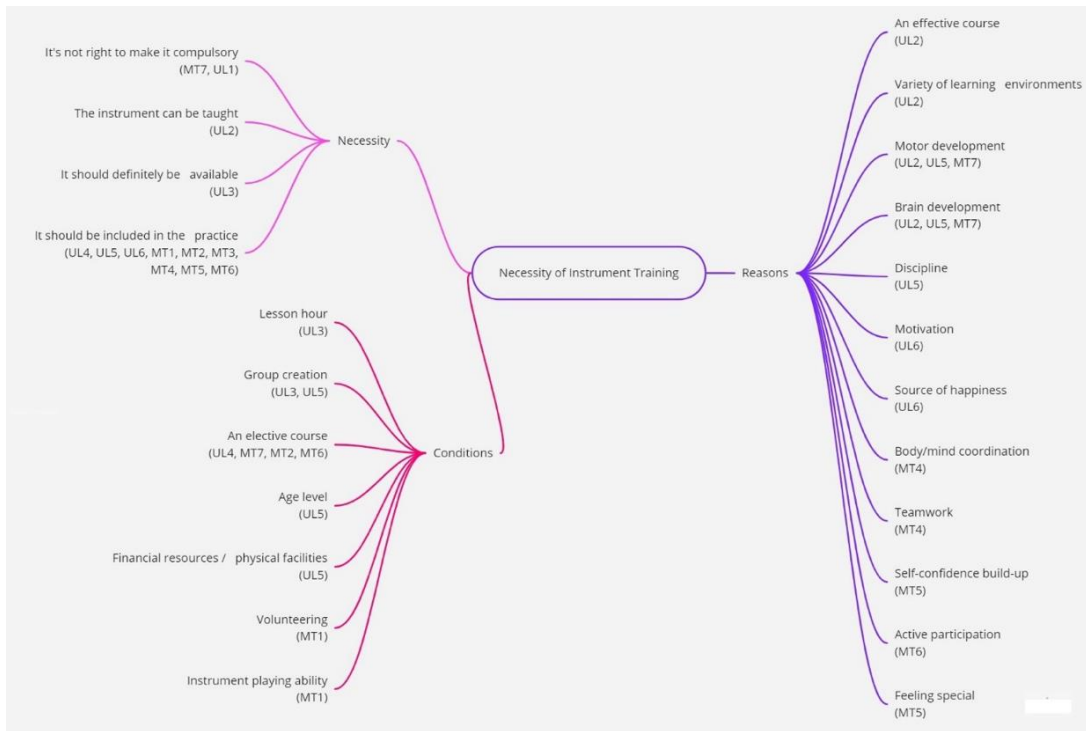
Figure 1. *Participants' views on the theme of the necessity of instrument training*

As shown in Figure 1, the participants evaluated the necessity of instrument training regarding "necessity," "reasons" and "conditions." Participants predominantly believed that it was necessary to provide instrument training in general music education, providing that sufficient class hours and appropriate age groups, as well as the necessary financial resources and physical opportunities, were provided. It was revealed that this necessity was based on reasons, such as reinforcing the theoretical knowledge of the student, developing their self-confidence by making them feel special, body-mind coordination and experiencing teamwork. Furthermore, some participants stated that it was incorrect to make instrument training compulsory in the classroom environment and that it should be included in the program as an elective course.

Some of the participants' views on the "Necessity of Instrument Training" theme are as follows:

> *"**It is necessary** because, in the music class, students don't just want to sing and read notes; they also want to play an instrument. Moreover, I think that the students who receive instrument training in the lesson feel special, contributing to their build-up of self-confidence"* (MT5).

*"... as a teacher who has observed the processes of the students I have trained for more than twenty years after they start to work as teachers, **I do not think that it is the right approach to make instrument education compulsory** in general music lessons or, from a broader perspective, in formal education institutions"* (MT7).

*"Class hours should be increased, and **groups should be formed** in line with the interests and abilities of the students, and they should be planned to include the teacher's practice hours"* (UL3).

*"The instrument to be taught should be specified by considering many factors, such as **the age level of the group trained, the number of groups,** and **the financial resources and physical facilities** of the school"* (UL5).

The participants of this study were asked the questions, "What are the most suitable instruments for offering quality instrument training in the classroom environment in general music education? Can you explain it with your reasons?" From the responses obtained, the theme of "Instruments that can be used" was obtained. In Figure 2, the theme, sub-themes and codes formed from the responses of the participants to the theme of instruments that can be used are illustrated.
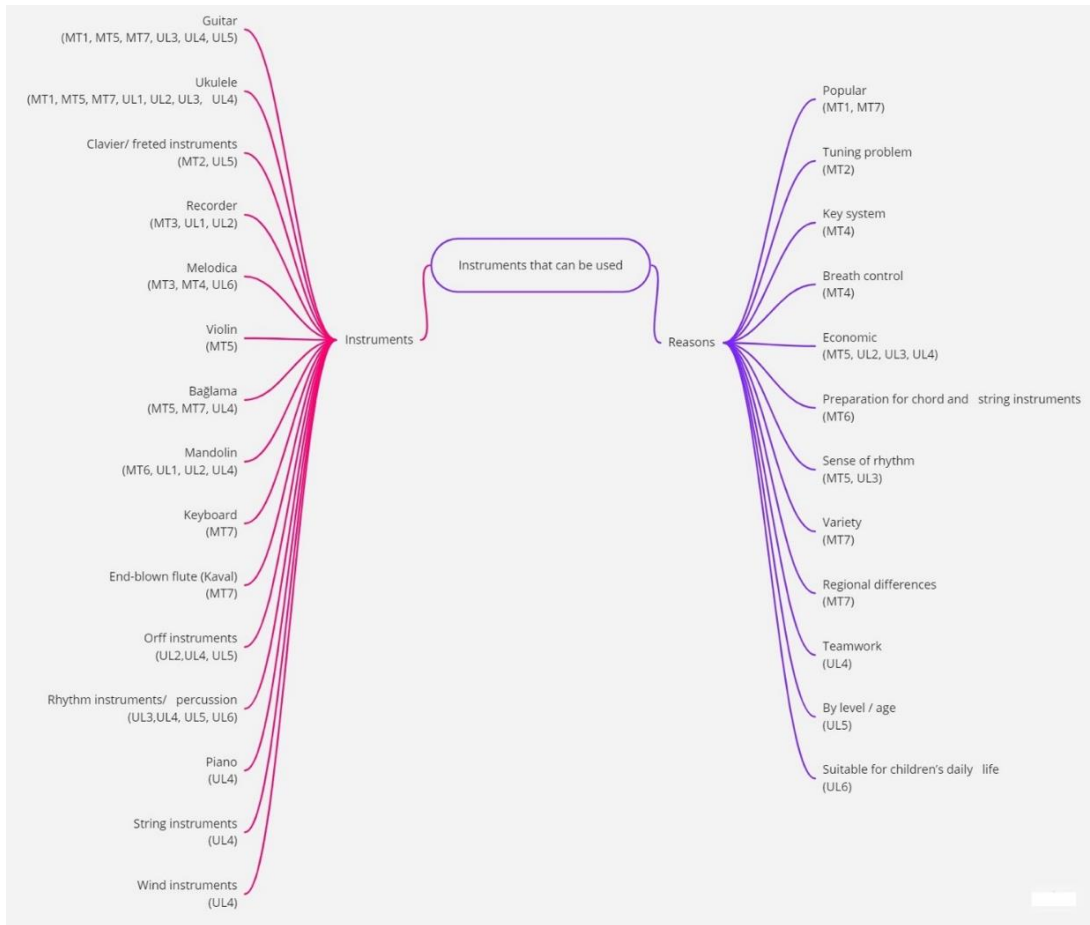
Figure 2. *Participants' views on the theme of instruments that can be used*

