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FROM THE EDITOR

Dear Distinguished Researchers and Readers,

At the very beginning of submissions, the editorial team, the editorial board members, or the advisory board members checks if manuscripts fulfill the criteria of our journal (https://dergipark.org.tr/en/pub/akukeg/page/7932). We are trying to strengthen the journal processes every year, and we sometimes need to update the members of the team. We thank Assoc. Prof. Dr. Koray Kasapoğlu for serving as the assistant editor for a long time and the advisory board members for supporting our publication processes. Also, we welcome the new members of the team.

Our editorial team has also been showing great effort to develop and publish this journal. Our language editor (Res. Asst. Merve Vezir) and our redaction editor (Res. Asst. Mehmet Ertürk Geçici) prepares the accepted manuscripts for the publication process at the end of the reviewing process. Lastly, I try to put the last touches on these manuscripts and publish them in a timely manner.

With the first issue of 2022, JTES-KEG is honored contribute to the literature with 10 research articles. In this issue, you will find 10 research articles of 17 authors from different disciplines. For this issue, the average time from submission to acceptance was 5 months (min. 1 month max. 7 months), and the average time from submission to publication was 7.6 months (min. 7 months max. 9 months). These statistics prove how our reviewing and publication process works equally for everyone.

Finally, we should also express our sincere thanks to the Editorial Board, reviewers and authors for their invaluable contributions.

We are looking forward to meeting you again for the 2022 April issue!

Fatih GÜNGÖR, PhD
Afyon Kocatepe University
Faculty of Education

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The Immediate Reactions of EFL Learners towards Total Digitalization at Higher Education during the Covid-19 Pandemic

Covid-19 Salgını Sırasında Yükseköğretimde Tam Dijitalleşmeye Yönelik YDİ Öğrenenlerin Ani Tepkileri

Erkan YÜCE*

Received: 20 May 2021 **Research Article** **Accepted:** 18 November 2021

ABSTRACT: The current study focused on English as a Foreign Language (EFL) learners' immediate reactions towards total digitalization at higher education during the Covid-19 pandemic. Accordingly, the perceptions of EFL learners on online foreign language learning during the COVID-19 pandemic were investigated. After discussing the advantages and disadvantages of online foreign language classes during the pandemic from the viewpoints of the participants studying at a public university in Turkey, the study questioned whether the participants preferred online foreign language classes or traditional face-to-face foreign language classes. The study adopted the phenomenological method of qualitative design and employed open-ended questions to collect data. The data were analysed by following a bottom-up strategy, and the categories were formed inductively. The results showed that online foreign language classes had both positive and negative aspects for the learners. Additionally, it was found that more than half of the participants preferred traditional face-to-face foreign language classes to online foreign language classes.

Keywords: COVID-19 pandemic, digitalization, EFL, higher education.

ÖZ: Mevcut çalışma, Yabancı Dil olarak İngilizce (YDİ) öğrenenlerin Covid-19 salgını sırasında yükseköğretimde tam dijitalleşmeye yönelik ani tepkilerine odaklanmıştır. Bu doğrultuda, COVID-19 salgını sırasında YDİ öğrenenlerin çevrimiçi yabancı dil öğrenmeye yönelik algıları araştırılmıştır. Çalışma, Türkiye'deki bir devlet üniversitesinde okuyan katılımcıların bakış açılarından pandemi sırasında çevrimiçi yabancı dil derslerinin olumlu ve olumsuz yönlerini tartıştıktan sonra katılımcıların çevrimiçi yabancı dil derslerini mi yoksa geleneksel yüz yüze yabancı dil derslerini mi tercih ettiklerini araştırmıştır. Çalışma nitel tasarımın fenomonolojik yöntemini benimsemiş ve veri toplamak için açık uçlu sorular kullanmıştır. Veriler aşağıdan yukarıya bir strateji izlenerek analiz edilmiş ve kategoriler tümevarımla oluşturulmuştur. Sonuçlar, çevrimiçi yabancı dil derslerinin öğrenciler için hem olumlu hem de olumsuz yönleri olduğunu göstermiştir. Ayrıca, katılımcıların yarısından fazlasının geleneksel yüz yüze yabancı dil derslerini çevrimiçi yabancı dil derslerine tercih ettikleri görülmüştür.

Anahtar kelimeler: COVID-19 salgını, dijitalleşme, YDİ, yükseköğretim.

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COVID-19, short for "coronavirus disease 2019", started spreading from Wuhan City, Hubei Province of China on December 31, 2019, and turned into a severe pandemic in a short period all across the globe (World Health Organization [WHO], 2020a, 2020b). Besides life losses and illnesses, the precautions by governments and the efforts of authorized health institutions both locally and globally to combat this new virus affected all aspects of human life, from travel to education. Most of the countries, including Turkey, imposed strict sanctions and physical distancing measures to prevent the spread of the virus and to protect their citizens. Distancing either socially or physically requires individuals to stay at their homes to prevent the spread of the virus; accordingly, both lecturers and learners were expected to conduct classes and take responsibility from their homes (Allo, 2020). Transition to online education as a form of distance education was one of these measures, and all sorts of educational institutions, including universities, shifted to online learning overnight to decrease the negative effects of the pandemic. The Internet enabled educational institutions to continue education and rescued learners and teachers from falling behind their schedules owing to the strict distancing restrictions of the pandemic. During these difficult times, the Web technology rushed to the aid of both students and educational professionals as it did to all aspects of professional and casual lives. Before doing so, the Web technology underwent profound developments, which enabled foreign/second language education contexts to shift easily from physical classrooms in which activities are conducted in face-to-face communication to online virtual classes in which activities are accomplished either synchronously or asynchronously. With various digital tools, online language education helps instructors and learners to continue their language education without disruption during these pandemic days. In this regard, most of the learners who are habitually used to face-to-face foreign language education distantly experienced online foreign language education recently, and they hold different perceptions about the advantages and disadvantages regarding this model. At this point, revealing experiences of the foreign language learners regarding total digitalization of EFL classes at the university may highlight points that may provide insights for professionals teaching at the tertiary level. Accordingly, this study aims at revealing Turkish EFL learners' perspectives concerning online foreign language learning during the COVID-19 pandemic. Three research questions of the current study are as follows:

- What are the advantages of online foreign language learning during the COVID-19 pandemic?
- What are the disadvantages of online foreign language learning during the COVID-19 pandemic?
- What do you think about the applicability of online foreign language learning during the COVID-19 pandemic?

Literature Review

Although the COVID-19 has been a quite recent pandemic, which profoundly affected education contexts, many professionals in foreign/second language education contexts in different parts of the world reported research studies focusing on different aspects of online foreign/second language education during the pandemic. This part of the study summarizes some of the research studies, which are directly related to the

focus of the current study. These studies having been carried out can be grouped under six groups, and they are:

- EFL/ESL learners' views on online language learning during the pandemic,
- EFL lecturers' views and challenges regarding online language classes during the pandemic,
- The effect of social media use in online foreign language learning during the pandemic,
- The importance of establishing virtual communities and online professional networks during the pandemic,
- The types of online tools and their impacts on learners during the pandemic,
- The experiences of EFL professionals in preparing and delivering online language classes during the pandemic.

The first of these groups dwelt on revealing EFL/ESL learners' views on online language learning during the pandemic. For example, Layali and Al-Shlowiy (2020) reviewed the ESL/EFL learners' views on e-learning in Saudi universities during the pandemic. The study analysed eight research studies in terms of learners' perceptions, benefits of e-learning, and drawbacks of e-learning. Writing quality, vocabulary learning, collaboration, and student-teacher communication were reported as benefits of e-learning, while the Internet connection was reported as a drawback of e-learning. Similarly, Allo (2020) figured out the perceptions of Indonesian EFL learners regarding online learning in the midst of the pandemic. The semi-structured interview questions were directed at the participants via a video calling application. The participants reported positive views on online language education during the pandemic. They also expressed that while Internet access helped them follow individual tasks in a physically distant way, the implementations needed improvements in terms of materials, assignments, and instructions. Harida (2020) tried to explore the views of the students on online learning during the pandemic. The results showed that the students felt unconfident, enthusiastic, and bored; and, they expected the transition to conventional classes very soon. Shahzad et al. (2020) questioned the impact of online teaching on ESL learners' behaviours. The results showed that the learners were in favour of online teaching. Likewise, Hartshorn and Mcmurry (2020) searched the effects of the COVID-19 pandemic on teachers and learners at a university ESL context in the U.S. through a survey addressing stress level, English learning and teaching, and distance instruction. The results revealed that the pandemic increased the stress levels of both teachers and learners in various contexts, and the stressors stemming from the pandemic negatively affected the priorities of the participants. The results also presented that transition to online instruction from conventional classes was less challenging for the teachers than the learners, and the speaking skills of the students were less developed than their writing skills.

The second of these groups investigated EFL lecturers' views and challenges regarding online language classes during the pandemic. For example, Atmojo and Nugroho (2020) probed EFL teachers' ways of conducting EFL classes and their challenges. The teachers reflected that they carried out the classes in different ways through various platforms, either synchronously or asynchronously, in line with school policies. They also mentioned many problems stemming from students, teachers, and

parents of the students. They noted that online learning did not accomplish the expected results due to preparation and planning. Furthermore, Lee and Bailey (2020) stated that the pandemic presented challenges in transferring classes to online education settings for the EFL instructors who are used to face-to-face communication regarding pronunciation and speaking classes when compared to the EFL instructors who are experienced in delivering online classes. They tried to reveal the benefits, challenges, and implementation strategies of EFL university lecturers with various levels of online teaching experience in South Korea. The participants with higher online teaching experience reported fewer obstacles and a wider choice of communication channels and activity types. All of the participants noted similar levels of anticipated advantages for lecturers and challenges for learners.

The third of these groups searched the effect of social media use in online foreign language learning during the pandemic. For example, Altam (2020) looked into the efficiency of social media use on EFL learners in India during the pandemic. The results informed that spending more time on social media platforms helped the learners not only to improve their language skills, especially writing skills and vocabulary knowledge but also decreased their spelling errors. Moreover, Bestari et al. (2020) researched the learners' perceptions of social media as an online learning environment during the pandemic. The participants stated that social media helped them to improve themselves concerning English grammar, writing, and vocabulary items.

The fourth of these groups focused on the importance of establishing virtual communities and online professional networks during the pandemic. For example, Lomicka (2020) focused on the importance of establishing virtual communities for language learners and suggested that social presence is very important for language learners to maintain a feeling of connectedness in virtual classrooms. Accordingly, several useful implications were provided for creating a virtual presence and engaging learners into virtual communities. Additionally, Knight (2020) addressed the issue of creating online professional networks for language educators and maintained that technical knowledge, reflective and evaluative competencies, sustained engagement, and collaboration with colleagues are the four important points for a successful online professional community.

The fifth of these groups addressed the types of online tools and their impacts on learners during the pandemic. For example, Handayani and Handayani (2020) tried to give an overview of online writing tools that can be potentially implemented in EFL writing classes at universities during the pandemic. The results indicated three online writing tools (Pro-Writing Aid, Edmodo, and Paragraph Punch) which are applicable in EFL classes. In addition, Fansury et al. (2020) searched how to implement digital content and whether it can help to enhance learner motivation and interest. The results revealed that digital contents are beneficial during the pandemic as they can be easily integrated into different online platforms flexibly, while limited web access can negatively affect learners' participation.

The last of these groups engaged in the experiences of EFL professionals in preparing and delivering online language classes during the pandemic. For example, Kanno (2020) searched the experiences of an EFL teacher in terms of developing and delivering classes in a higher education context in Japan. Peer-to-peer communication in enhancing collaborative learning in a virtual classroom was searched. The

communicative learning spaces were created in the synchronous distance classes through digital applications. Analyses showed various types of communication in the virtual environments and the students' positive feelings towards EFL classes albeit distancing physically. Likewise, Shaaban (2020) quested teaching English as a foreign language (TEFL) lecturers' experience on e-learning during the pandemic in Gaza. The results informed that the participants need the training to enhance their skills regarding designing, developing, and planning action plans for TEFL online classes. Additionally, Yi and Jang (2020) discussed how the pandemic affected EFL contexts based on the cases of two EFL teachers in South Korea and how these teachers coped with the situation through video-based online EFL classes.