As seen in Figure 2, most participants stated that guitar, mandolin and rhythm instruments, especially ukulele, could be used primarily in instrument education in the classroom environment. The findings showed that the music teachers and university lecturers participating in the study mostly preferred popular and easy-to-tune string, key, chord, wind and percussion instruments for reasons, such

as gaining a sense of rhythm and experiencing teamwork in accordance with the students' daily lives, especially for economic reasons.

Some participants' views on the "Instruments that can be used" are as follows:

*"...Since they are **cheap and easily accessible**, **the recorder** and **mandolin** are the main ones. With a vast usage area, the ukulele can be another one. Moreover, before all this, basic music education can be offered with **the Orff instruments**" (UL2).*

*"The most suitable instruments, since they enable children to learn by keeping a tempo that coincides with their active **daily life**, and **by doing and experiencing**, are **wooden spoons, finger cymbals, tambourine, bell, steel triangle, small drum, snare drum, darbuka, bendir, castanets, rhythm sticks, metallophone and melodica**" (UL6).*

In an attempt to identify the views of the participants on the elements required for quality instrument training in the classroom environment in general music education, the following question, "What are your views on the course duration, class size and requirements for quality instrument education in the classroom environment?" was asked. The theme of "Qualified Instrument Education" was formed from the answers obtained. In Figure 3, the theme, sub-themes, and codes are presented.
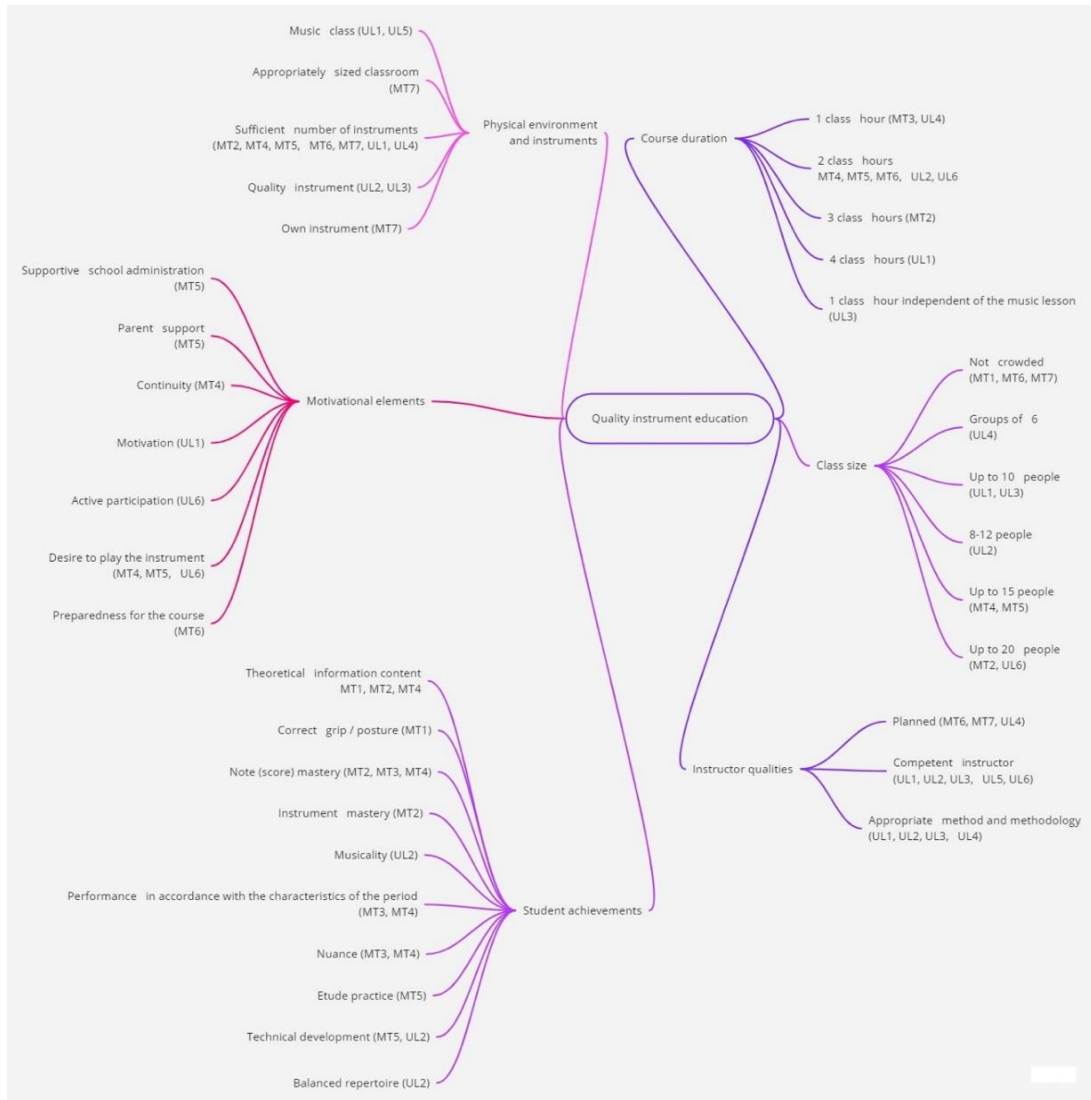

Figure 3. *Participants' views on the theme of quality instrument education*

As shown in Figure 3, the participants evaluated quality instrument education from the perspective of "class duration," "class size," "physical environment and instruments," "motivational elements," "instructional qualities" and "student achievements." It was revealed that the music teachers and university lecturers participating in this study mostly believed that the music lessons should be given at least two hours a week and in groups that were not overcrowded. Furthermore, most participants stated that there should be a sufficient number of instruments for the physical environment and instruments sub-theme. The desire to play was one of the motivational factors most specified by the participants. Moreover, while the participants frequently indicated their views about the competence of instructors, they also mentioned that appropriate methods and methodology should be used. The participants, while stating that many achievements could be an indicator of quality instrument education, especially emphasized the content of theoretical knowledge and note mastery.

Some of the participants' views on the "Quality Instrument Education" theme are as follows:

*"If the school has a special **music class**, an enduring environment can be offered"* (MT1).

*"One of the biggest problems is that the music lesson is just one hour. We need time long enough during which we can both teach theoretical knowledge and carry out etudes and practices, which means at least **3 class hours** of music lessons per week... **A level repertoire created with mastery of notation**, control of rhythm and command of keyboard are the most important achievements of students"* (MT2).

*"... class size should **not exceed 15**, personally speaking... If the student's **desire** to play an instrument continues, if s/he can play the notes and chords cleanly, **apply the nuances**, and interpret the works **in accordance with the characteristics of the period** of the composer, we can define it as a quality lesson"* (MT4).

*"We can say that it is an indication of quality education if there are students who are **eager and motivated** to play instruments, **if parents support, this course if etudes are carried out** and **also if there are courses aimed to develop students technically**"* (MT5).

*"In my opinion, the fact that the teacher has acquired the principles of **progressivity and continuity** is a critical factor in quality instrument education. It is equally important to note that the teacher should be organized and planned, the students come prepared to the lesson, and both teacher and students should **avoid absenteeism**"* (MT6).

*"It is important to aim to produce **an expert teacher competent in his/her field**, suitable instruments, purpose-fit methodology, sufficient time frame, quality music suitable for age and emotion level* (UL3).

Another question asked to the participants was, "What are the quality indicators for quality instrument education in the classroom in general music education?" and the theme of "Quality Indicators in Instrument Education" was obtained from the participants' responses. In Figure 4, the theme and codes are illustrated.
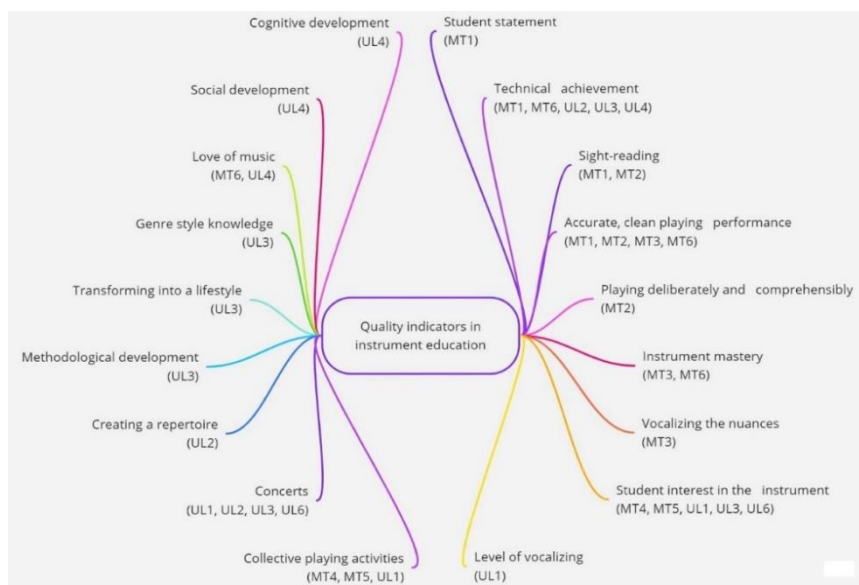
Figure 4. *Participants' views on the theme of quality indicators in instrument education*

The participants of this study reported that the indicators of the quality of the instrument education in the classroom were primarily technical achievement, the student's interest in the instrument, playing accurately and cleanly, performing concerts, collective playing activities, sight-reading skills, mastery of the instrument and love of music. In Figure 4, it is explicit that the participants specified many different elements as the quality indicators of instrument education in the classroom environment.

Some of the participants' views on the theme of "Quality Indicators of Instrument Education" are as follows:

> *"Completion of the processes of **correct technique, musicality** and **balanced repertoire** is the quality indicator of instrument education"* (UL2).

> *"**An expert teacher who has a good command of the** field, appropriate instruments, **purpose-fit methodology, sufficient time** frame, **producing quality music** suitable for age and emotion level are the indicators of quality in instrument education"* (UL3).

> *"If the student's desire to play an instrument continues in instrument education, if s/he can play the notes and chords **cleanly**, if s/he can apply the **nuances**, if s/he can interpret the works in accordance with the **characteristics of the period of the composer**, we can define it as a quality lesson"* (MT4).