In conclusion, a number of research studies searched online foreign/second language education contexts for various purposes, as the impact of the pandemic has been profound on education contexts though it has a short history. The literature review indicated a gap regarding the research studies of online foreign language teaching during the pandemic in our country. The current study would contribute to the literature by presenting results in terms of student perspectives from an EFL education context in Turkey during the pandemic.

Methodology

Research Design

The study employed the phenomenological method of qualitative design. The qualitative inquiry focuses on understanding or exploring the definitions, characteristics, experiences, and descriptions ascribed to a problem by individuals or groups (Berg & Lune, 2013; Creswell & Creswell, 2018; Scott & Morrison, 2007). To this end, open-ended questions were directed at the participants through an interview form. Interviewing is one of the ways through which we can understand how individuals understand their surroundings (Merriam, 2009). The results were analysed descriptively in categories by giving direct quotations from the participants (Patton, 2002).

Study Group

The 2nd Grade students studying at a Gastronomy and Culinary Arts Department of a public university in Turkey were the participants of the study. This group was an ordinary EFL group at an average state university in the country, and it was thought that the findings reached in this group could reflect common issues related to foreign language teaching during the pandemic. Additionally, the group was one of those who regularly followed the online classes during the pandemic, which could contribute to the findings. The EFL classes were conducted in a traditional face-to-face class mode during the fall term of the 2019-2020 academic year at the department, but the classes shifted to online mode during the spring term of the 2019-2020 academic year after the pandemic. Purposeful sampling and convenient sampling techniques were followed in defining the participants. The participants were included in the study voluntarily. There were 14 male participants and 6 female participants, 20 participants in total. Their ages ranged between 20 and 25 years.

Data Collection

The qualitative inquiry was followed in the data collection process and the researcher designed a form consisting of three open-ended questions. The questions investigated the participants' views on the advantages and disadvantages of online EFL classes during the pandemic and the participants' preferences (conventional face-to-face EFL course or online EFL classes). Due to the strict social isolation rules of the pandemic, the researcher and the participants avoided face-to-face interviews and the question form was sent to the participants via e-mails. They responded to the open-ended questions in a written way and sent them back in the same way to the researcher. The questions were prepared in English, and the participants were allowed to use online dictionaries to express their ideas clearly.

Data Analysis

Descriptive analysis was employed to analyze the data, and categories were formed inductively by following a bottom-up organizing strategy (Creswell & Creswell, 2018; Thorne, 2000). Sample quotations from the participants were provided to present the views of the participants (Creswell, 2012). Additionally, each participant was put in order numerically and was also labelled with "P" (participant); for example, "P10" refers to "Participant 10". The purpose of labelling was to keep the participants' identities confidential.

Trustworthiness

Trustworthiness of the study was provided by peer review and external auditor strategies. Another peer who was familiar with the qualitative research reviewed the research processes and the data; and, then an external auditor examined the whole research process and findings to establish credibility (Creswell & Miller, 2000).

Ethical Procedures

Ethical committee approval for this study was obtained from the Ethics Committee of Nevşehir Hacı Bektaş Veli University (Num: 2020.17.230; Date: 22.09.2020).

Results

The first research question investigated the participants' views on the advantages of online foreign language learning during the Coronavirus disease (COVID-19) pandemic. The results of the analyses revealed seven categories regarding the advantages of online foreign language learning during the pandemic, and these categories and distributions of the participants into the categories were presented in the following table (Table 1) as follows:

Table 1

Advantages of Online Foreign Language Learning during the Pandemic

Categories	Participants
Availability	P2, P3, P5, P6, P7, P8, P9, P10, P11, P12, P14, P16, P17, P19, P20
Accessibility	P1, P3, P5, P6, P7, P8, P11, P13, P15, P16, P17, P18, P19, P20
Cost efficiency	P1, P2, P5, P7, P8, P10, P11, P13, P17, P18, P19
Time efficiency	P2, P7, P8, P10, P12, P13, P14, P18
Comfort	P2, P4, P7, P8, P10, P19
Personal speed	P5, P13, P15, P18
Free from social pressure	P12, P17

According to Table 1, the categories were sequenced as availability, accessibility, cost-efficiency, time efficiency, comfort, personal speed, and free from social pressure. These seven categories were handled respectively. Considering the category of availability, fifteen participants stated that online platforms made foreign language classes available 7 days and 24 hours during the pandemic, and they did not fall behind their classes. "…we can listen to the lessons whenever we want…" (P2), "…whenever we want, we can open and watch the lessons…" (P9), and "...It is good for students that there is not a certain class hour. We can watch lessons whenever we want…" (P14) were expressions from the participants. Given the category of accessibility, 14 participants considered that online platforms made foreign language classes accessible for them, and they could easily reach the classes from their homes in different cities during the pandemic. For example, the participants said, "…we had a chance to access information quickly and easily. That is, no matter where you are physically in, whether in Nevşehir or Bahamas, you can join the distance lessons just with a click…" (P15), "…first of all you can realize yourself regardless of time and place thanks to the Internet…" (P20). Concerning the category of cost-efficiency, 11 participants claimed that online foreign language classes were cost-efficient for them during the pandemic. For example, the participants voiced that "…online classes eliminate additional expenses…" (P5), and "…the other positive side is cost. Online education costs less than traditional face-to-face education…" (P11). Related to the category of time efficiency, eight participants proclaimed that online foreign languages were time-efficient for them during the pandemic. For example, the participants expressed that "…there is no waste of time. First of all, there is no need to interrupt education in adverse weather conditions…" (P7), and "…I think the most important advantage is to save time…" (P12). Regarding the category of comfort, six participants stated that online foreign language classes were comfortable for them during the pandemic. For example, the participants said that "…You can listen to your lessons on your comfortable chair at home..." (P4), and "…First of all, students can learn at the comfort of their place…" (P10). In connection to the category of personal speed, four participants considered that online foreign language classes enabled them to follow the classes at their speeds during the pandemic. For example, the participants expressed that "…Students can study at their own paces…" (P5) and "...the student learns at his/her learning speed…" (P15). With regard to the last category, free from social pressure, two

participants stated that online foreign language classes were free from social pressure and enabled them to communicate with teachers directly during the pandemic. For example, P12 expressed that "…It provides students who are embarrassed in a face-to-face session to be more active in online lessons…", and P17 said that "…Online lessons improve communication with teachers…"