Regarding the participants' views on the quality instrument education process in the classroom in general music education, the theme "Instrument Education Process" was formed. In Figure 5, the theme, sub-themes and codes formed from the responses of the participants are presented.
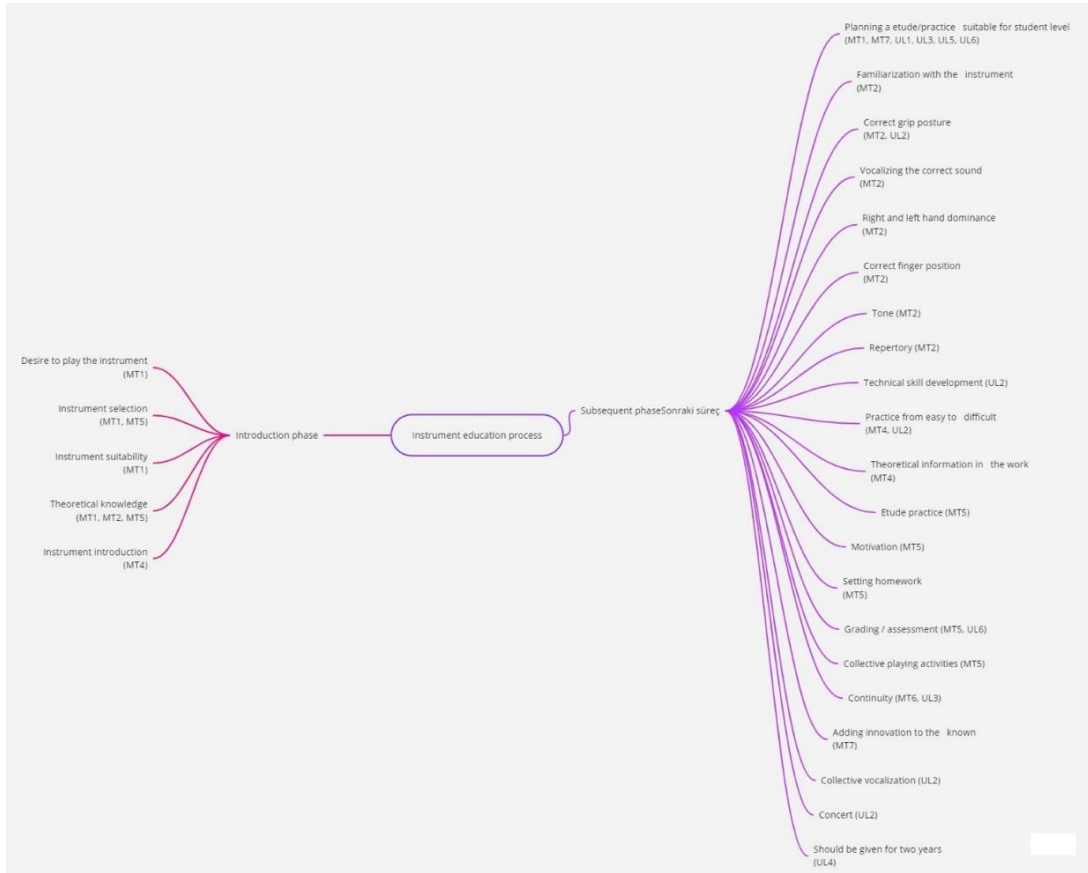
Figure 5. *Participants' views on the theme of the instrument education process*

Figure 5 illustrates the sub-themes and codes formed based on the views of the participants on quality instrument education. Correspondingly, the participants grouped this phase as the initial phase and the subsequent phase. According to some participants, during the initial phase of instrument education, the student's desire to play an instrument and its suitability for the instrument should be considered, a correct instrument selection should be made, and theoretical knowledge deficiencies should be eliminated, as well as knowledge on the introduction to the instrument. In the subsequent phase, most participants emphasized the importance of planning and specified their views about what should be in that phase.

Some of the participants' views on the "Instrument Education Process" theme are as follows:

*"... a program should be made, and **continuity** should be ensured. The important issue here is to structure the process in such a way as to achieve appropriate-effective learning. More importantly, instrument education in the classroom should give the student **the motivation** to play an instrument, rather than providing artistic performance"* (UL1).

*"Technical skills should be introduced gradually. Skills required by **listening to each other** and **performing collectively** and individually should be taught. **Technical and interpretation** efforts should be carried out on an entertaining repertoire. The process should be completed with the stage of exhibiting the preparations"* (UL2).

*"It is necessary to prepare a well-prepared **lesson plan** in a way that will develop cognitive and psychomotor skills in students, conduct the lesson in accordance with this plan, **measure** and **assess** the student achievements aimed in education, and eventually based on this result, the plan should be revised and updated if necessary"* (UL6).

Discussion, Conclusion and Recommendations

In the present study, quality instrument education in the classroom environment was investigated from a phenomenological point of view. In the light of the ensuing results, the themes of the necessity of instrument education within general music education, the instruments that could be used, the requirements of quality instrument education, the indicators of quality instrument education and the quality instrument education process were obtained. Within the scope of these themes, the conceptual framework of the problem "How quality instrument education should be implemented in the classroom environment?" was created.

In the light of the data obtained, it was concluded that instrument education should be included in general music education. It was reported by the participants that instrument education was a significant step in general music education, and that playing an instrument led to achievements, such as self-confidence, physical and mental coordination, and teamwork in students. Consistent with the findings obtained in the present study, Acar Önal and Aydoğan (2012, p. 59) reported that instrument education was significant regarding "one's ability to think multi-dimensionally and discipline himself/herself." Küçüköncü (2006) regarded instruments as a tool that ensured the desired quality of music education.

Furthermore, while the majority of the study participants (n=11) who mentioned the early period instrument education, adopted the view that instrument education should be included within the curriculum, and two participants argued that instrument education should not be made compulsory in parallel with the latest music programs of the Ministry of National Education. Participants literally thought that a system in which the student was included in the process of wanting and choosing to play an instrument would be much more beneficial for music education. Similarly, Tanınmış (2014, p. 175) stated that "… it is impossible to instill the desired love of music by forcing the child to play an instrument."

Regarding instruments that could be used in the classroom, the participants stated that in addition to instruments, such as the ukulele, guitar, and rhythm instruments, that were easily accessible and had no tuning problems, key instruments, string instruments, and wind instruments could also be used. Some studies were carried out on the use, advantages and disadvantages of all these instruments in the classroom environment (Gayretli, Yılmaz, & Zahal, 2021; Giebelhausen, 2016; Lessard, 2011; Ranelli & Smith, 2011; Thibeault, 2015). Furthermore, it was also stated by some participants that the baglama and end-blown (kaval) flute, which were Turkish music instruments, could be taught as classroom instruments. These suggestions can be considered for the content created by considering the student expectations and local requirements. In their study, Özkasnaklı and Dalkıran (2017) identified students' views on playing instruments in general music education. They concluded that the majority (438) of the students (n=822) who participated in this study wanted to play the guitar first and then the baglama. In the study conducted by Üstün and Albuz (2020) on this subject, when 1321 music teachers' use of Turkish music instruments was investigated, the findings showed that 35.3% of the teachers did not use Turkish music instruments. However, with the addition of the Baglama Training course in the music teaching program developed by the Higher Education Institution in 2018, it is believed that there will be an increase in the ability of music teachers to use Turkish music instruments. As a result, the use and teaching of Turkish music instruments, such as baglama, in the classroom environment, will rise.

In this study, the findings showed that a music class was required to provide quality instrument training in the classroom environment. The significance of the music class was also reported in many studies on general music education (Atak Yayla & Dalmışlı, 2014; Şahin & Toraman, 2014; Yaman Akkuzu, 2016; Kademli & Çelik Kılıç, 2019; Taşkıran & Şenol Sakin, 2022). The participants also stated that instrument education could only be implemented in a classroom environment with a sufficient number of instruments and they further emphasized the importance of a quality instrument as well as using one's own instrument.