The second research question searched for the participants' views on the disadvantages of online foreign language learning during the COVID-19 pandemic. The results of the analyses revealed seven categories regarding the disadvantages of online foreign language learning during the pandemic, and these categories and distributions of the participants into the categories were presented in the following table (Table 2) as follows:

Table 2

Disadvantages of Online Foreign Language Learning during the Pandemic

Categories	Participants
Lack of peer and social interaction	P1, P5, P6, P7, P8, P9, P12, P14, P15, P16, P17, P18, P19
Tech-related problems	P2, P3, P5, P7, P11, P12, P13, P16, P17, P19
Mode of learning	P7, P8, P12, P15, P17, P18, P20
Ineffective feedback	P1, P2, P7, P8, P9, P13, P14
Lack of concentration	P2, P3, P4, P8, P14, P16
Lack of self-discipline	P2, P6, P10, P20
Health problems	P2, P16

According to Table 2, the seven categories were lack of peer and social interaction, tech-related problems, mode of learning, ineffective feedback, lack of concentration, lack of self-discipline, and health problems. These seven categories were dealt with accordingly. Regarding the category of peer and social interaction, 13 participants considered that they were dissatisfied with the lack of peer and social interaction in online foreign language classes during the pandemic. For example, P1 stated, "…it is the lack of social interaction in online classes. It is harder to communicate and be understood when students and teachers do not see each other directly…" and P18 expressed that "…there is less teacher and student interaction…" Considering the category of tech-related problems, 10 participants informed that technology and Internet-related problems were among the disadvantages of online foreign language classes during the pandemic. For example, P2 said, "…Another major disadvantage of online education is that some students do not have enough equipment in terms of technology…", and P17 said that "…not everyone has enough equipment, for example, I have not got a laptop and the Internet connection…" In light of the mode of learning category, seven participants noted that online foreign language learning did not appeal to their learning styles during the pandemic. For example, P7 expressed that "…it is difficult to learn lessons only with notes. Also, education efficiency in distance education is lower than face-to-face communication…", and P15 mentioned "…distance education cannot be completely adequate and efficient on its own…" Viewing the

category of ineffective feedback, seven participants stated that online foreign language classes were ineffective in terms of students' feedback. For example, P2 expressed by addressing the asynchronous classes that "…we cannot ask questions to our teachers about subjects we did not understand…", and P8 noted "…we, students, could not remember the information we receive from our teachers. I could not ask and discuss the topics…" Inferring from the category of lack of concentration, six participants declared that they had concentration problems in online foreign language classes during the pandemic. For example, P8 mentioned that "…I experienced stress because my motivation also decreased… I was reluctant to do the homework that had to be submitted… I did not feel like a student…", and P14 said, "…it was difficult to focus on the lessons…" Deducing from the category of lack of self-discipline, four participants revealed that lack of self-discipline caused problems in online foreign language classes during the pandemic. For example, P6 said, "…You must have time management skills to benefit from online education…", and P10 affirmed that "…online education requires self-discipline…students have to make their study plan…" Relating to the last category, health problems, two participants stated that online foreign language classes could cause health problems during the pandemic. For example, P2 expressed that "…online lessons affect our physical health. Lessons take a long time and we sit in front of the screen for a long time. This harms our eyes and back as other technological devices…" and P16 mentioned, "…students and lecturers may have health problems due to the long-term computer use…"

The last research question probed into Turkish EFL learners' preferences regarding online foreign language classes. The participants' responses were categorized into "In favour" and "Not in favour". The distributions of the participants into categories were given in the following table (Table 3):

Table 3

Preferences of Turkish EFL Learners Regarding Online Foreign Language Learning

Categories	Participants
In Favour	P2, P4, P6, P7, P11, P13, P19, P20
Not in Favour	P1, P3, P5, P8, P9, P10, P12, P14, P15, P16, P17, P18

According to Table 3, while eight participants were in favour of online foreign language classes, twelve participants were not in favour of online foreign language classes. Some of the participants who were in favour of online foreign language classes expressed, for example, that: P2: "…I think online education is very useful especially nowadays, but it is a system that we are not used to…", and P7: "…it is a great opportunity for families with financial difficulties…" Some of the participants who were not in favour of online foreign language classes mentioned, for example, that: P12: "…I do not like online education…I find face-to-face education more useful…", and P15: "…I do not believe that this form of education can replace formal training…"

Considering the findings, the features of availability, accessibility, cost-efficiency, time efficiency, comfort, personal speed, and being free from social pressure were defined as the advantages of online foreign language learning during the pandemic

while lack of peer and social interaction, tech-related problems, mode of learning, ineffective feedback, lack of concentration, lack of self-discipline, and health problems were found out as the disadvantages of online foreign language learning during the pandemic according to the responses gathered from the participants.

Discussion

The findings of the current study regarding Turkish EFL learners' perceptions of the advantages of online foreign language learning revealed seven categories as availability, accessibility, cost-efficiency, time efficiency, comfort, personal speed, and free from social pressure. Several of these findings supported the findings of previous research studies in the literature. For example, cost-efficiency emerged as an advantage of online language classes in the current study. This category was supported by Casey (2008), who stated that online distance education provides viable and cost-effective training for higher education institutions. Considering the other expenses of university education such as accommodation, commuting, stationery, and nutrition, online foreign language classes may prevail over traditional face-to-face classes in this respect. Two participants (P12, P17) in the current study expressed that they felt free from social pressure and were engaged better in the tasks of online foreign language classes compared to the traditional face-to-face classes. Especially introverted students may express themselves better and participate more in online foreign language classes compared to extroverted ones. Previous research reported that the learners with more positive attitudes towards the Internet were inclined to participate more in the online forums, and the students who were self-efficient on the Internet performed better engagement in online learning tasks (Coffin & MacIntyre, 1999; Tsai & Tsai, 2003; Yang & Lin, 2010). Availability and accessibility of online foreign language classes were expressed as advantages by most of the participants of the current study. Accordingly, Allo (2020) said that the Internet made classes available and accessible for EFL learners during the pandemic though they were physically away from their institutions. The Internet facilitated most of the students to follow their classes without interruption either in synchronous mode or in asynchronous mode during the pandemic. Furthermore, time efficiency, comfort, and personal speed may be foregrounded as other advantages that online education provides for students. These features posed by the education of this mode may save the students' time by supplying them the opportunity to join their classes from their comfort zones without any journeys that would otherwise consume their time and energy. Additionally, this type of education may lead the students to cover topics in line with their speeds related to their learning processes in the cases of an asynchronous mode of delivery.

Turkish EFL learners' perceptions of the disadvantages of online foreign language learning indicated seven categories: lack of peer and social interaction, tech-related problems, mode of learning, ineffective feedback, lack of concentration, lack of self-discipline, and health problems. The current study reported a lack of peer and social interaction as a disadvantage of online foreign language learning. Similarly, previous studies in the literature stressed the importance of active participation and negotiation in language learning (Alavi, 1994; Ellis, 1997; Shaw, 2013). Student interactions regarding cooperation and collaboration during course activities in face-to-face classes may enhance students' productive skills, which may not be as available as in online

education. Also, technology-related problems were reported as a disadvantage of online foreign language learning in the current study. Problems regarding technology and Internet connection were mentioned previously in the literature as a disadvantage (Barr & Tagg, 1995; Hakami, 2020). Technical problems such as electricity and lack of Internet connection, which may arise during online classes in progress, might severely interrupt the teaching and learning process. The participants of this study underlined self-discipline as a disadvantage, and, accordingly, Barnard et al. (2009), who highlighted the importance of becoming an autonomous learner in online learning contexts, raised this issue previously. Following scheduled classes regularly in traditional education may be an incentive for students to join the classes and accomplish their requirements. However, online classes may not be as encouraging for them to follow their programs in a disciplined way. The current study participants stated the mode of learning in online foreign language learning as a disadvantage. This finding was supported by Juhary (2012), who stressed the importance of preparing resourceful and engaging lessons for learners. The online mode of education may pose problems for those who prefer learning in a multimodal way, which combines social interaction between peers and instructors, learner feelings, motives. In addition, only relying on digital resources in this mode can be regarded as a problem for some learners. Lastly, the participants expressed problems regarding getting feedback during the online foreign language classes, which overlaps with the previous findings. For example, Tuncay and Uzunboylu (2012) stipulated that teachers cannot deal with students' online assignments. Direct feedback from the instructors during the classes in progress or learning from mistakes of other learners may not be available in online classes as they are in traditional ones. Furthermore, students who are used to the conventional education system in which they are physically and socially active may experience a lack of concentration or health problems such as backache, neck ache, and so forth during online mode learning.

Lastly, more than half of the participants of this study expressed that they were not in favour of online foreign language classes, and this finding was also in line with the findings of previous studies in the literature, which suggested that online learning platforms cannot completely replace traditional face-to-face learning and can be benefited as supplementary tools for language learning to enhance performances of learners (Njenga & Fourie, 2010; Shaw, 2012).

Conclusion

The current study investigated the perceptions of Turkish EFL learners of online foreign language learning during the COVID-19 pandemic. In this regard, the study focused on the advantages, disadvantages of online foreign language classes during the pandemic, and whether the learners prefer online foreign language classes or not. The results showed that availability, accessibility, cost-efficiency, time efficiency, comfort, personal speed, and being free from social pressure were the advantages of online foreign language classes while problems regarding peer and social interaction, technology, mode of learning, feedback, concentration, self-discipline, and health were disadvantages of online foreign language classes during the pandemic according to the participants. Furthermore, more than half of the participants (12 participants) expressed

that they were not in favour of online foreign language classes and expected to shift to traditional face-to-face language classes after the pandemic.

Implications

Several pedagogical implications can be suggested for foreign language education contexts based on the findings of the current study. Designing activities that can enhance and focus on peer and social interactions among foreign language learners may help to overcome their interaction problems in online foreign language classes. Also, applying synchronous mode in online distance education instead of asynchronous mode may contribute to instant interaction among professionals and learners. Additionally, choosing user-friendly online platforms may eliminate concentration problems and be more engaging for the learners. Lastly, lecturers may design weekly detailed study programs for learners to follow, and in this way, they may help learners to become more self-disciplined and autonomous.

Limitations

The current study involved several limitations that can be eliminated in further research studies. For example, the study included only one of the departments, Gastronomy and Culinary Art, and only one of the grades, 2nd grade, at the faculty. Further research can be planned with different grades and departments to reveal the perceptions of EFL students during the pandemic. Furthermore, the data of this study were gathered only from qualitative design throughout the processes. Using a form only to collect data can be seen as a limitation in the study. The researcher could implement online interviews (e.g., via Zoom or Skype) to elicit more detailed answers from the participants to provide data triangulation. Quantitative design or mixed methods design can be projected in further research to study the different aspects of online EFL education during the pandemic.

Conflicts of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

Alavi, M. (1994). Computer-mediated collaborative learning: an empirical evaluation. *MIS Quarterly, 18*(2), 159-174. https://doi.org/10.2307/249763

Allo, M. D. G. (2020). Is the online learning good in the midst of Covid-19 Pandemic ? The case of EFL learners. *Jurnal Sinestesia, 10*(1), 1-10.

Altam, S. (2020). Influence of social media on EFL Yemeni learners in Indian Universities during Covid-19 Pandemic. *Linguistics and Culture Review, 4*(1), 35-47. https://doi.org/10.37028/lingcure.v4n1.19

Atmojo, A. E. P., & Nugroho, A. (2020). EFL classes must go online! teaching activities and challenges during COVID-19 Pandemic in Indonesia. *Register Journal, 13*(1), 49-76. https://doi.org/10.18326/rgt.v13i1.49-76

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S.-L. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education, 12*(1), 1-6. https://doi.org/10.1016/j.iheduc.2008.10.005

Barr, R. B., & Tagg, J. (1995). From teaching to learning-a new paradigm for undergraduate education. *Change: The Magazine of Higher Learning, 27*(6), 12-26. https://doi.org/10.1080/00091383.1995.10544672

Berg, B. L., & Lune, H. (2013). *Qualitative research methods for the social sciences: Pearson new international edition*. Pearson Education Limited.