When the participants were asked their views about the class size suitable for performing qualified instrument education in the classroom environment, it was clear that all the participants indicated the class sizes that were not overcrowded, although the numbers they described as "overcrowded" changed. Although the participants articulated different views about the duration of lessons, it was stated by most participants that the music lesson should be for two lesson hours. In the light of these findings, in line

with the views of the participants, it was concluded that it would be more appropriate to perform music lessons or activities in which instrument education would be carried out within the scope of compulsory or restricted elective lessons/activity hours other than the restricted elective music lessons, with eager students and in line with the teacher's time planning.

In addition to the duration of lessons, class size, physical environment and instruments, the participants also stated that their teaching competence and qualities were equally important for implementing quality instrument education in the classroom environment. In general, the participants emphasized that the teacher carrying out the training should have the skill and ability to use a regular, competent, and appropriate method and methodology. Similarly, according to Umuzdaş (2013, pp. 2-4), "the experience of an art instructor and his/her training in the field significantly affect the quality of education. …The proficiency of a music teacher in his/her instrument also affects the quality of that teacher's teaching performance."

While the participants, on the one hand, predominantly specified the technical achievement, student's interest in the instrument, correct/clean playing and concerts as indicators related to quality instrument education in the classroom environment, they also emphasized the elements of collective playing activities, sight-reading skills, instrument mastery and love of music. In addition to all these, the participants also stated that students' statements, playing deliberately and comprehensibly, vocalizing the nuances correctly, vocalization level, creating a repertoire, methodological development, transforming it into a lifestyle, knowledge of genre and form, social and cognitive development were required as well. In addition to all these indicators regarding the education process, presenting the works that point to the end of a deadline in collective or individual activities in or out of school was particularly emphasized by the participants. Çimen (2008) had a similar view and showed that the technical and musical knowledge gained by the students and exhibited on the stage, in front of an audience, was among the objectives of instrument education. According to the participants, the instrument education process should operate in line with the principles of progressivity and continuity. Participants stated that each stage should be planned in detail, challenges to be encountered, and solutions should be tried to be identified, and this planning should be ready to get changed dynamically during the process.

In conclusion, based on the data obtained in the present study, it has been concluded that for instrumental music education in a classroom setting to be considered qualified, the following aspects should have been realized:

- Class size that is not overcrowded (up to 20 people) consisting of student groups eager to play instruments should be ensured.
- Sufficient course hours, not less than two lesson hours per week, should be offered.
- A music classroom suitable for making music collectively, equipped with sufficient materials and instruments should be made available.
- Motivational support (school administration and parent support, student continuity, student interest, student readiness) should be provided.
- Competent teachers who can apply the right and appropriate methodology and carry out appropriate planning at every stage of education should be available.
- Students should be able to demonstrate correct instrument-playing attitudes and skills.
- Collective playing activities for the development of listening and vocalization skills should be organized.
- In line with the repertoire appropriate for the level, the works should be exhibited through events, such as concerts.

In line with the results obtained from this study, the following are recommended to the researchers who will investigate this or similar subjects in the future:

- Studies can be conducted on the issues to be considered while creating appropriate age groups in collective instrument education. Interdisciplinary studies can be conducted on the effects of playing an instrument on teamwork in the classroom environment.
- Studies can be performed to plan the teaching methodology and materials of the instruments primarily in the classroom environment. Studies can be conducted to identify the effects of teaching qualities for motivation in the instrument-playing process.

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Contribution of Choir Practices to the Integration Process of Immigrant Students

Gülnihal Gül*   **Gizem Arıcı****

Abstract

This study aimed to identify to what extent the choirpractices implemented in schools contributed to the integration process of immigrant students. In this study, action research, one of the qualitative research methods, was used as the research design and homogeneous sampling method. It is one of the purposeful sampling types, as the sample group. A questionnaire form consisting of 12 open-ended questions and a demographic information form with three questions were applied to the study group. Content analysis was used to analyze the interviewdata. In line with the findings obtained in this study, it was found that the choir practices implemented in schools contributed to the sense of belonging of immigrant students and their recognition in their social environment. The choir practices generated positive emotions that supported students' self-confidence, personal and spiritual development. It was revealed that choir practice had positive contributions to students' Turkish reading, writing, and speaking skills, the development of their vocabulary, acquisition of cooperative working habits and family and peer relations. In line with these results obtained, it was also found that some of the participants included in the choir practice were exposed to peer bullying.

Keywords: Immigrant students, integration, music education, choir practice.

**Corresponding Author*: Assoc. Prof. Dr., Bursa Uludag University, Faculty of Education, Department of Music Education, Bursa, Turkey. E-mail: gulnihalgul@gmail.com, https://orcid.org/0000-0001-9437-2419.

**PhD Student, Bursa Uludag University, Institute of Education, Bursa, Turkey. E-mail: gizem.erdeveciler@gmail.com, https://orcid.org/0000-0002-1606-9948.

Koro Çalışmalarının Göçmen Öğrencilerin Entegrasyon Sürecine Katkısı

Gülnihal Gül* Gizem Arıcı**

Öz

Bu araştırmada okullarda gerçekleştirilen koro çalışmalarının göçmen öğrencilerin entegrasyon sürecine ne düzeyde katkı sağladığını tespit etmek amaçlanmıştır. Araştırmada nitel araştırma yöntemlerinden eylem araştırması deseni ve örneklem grubu olarak amaçlı örneklem türlerinden benzeşik (homojen) örnekleme yöntemi kullanılmıştır. Çalışma grubuna açık uçlu 12 sorudan oluşan görüşme formu ve üç soruluk kişisel bilgi formu uygulanmıştır. Görüşmeler sonucunda elde edilen verilerin çözümlenmesinde içerik analizi tekniğinden yararlanılmıştır. Bu çalışmadan elde edilen bulgular doğrultusunda okullarda gerçekleştirilen koro çalışmalarının göçmen öğrencilerin aidiyet duygularına ve bulundukları sosyal çevrede kabul görmelerine katkı sağladığı tespit edilmiştir. Ayrıca okullarda gerçekleştirilen koro çalışmalarının öğrencilerde özgüveni, kişisel ve ruhsal gelişimi destekleyen olumlu duygular yarattığı belirlenmiştir. Bununla birlikte koro çalışmalarının öğrencilerin Türkçe okuma, yazma ve konuşma becerilerine, kelime hazinelerinin gelişimine, işbirliğine dayalı çalışma alışkanlıkları kazanmalarına, aile ve akran ilişkilerine de olumlu yönde katkısının olduğu tespit edilmiştir. Sonuç olarak, araştırmadan elde edilen bulgular doğrultusunda koro çalışmalarına dahil olan bazı katılımcıların akran zorbalığına maruz kaldığı da belirlenmiştir.

Anahtar Sözcükler: Göçmen öğrenciler, entegrasyon, müzik eğitimi, koro çalışmaları.

*Sorumlu Yazar: Doç. Dr., Bursa Uludağ Üniversitesi, Güzel Sanatlar Eğitimi Bölümü, Müzik Eğitimi Ana Bilim Dalı, Bursa, Türkiye. E-posta: gulnihalgul@gmail.com, https://orcid.org/0000-0001-9437-2419.

**Doktora Öğrencisi, Bursa Uludağ Üniversitesi, Eğitim Bilimleri Enstitüsü, Bursa, Türkiye. E-posta: gizem.erdeveciler@gmail.com, https://orcid.org/0000-0002-1606-9948.

Introduction

Immigrants, who will probably have some challenges reaching social resources in a new country, have high feelings of loneliness and isolation (Almutairi, 2015) and may face many problems, such as adaptation to the society they have migrated to, education and language learning (Bloch, 2002; Castleset al., 2013). In this sense, it is possible to say that orientation and integration of individuals who have migrated due to social, psychological and cultural reasons to the region they have migrated is necessary and significant. Integration is a crucial priority, especially regarding the communal feeling of belonging of immigrants in the education age.

The events and activities organized in schools, which are considered to be among the most significant institutions that contribute to the development of integration and a sense of belonging (Dere & Demirci Dölek, 2023; Özgök & Sarı, 2016) and enable immigrant students to recognize themselves as a part of the institution and think that they are approved and supported by the teachers and local pupils. In this way, it is considered that these students' sense of belonging and commitment to the country and society they live in develops (Fuller & Macfadyen, 2012; Goodenow, 1992; Goodenow & Grady, 1993; Sağın & Güllü, 2020; Sukma et al., 2020; Şimşek & Kula, 2018).

Conducted studies show that immigrant students are facing peer ostracisations because of the prejudices against immigrants, language barriers and economical problems (Gökmen,2020; Uçar 2021) and also states that educational activities have significant place in their integration (Cerna, 2019; Luchtenberg, 2004; Schneeweis, 2011). However, we should note that the relevant literature has some studies conducted on the contribution of artistic activities in the integration process of students (Dowell & Goering, 2018; Kahvecioğlu, 2022), on the music activities in the education process of disadvantaged groups (Gül & Eren, 2017; Robinson, 2013) and the integration process of immigrant students (Aksoy, 2022; Gustavsson & Ehrlin, 2016; Uğurlu, 2015). In this context, the bonding power of the musical activities thats conducted with the community may contribute to immigrant students integration into the society and also it is thought that the lyrics of the songs used in the musical activities will be an efficient tool in the process of adaptation of the language that they are reside in.

Further study of the relevant literature showed that there were studies on the contribution of choral practices, which were included in the musical activities, to the integration process of disadvantaged groups. In their study, Tos and Gökçe (2021) stated that the activities of establishing choirs and music groups in schools were crucial in the integration of immigrant pupils. Furthermore, the findings showed that different studies on the contribution of choral studies to the integration process of immigrant pupils existed in the literature (Göktaş & Ayhan, 2017; Lenette &Procopis,2016; Rinde & Kenny, 2021).

It is believed that the classroom and extracurricular activities organized in schools where the individual learns to be a part of their community, adapt and express him/herself will contribute to the strengthening of the students' feeling of belonging to the school (Arslan, 2020). It is equally significant that the choir practices included in these activities exist in the education process since they are community-based and support peer cooperation (Gül & Eren, 2017).

In this context, it it thought that choir activities that the immigrant students take part in their social, cultural and psychological inclusion may be an effective tool. With this point of view, this research aimed to examine how choir activities affect the processes of strengthening their sense of belonging in the integration of immigrant students, their role in cultural interaction, and their contribution to social skill development. It is aimed to determine to what extent it contributes in various aspects. This research differs from previous studies in this aspect. For this goal, answers were sought to the following question: "What is the contribution of the choir practices carried out with immigrant students to their integration process?"

1. What are the individuals' viewson the contribution of singing in the choir to social outcomes?

2. What are the participants' opinions about the skills that singing in the choir contributes and the positive emotions it creates?

3. What are the individuals' views on the contribution of singing in the choir to their academic development?

4. What are the individuals' views on the contribution of singing in the choir to their family and peer relationships?

Method

In this study, case study, which is one of the qualitative research methods, was used. In case studies, where one or a few situations are investigated in depth, the factors related to the situation are addressed with a holistic approach (Yıldırım & Şimşek, 2011). When the research points out a descriptive or explanatory question, it is appropriate to use a case study (Yin, 2012/2017).

Participant Group

While generating the study group, the method of homogeneous sampling, which is one of the purposive sampling methods, was used to establish the sample group of this study. In the homogeneous sampling method, the subjects identified and focused on by the researcher are studied in detail by covering a small and homogeneous sample (Neuman, 2014; Patton, 2005; Marshall, 1996).

The study group consisted of eight Syrian students studying in 7th-grade level who agreed to participate in this study voluntarily and participated in choir activities for two lesson hours a week for 18 weeks in the spring semester of the 2021-2022 academic year within the scope of the PIKTES (Integration of Syrian Children into the Turkish Education System) project at Çelik Sanayi Secondary School in the Körfez district of Kocaeli province in Türkiye. The demographic data of this study group participants are illustrated in Table 1.

Table 1
Results related to the demographic information of the participants

Gender	N	%
Male	1	12,5
Female	7	87,5
Age		
12	4	50
13	4	50
Educational Status of Parents		
Educational Status of Mothers		
Primary school	2	25
Middle school	3	37,5
High school	2	25
Educational Status of Fathers		
Primary school	2	25
Middle school	1	12,5
High school	3	37,5
University	1	12,5
Educational Status of Grandmothers		
Non-literate	1	12,5

As is implicit in Table 1, it was revealed that 87.5% of the immigrant students joining in this study were females and 12.5% were males; 50% of them were 12 years old and 50% 13 years old. Regarding their parents' educational background, 25% of the students' mothers had the education of elemantary school, 37.5% the education of secondary school and 25% high school education. Regarding fathers, on the other hand, the findings showed that 25% of participants' fathers had the education of elemantry school, 12.5% the education of secondary school, 37.5% the educational of high school and 12.5% university level education. Moreover, it was found that one participant lived with his grandmother and that the grandmother was non-literate.