Bestari, A. C. Y., Faiza, D., & Mayekti, M. H. (2020). Instagram caption as online learning media on the subject of extended writing during pandemic of Covid-19. *Surakarta English and Literature Journal, 3*(1), 9-21. http://ejournal.unsa.ac.id/index.php/selju/article/view/359

Casey, D. M. (2008). A journey to legitimacy: The historical development of distance education through technology. *TechTrends, 52*(2), 45-51. https://doi.org/10.1007/s11528-008-0135-z

Coffin, R. J., & MacIntyre, P. D. (1999). Motivational influences on computer-related affective states. *Computers in Human Behavior, 15*(5), 549-569. https://doi.org/10.1016/S0747-5632(99)00036-9

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson.

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice, 39*(3), 124-130. https://doi.org/10.1207/s15430421tip3903_2

Ellis, R. (1997). SLA and language pedagogy: An educational perspective. *Studies in Second Language Acquisition, 19*(1), 69-92. http://www.jstor.org/stable/44488668

Fansury, A. H., Januarty, R., Rahman, A. W., & Syawal. (2020). Digital content for millennial generations: Teaching the English foreign language learner on COVID-19 Pandemic. *Journal of Southwest Jiaotong University, 55*(3). https://doi.org/10.35741/issn.0258-2724.55.3.40

Hakami, M. (2020). Using Nearpod as a tool to promote active learning in higher education in a BYOD learning environment. *Journal of Education and Learning, 9*(1), 119. https://doi.org/10.5539/jel.v9n1p119

Handayani, F., & Handayani, N. D. (2020). The potential of online writing tools for EFL university students during the Covid-19 Pandemic. *Journal of English Education, 6*(1). 9-18. https://doi.org/10.30606/jee.v6i1.406

Harida, E. S. (2020). Students' learning in Corona virus diseases 2019 (Covid-19) situation. *English Education: English Journal for Teaching and Learning, 8*(1), 25-37. http://jurnal.iainpadangsidimpuan.ac.id/index.php/EEJ

Hartshorn, K. J., & Mcmurry, B. L. (2020). The effects of the COVID-19 Pandemic on ESL learners and TESOL practitioners in the United States. *International Journal of TESOL Studies, 2*, 140-156. https://doi.org/10.46451/ijts.2020.09.11

Juhary, J. (2012). Online comments for language learning: a pilot study. *Procedia Technology, 1*, 297-302. https://doi.org/10.1016/j.protcy.2012.02.063

Kanno, M. (2020). Maintaining and enhancing students' collaborative learning in a Japanese EFL higher education context. *Journal of Education, Innovation, and Communication, Special Issue*, 91-106. https://doi.org/10.34097/jeicom_SP_june2020_4

Knight, S. W. P. (2020). Establishing professional online communities for world language educators. *Foreign Language Annals, 53*(2), 298-305. https://doi.org/https://doi.org/10.1111/flan.12458

Layali, K., & Al-Shlowiy, A. (2020). Students' perceptions of e-learning for ESL / EFL in Saudi Universities and their implications during Coronavirus Pandemic: A review of literature. *International Journal of English Language & Translation Studies, 8*(1), 64-72. http://www.eltsjournal.org/archive/value8%20issue1/9-8-1-20.pdf

Lee, A. R., & Bailey, D. R. (2020). Learning from experience in the midst of covid-19: Benefits, challenges, and strategies in online teaching. *Call-Ej, 21*(2), 176-196. http://callej.org/journal/21-2/Bailey-Lee2020.pdf

Lomicka, L. (2020). Creating and sustaining virtual language communities. Foreign Language Annals, 53(2), 306-313. https://doi.org/10.1111/flan.12456

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. John Wiley \& Sons.

Njenga, J. K., & Fourie, L. C. H. (2010). The myths about e-learning in higher education. *British journal of educational technology, 41*(2), 199-212. https://doi.org/10.1111/j.1467-8535.2008.00910.x

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Sage.

Scott, D., & Morrison, M. (2007). *Key ideas in educational research*. Bloomsbury Academic.

Shaaban, S. S. A. (2020). TEFL professors' e-learning experiences during the Covid 19 pandemic. *European Journal of Foreign Language Teaching, 5*(1), 82-97. https://doi.org/10.46827/ejfl.v5i1.3202

Shahzad, S. K., Hussain, J., Sadaf, N., Sarwat, S., Ghani, U., & Saleem, R. (2020). Impact of virtual teaching on ESL learners' attitudes under COVID-19 circumstances at post graduate level in Pakistan. *English Language Teaching, 13*(9), 1-9. https://doi.org/10.5539/elt.v13n9p1

Shaw, R. S. (2012). A study of the relationships among learning styles, participation types, and performance in programming language learning supported by online forums. *Computers & Education, 58*(1), 111-120. https://doi.org/10.1016/j.compedu.2011.08.013

Shaw, R. S. (2013). The relationships among group size, participation, and performance of programming language learning supported with online forums. *Computers & Education, 62*, 196-207. https://doi.org/10.1016/j.compedu.2012.11.001

Thorne, S. (2000). EBN notebook data analysis in qualitative research. *EBN Notebook, 3*, 68-70. https://doi:10.1136/ebn.3.3.68

Tsai, M. J., & Tsai, C. C. (2003). Information searching strategies in web-based science learning: the role of internet self-efficacy. *Innovations in Education and Teaching International, 40*(1), 43-50. https://doi.org/10.1080/1355800032000038822

Tuncay, N., & Uzunboylu, H. (2012). English language teachers' success in blended and online e-learning. *Procedia - Social and Behavioral Sciences, 47*, 131-137. https://doi.org/10.1016/j.sbspro.2012.06.626

World Health Organization [WHO]. (2020a). *Novel Coronavirus (2019-nCoV) SITUATION REPORT-1*. Accessed 16 September, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4

World Health Organization [WHO]. (2020b). *Novel Coronavirus (2019-nCoV) SITUATION REPORT-22*. Accessed 16 September, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200211-sitrep-22-ncov.pdf?sfvrsn=fb6d49b1_2

Yang, Y., & Lin, N. C. (2010). Internet perceptions, online participation and language learning in Moodle forums: A case study on nursing students in Taiwan. *Procedia - Social and Behavioral Sciences, 2*(2), 2647-2651. https://doi.org/10.1016/j.sbspro.2010.03.388

Yi, Y., & Jang, J. (2020). Envisioning possibilities amid the COVID-19 pandemic: Implications from English language teaching in South Korea. *TESOL Journal, 11*(3), 1-5. https://doi.org/10.1002/tesj.543