Data Collection

In this study, as one of the interview types, the half-structured interview technique was utilized as the data collection tool. The half-structured interview form should consist of questions that contain logical and narrative integrity, in which the participants can express themselves (Büyüköztürk et al., 2018; Polat, 2022).

In an attempt to collect the data, apart from the first part, an questionnaireform having of 12 open-ended questions developed by the researchers was generated which included the participants' age, class level, and family education status. The questions prepared were presented to the comments of two experts and the interview form was finished in line with the expert opinions obtained.

Data Analysis

The data gained in this study were analyzed using the content analysis method. Using the content analysis, the researcher aims to obtain views and relationships that can explicate the data (Çepni, 2018). The data obtained in this study were analyzed in depth, divided into topics and codes and eventually interpreted. The students' names in the study group were excluded from this study and were coded as S1, S2.

The data obtained in this study were presented to the comment of two field experts in an attempt to ensure reliability, and consistency analysis implemented. To identify the similarities between the opinions of the experts, the formula of percentage of consistency P (Percentage Consistency) = Na (Number of items which were coded the same in two forms) *100/Nt (The items total number in one form) was utilized (Çepni, 2018). The percentage of consistency of this study was calculated as 87.93. Since it was deemed appropriate that this value was 70 or more (Miles & Huberman, 1994, cited in Baş, 2014), it is possible to say that the reliability of the study was achieved.

Ethical Procedures

Ethics committee approval was obtained from Bursa Uludag University for this research. Decision number: 2022/10.

Results

In this section, the results obtained from the answers to the research questions of the participant immigrant students included in the search are presented.

In Table 2, the sub-themes and codes together with sample statements related to the "social outcomes" theme gained from the participants' views on the contribution of choir practices to social outcomes are illustrated.

Table 2
Views of the individualsabout the positive effects of singing in the choir on the social outcomes

Theme	Sub-theme	Codes	Participants
	Belongingness	Belonging	S2, S3, S4
		Power	S1
		Courage	S1
		Security	S8
Social Outcomes			
		Sustainability	S1, S3, S4, S5, S6, S7, S8
	Social Environment	Making friends	S1, S3, S4, S6, S7
		Common language	S3, S4, S6
		Adaptation	S5, S8
		Sincerity	S8

As is explicit in Table 2, some participants stated their views about the contribution of choir practices to the social outcomes. Regarding the sub-theme of "belongingness," it was found that some participants stated their views about belonging (3),power (1), courage (1), and security (1). Furthermore, it was revealed that the participants stated their views about sustainability (7), making

friends (5), common language (3), adaptation (2) and sincerity (1) regarding the "social environment" sub-theme. An explanation for these findings could be that choir practices contributed to students' feeling of belonging, making friends and the continuity of their friendships.

Some participants' views on this theme are presented below:

"It made me feel strong and courageous (S1)."

"When I joined the choir, I was friends with only two people. But now I have made friends with all of them. Every day we exchange greetingsand inquire after with each other's health. They also tell me that they got used to the Syrians and like us they think we are talented and smart (S4)."

"We are sincerer because we practice collectively as a group. Our friendship bonds have been gradually getting stronger (S8)."

Table 3 shows the views of the individuals regarding the positive emotions created by singing in the choir.

Table 3
The participants' opinions about the skills that singing in the choir contributes and the positive emotions it creates

Theme	Codes	Participants
	Happiness	S1, S2, S3, S4, S5, S6, S7, S8
	Self- Confidence	S3, S4, S6, S7, S8
	Pride	S1, S5, S6, S7
Skills and	Desire	S2, S3, S7
Positive Emotions	Extraversion	S4, S6, S8
	Enthusiasm	S3, S6, S8
	Sense of Achievement	S4, S7
	Adaptation	S5, S8
	Communication	S4
	Team spirit	S4

As can be seen in Table 3, there were participants who declared their opinions about the skills that singing in the choir contributes to and the positive emotions it creates. "Skills and positive emotions," some participants stated their views about happiness (8), self-confidence (5),pride (4), desire (3), extraversion (3),enthusiasm (3), sense of achievement (2), adaptation (2), communication (1) andteam spirit (1). The findings obtained in this study suggest that the choir practices contributed to students' having positive feelings about the community they lived in and strengthening their sense of belonging and social relations.

Some participants' views on this theme are presented below:

"It just gave me a sense of confidence. I began to spend more time with my teachers. I am very happy, especially when I meet with my music teacher. Initially, I didn't like meeting anyone. Even when someone came over to our home, I would directly go to my room and would not come out. But now I can easily talk to everyone, and I feel myself more successful because I put some effort into something at school (S4)."

"I got nervous, at first I was afraid of going on stage, but then I got used to it, so I was no longer afraid. Butterflies were flying in my stomach; I felt happiness. It was very nice actually (S6)."

Table 4 presents the participants' views on the contribution of singing in the choir to academic achievement.

Table 4
Views of the individualsabout positive effects of singing on the choir to academic development

Theme	Codes	Participants
Academic Development	Reading Skill	S1, S3, S4, S5, S7, S8
	Speaking Skill	S3, S5, S7, S8
	Writing Skill	S3, S4, S5, S8
	Vocabulary	S4, S6
	Being articulate	S3
	Coding	S3

As shown in Table 4, the participants stated their views about reading skills (6), speaking skill (4), writing skills (4), vocabulary (2), being articulate (1) and coding (1). Given these particular results, it is possible to say that the choir practices positively contributed to the academic achievement and mastery of the language of the country in which the immigrant students resided.

Some participants' views on this theme are presented below:

"The choir practices contributed to my Turkish lessons a lot. I also joined the drama club initiated by our Turkish teacher. I think that singing in the choir improved my acting a lot as well. Now I got more used to being on stage, I cooperatewith people more comfortably and my reading and my pronunciation aremuch better than before (S5)".

"The choir practices contributed to my Turkish lessons and English lessons. I look up the Turkish translations of words to understand the lyrics of English songs. In this way, while learning the songs, I also learn English words (S4)".

Table 5 shows the views of the individuals on the contribution of singing in the choir to the family and peer relations.