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The Relationship between Empowering Leadership and Teachers' Job Performance: Organizational Commitment as a Mediator*

Güçlendirici Liderlik ile Öğretmen İş Performansı Arasındaki İlişki: Örgütsel Bağlılığın Aracı Rolü

İbrahim LİMON**

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ABSTRACT: This study investigates the mediating role of organizational commitment on the relationship between principals' empowering leadership and teachers' job performance. To this end, it employed a cross-sectional design, one of the quantitative methods. Data were collected through the "Empowering Leadership Behaviors Scale", "Organizational Commitment Scale" and "Job Performance Scale". The sample consisted of 324 teachers working in different cities in Turkey. They were employed through convenience sampling and responded to the scales online. Predictive relationships between variables were revealed using a structural equation model. Before testing the structural model, the validity of the scales and measurement model was investigated. The findings indicated that validity and reliability of scales were ensured. On the other hand, the fit indices regarding the measurement model satisfied the cutoff values in the literature. Since the data did not satisfy the multivariate normal distribution assumption, bootstrapping was used. The findings indicated that empowering leadership is positively associated with teachers' job performance and organizational commitment. On the other hand, organizational commitment boosts job performance. Lastly, empowering school leadership enhances organizational commitment, which in turn teachers' job performance. The findings were discussed based on the literature and some suggestions were made based on the findings.

Keywords: Teacher empowerment, commitment, job performance.

ÖZ: Bu çalışma, okul müdürlerinin güçlendirici liderliği ile öğretmenlerin iş performansı arasındaki ilişkide örgütsel bağlılığın aracı rolünü incelemektedir. Nicel desende kurgulanan mevcut araştırma kesitsel bir çalışmadır. Veriler, "Güçlendirici Liderlik Ölçeği", "Örgütsel Bağlılık Ölçeği" ve "İş Performansı Ölçeği" aracılığı ile toplanmıştır. Araştırmanın örneklemini Türkiye'nin farklı illerinde görev yapan 324 öğretmen oluşturmaktadır. Katılımcılara uygun örnekleme yöntemi ile ulaşılmış ve katılımcılar ölçekleri çevrimiçi olarak yanıtlamıştır. Değişkenler arası öngörücü ilişkiler yapısal eşitlik modeli kullanılarak ortaya çıkarılmıştır. Yapısal modelin test edilmesinden önce, ölçüm modelinin ve araştırmada kullanılan ölçeklerin geçerliliği incelenmiştir. Elde edilen bulgular ölçeklerin geçerlik ve güvenirliğine işaret etmektedir. Ölçüm modeline ilişkin uyum iyiliği değerleri alanyazındaki ölçütleri karşılamıştır. Veri çok değişkenli normal dağılım varsayımını karşılamadığından önyükleme (bootstrapping) yöntemi kullanılmıştır. Bulgular, güçlendirici okul liderliğinin öğretmenlerin iş performansı ve örgütsel bağlılığı ile pozitif ilişkili olduğunu göstermiştir. Öte yandan, örgütsel bağlılık iş performansını artırmaktadır. Son olarak, güçlendirici okul liderliği örgütsel bağlılık aracılığı ile öğretmen iş performansını dolaylı olarak etkilemektedir. Araştırma bulguları alanyazın temelinde tartışılmış ve bulgulara dayalı olarak bazı önerilerde bulunulmuştur.

Anahtar kelimeler: Öğretmen güçlendirme, bağlılık, iş performansı.

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The leadership role of school principals on the effectiveness and development of the school has attracted considerable attention recently in the literature (Abdurrezzak & Uğurlu, 2016; Cerit & Yıldırım, 2017; May & Supovitz, 2011; Setwong & Prasertcharoensuk, 2013; Slater & Teddlie, 1992; Tatlah & Iqbal, 2012). However, as in all other social fields, a transformation and change have become necessary for school leadership. In an increasingly complex environment, it became difficult for school principals to undertake all management and leadership responsibilities of the school alone (Beycioğlu & Aslan, 2010; Carter, 2016; Dilekçi & Sezgin Nartgün, 2020). In this context, autocratic or hierarchical leadership styles in which organizational power is concentrated are out of date, and sharing power has gained great importance (Bastian, 1995; Elmazi, 2018; Moran, 2015; Pan, 2007). This transformation brought the concept of "teacher empowerment" to the agenda (Blase & Blase, 1996, 2001; Short, 1994; Short & Rinehart, 1992; Terry, 1995). As for educational organizations, empowering leadership emerged from teacher empowerment (Çelik & Konan, 2020). In order to achieve the desired outcomes from ongoing reform initiatives in education systems (Lee & Nie, 2016), the effectiveness of school principal as a leader (Maxfield & Flumerfelt, 2009; Muzvidziwa, 2014) and school as an organization and ultimately the creation of a better learning environment are associated with empowered teachers (Aliakbari & Amoli, 2016; Lutsilili et al., 2014). Empowering teachers is regarded as one of the best methods for the school to realize its mission and goals (Blase & Blase, 2001).

On the other hand, teachers' commitment is another crucial factor which enhances school effectiveness (Bogler & Berkovich, 2020; Özgenel & Koç, 2020). It is a critical antecedent of the success of educational reforms and school effectiveness because higher teacher commitment results in extra effort to achieve school vision and goals; therefore, it is important to identify the factors contributing to teachers' commitment (Selamat et al., 2013). In the literature, it is stated that teachers' empowerment is one of the most effective ways to enhance teachers' commitment (Muhammad & Hussain Ch., 2020). Thus, Bogler and Somech (2004) found that empowered teachers display a higher level of organizational commitment which implies that empowering leadership is promising to have more committed teachers. As well as being an outcome of empowering leadership, organizational commitment is an antecedent of performance (Boz et al., 2021; Mailool et al., 2020) on which schools mainly rely to achieve their goals. Considering the importance of these three variables in terms of school effectiveness, there is a need to further investigate the relationships among them.