Table 5
Views of the individuals about the positive effects of singing in the choir to the family and peer relations

Theme	Sub-theme	Codes	Participants
Family and Peer Relations	Family	Happiness	S2, S3, S5, S6, S7, S8
		Encouragement	S1, S2, S3, S5, S6
		Pride	S3, S5, S6, S7
		Support	S1, S3, S6
		Hope	S3
		Satisfaction	S4
	Peer**s**	Bullying	S2, S4, S5

As seen in Table 5, some participants stated their views about the contribution of choir practices to the social outcomes. Regarding the sub-theme of "family," it was found that some participants indicated their views about happiness (6), encouragement (5), pride (4), support (3), hope (1) and satisfaction (1).

Furthermore, the findings showed that the participants specified their views about bullying (3) regarding the sub-theme of "peers." As far as these results are concerned, it is possible to say that their families' encouragement and support to the students participating in the choir practices also affected their positive feelings and positively contributed to their family relations. However, it is also possible to claim that the peer bullying they experienced while singing in the choir had negative emotional effects on the immigrant students.

Some participants' views on this theme are presented below:

"My family was very happy when I joined the choir. They are proud of me and say 'our daughter will improve herself. 'I want to take part in even more events so that my family can be proud of me more (S6)".

"My friends say that my music teacher likes me and that's why he let me in the choir. I like this, but sometimes some people say that because I am Syrian and because he sympathizes with me, he has let me in the choir practices; I feel sad when I hear this. However, my teacher trains me because he thinks I am talented (S4)."

Discussion, Conclusion and Recommendations

The information reached of this study demonstrated that the choir practices positively supported immigrant pupils' feeling of belonging and their recognition in the social environment. In earlier studies conducted in the similar literature, it was learnt that musical events and activities organized by the individuals from different cultures positively contributed to their social environment and social relations (Rinde & Kenny, 2021; Carlow, 2004). Furthermore, there are also studies in the relevant literature suggesting that choir practices for immigrants contributed positively to the sense of belonging of the choirists (Çerezcioğlu, 2010; Şahin, 2018; Wood, 2010; Shaw, 2016).Against this background, it is believed that the community-based activities carried out in schools had a positive contribution to the commitment of students from different countries and cultures, to their adaptation to the social environment they were in, and to their social recognition. With this in mind, it is considered essential for immigrant students to be involved in different community-based activities, including choir practices, which will make them feel like they belong to a communal local group at their schools.

In accordance with another finding, it was found that singing in the choir created positive emotions that supported self-confidence, personal and spiritual development of the immigrant students. As a conclusion of this study, all the participants stated that singing in the choir contributed to their happiness. Furthermore, it was concluded that singing in the choir positively contributed to the self-confidence, pride, desire, enthusiasm, sense of achievement, team spirit, extroversion, communication and confirmity with the participants.

Olivier et al. (2022) concluded that the immigrant students who participated in musical activities had fewer problems in adapting to school, and that these activities also helped strengthen their positive emotions and feel enthusiastic. Against this background, it is thought that the choir practices helped to the adaptation of immigrant pupils to the community they belonged to and development of positive emotions.

In this study, it was revealed that singing in the choir contributed to immigrant students' Turkish reading, writing and speaking skills, the development of their vocabulary, and their acquisition of cooperative study habits. Furthermore, it was also found that the Turkish language mastery of the students through choir practices also contributed positively to their academic achievement.

In similar previous studies, it was concluded that choral training supported the learning process based on teamwork and contributed more effectively and positively to increasing students' academic achievement (Saldun, 2019; Sevinç, 2017; Swaminathan & Schellenberg, 2020). From this perspective, it is possible to claim that the choir practices made crucial contributions to the language skills of the immigrant students in the society they lived in and the academic improvement of these skills. With this in mind, choral practices carried out in schools are vitally important to develop the feeling of belonging, achievement and self-expression skills of students from different cultures.

Similarly, as far as the results of this study are analyzed, the findings showed that participation in the choir practices contributed positively to the family and peer relations of the students and that the parents of the children participating in the choir demonstrated encouraging and supportive attitudes. However, it was also found that some participants were exposed to peer bullying in their circle of friends. In similar studies, it was revealed that the musical events and activities carried out in support of this study supported family and peer relations. In the survey of Boer and Abubakar (2014), its has clearly been recognized that to make and listen to music with family members and peers is not only entertaining but also supportive to the personel improvement of individuals. Moreover, the musical

events and activities carried out in the school positively affected the peer and family relations of students and their adaptation to the school (Hallam, 2010; Schellenberg et al., 2015).

In light of the findings obtained in the present study, the following recommendations can be made:

Choir is a collective music activity that reflects the universal spirit of music, raises awareness of being a community, and supports the integration process with its features that allow individuals with different cultures and different perspectives to express themselves (Balsnes, 2016; Sevinç, 2017; Taş Güzeloğlu, 2019). Choir activities, in which intercultural interaction is emphasized, have a function that brings together individuals with different identities closer, especially as an integrating and unifying element for immigrants (Türkmen, 2012).

From this point of perspective, it is recommended to increase the number of collective musical activities performed in schools to support the feeling of belonging and peer relations of immigrant students through the unifying and integrating function of the choir. Immigrants' feeling of belonging to the society they live in will only be possible by recognizing and integrating the culture of that society and contributing to their adaptation (Ateş, 2021). In this framework, it is considered cruciallysignificant to increase the community-based events and activities in schools and ensure that immigrant students are included in these activates to allow for social integration, especially in the regions that extensively receive immigration.

In schools, which are among the most essential institutions in the immigrant students'orientation and integration process, one of the most significant elements having positive integration process is the teachers. The teachers involved in this process should have a command of studies based on multiculturalism in an attempt to contribute to the integration of immigrant students into the society they belong to.In this context, it is recommended that the teachers be supportedfor their professional achievements with in-service training, seminars, and domestic and international project studies related to the integration of immigrant students, and increase their awareness and eventually acquire the knowledge and abilities that will contribute to the integration process toward multiculturalism.

The choir activities involving the immigrant students in schools are regarded as an encouraging and reinforcing practice that contributes to making friends, maintaining friendships, and contributing to cooperation and performance behaviors, and strengthening peer relations. In this sense, it is deemed significant to ensure the joining of parents in the process to support the integration of students. In an attempt to identify the psychological, sociological and cultural contributions of musical activities on individuals in the integration process, it is recommended that the studies involving individual, collective, and listening-speaking applications in which the immigrant students studying at different levels can be conducted to contribute to the relevant literature.

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