Previous literature also suggested that teachers' being more involved in critical decisions that direct the school, being more autonomous and being exposed to more school-related input, may cause stress by complicating communication processes and harm their motivation (Davis & Wilson, 2000). Based on this, the efforts to empower teachers can have negative outcomes. As a matter of fact, studies conducted in different sectors reveal that there is not always a linear relationship between employee empowerment and performance (Cheong et al., 2016; Hao et al., 2018; Humborstad et al., 2014). Considering the limited empirical evidence on the effects of empowering school leadership (Atik & Celik, 2020; Çelik & Konan, 2020; Lee & Nie, 2013), there is a need to further examine the relationship between teacher empowerment and performance. Based on the aforementioned gap in the literature, the mediating role of

organizational commitment on the relationship between empowering school leadership and teacher job performance is investigated in the present study. Thus, this study aims to provide insight into the relationship between empowering leadership and teacher performance and to reveal the processes through which empowering school leadership affect performance. Additionally, the findings are supposed to have significant implications for school administrators in terms of leadership style that they should adopt. Lastly, the study can extend our existing knowledge on empowering school leadership and guide the theoretical frameworks in further research.

Theoretical Framework

Empowering Leadership

The concept of "empowering leadership" was first proposed by Manz and Sims (1989, 1991). Researchers defined the concept, which they expressed as leaders directing employees to self-management, as "super leadership" (Knezovic & Musrati, 2018; Liu, 2015). Pearce et al. (2003) argued that empowering leadership could be regarded as a distinctive leadership behavior and determined that empowering leadership behaviors are gathered in a separate dimension from transformative, interactional, and directive leadership behaviors. According to the authors, directive leadership embodies organizing, problem solving, clarifying roles, and objectives, informing and monitoring; transactional leadership recognizing, and rewarding; transformational leadership planning, motivating, inspiring, and networking. On the other hand, empowering leadership covers consulting, delegating, supporting, developing, and mentoring, and managing conflict, and team building.

While leadership is defined as the process of influencing others, empowering leadership can be conceptualized as empowering subordinates to influence rather than influencing them (Knezovic & Musrati, 2018). Empowering leadership can be regarded as an approach that offers leaders a prescription for the distribution and use of power (Vecchio et al., 2010). In its broadest term, empowering leadership is the behavior of the leader to share her / his power with subordinates (Amundsen & Martinsen, 2014). Empowering leaders increase the meaningfulness of the work for the employee by ensuring that employees understand the importance of their contribution to the overall effectiveness of the organization; express confidence in the employee's competence, and possibility of high performance by encouraging the employee to make decisions about how to do her/his job, and offering autonomy (Audenaert & Decramer, 2018; Zhang & Bartol, 2010). Empowering leadership behaviors are listed as delegation of authority, coordination, and information sharing, encouragement of initiative, and being goal-oriented, support of effectiveness, inspiration, modeling, motivational support, participatory decision-making, showing interest, assuming responsibility, providing opportunities for professional development, coaching for innovative performance, guidance, participatory goal setting, and encouraging teamwork (Ahearne et al., 2005; Amundsen & Martinsen, 2014; Arnold et al., 2000; Davis & Wilson, 2000; Dennerlein, 2017; Konczak et al., 2000; Pearce et al., 2003).

Considering school organizations, empowerment is defined as the processes that offer the school stakeholders the opportunity to take responsibility for their professional

development, and solve their own problems (Short et al., 1994). On the other hand, Short (1994) briefly explains the dimensions of teacher empowerment as follows:

> ***Participation in decision making:*** It refers to the participation of the teacher in class and school level decisions. Achieving the desired results from participating in decisions depends only on the teachers being sure that her/his involvement in the process will affect the outcomes.
>
> ***Professional development:*** It refers to the teacher's perception that the school offers the opportunity to develop professionally, learn continuously, increase professional skills, and work collaboratively (Short & Rinehart, 1992).
>
> ***Status:*** It is the perception that teacher is respected and appreciated.
>
> ***Self-efficacy:*** It is the perception that the teacher has the abilities and skills that can aid student learning and the competence to develop a curriculum for students.
>
> ***Autonomy:*** It refers to the perception of whether the teacher has control over key elements in a professional sense or not.
>
> ***Impact:*** It is the perception that the teacher is valuable for the school; s/he affects teaching and learning processes and her/his ideas are put into practice.

Empowering school leadership is to create a sense of trust in teachers, develop shared management structures, ensure teacher participation in problem-solving, and decision-making mechanisms, enable teacher autonomy, encourage innovation, creativity and risk-taking, reward, offer support, the delegation of authority, providing intellectual stimulation, affirming and appreciating, creating a vision, encouraging collaborative relationships, respecting the teacher's ideas, providing the teacher with resources for the benefit of students, being a role model and displaying personality traits such as being interested, enthusiastic, optimistic, honest and approachable (Bastian, 1995; Blase & Blase, 1996; Konan & Çelik, 2018; Lee & Nie, 2013; Reitzug, 1994).

Organizational Commitment

Employee commitment is very important for organizations to achieve their goals by performing at a high level (Princy & Rebeka, 2019; Visanh & Xu, 2018), develop and maintain sustainability (Batugal & Tindowen, 2019). Because of its importance for organizations, organizational commitment is one of the mostly discussed issues in literature (Al Jabri & Ghazzawi, 2019; Bogler & Berkovich, 2020). Interest in organizational commitment increased especially in the 1980s, and commitment became a rival to the concept of job satisfaction as an organizational research topic (Meyer et al., 1993). In general terms, organizational commitment is the internalization of organizational goals and values and a feeling of loyalty towards the organization (Kushman, 1992). Meyer and Allen (1991) described the concept, which was previously considered as attitudinal and behavioral commitment, as a psychological condition, and discussed it in three dimensions: affective, continuance, and normative commitment. Accordingly, organizational commitment characterizes the employee's relationship with the organization and includes implications of whether s/he wants to continue organizational membership. These three dimensions of organizational commitment can be briefly explained as follows (Meyer & Allen, 1991, 1997; Meyer et al., 1993). Affective commitment refers to the emotional attachment of the employee towards, the level of identification with and involvement in the organization. Employees with high affective commitment stay because they want to stay in the organization. On the other hand, continuance commitment refers to the cost that employee associates with leaving the organization. Employees who have continuance commitment remain in the organization because they must remain. Finally, normative commitment refers to the

employee's feeling of obligation to work and the employee feels a moral obligation to stay in the organization. Meyer and Allen (1991) stated that any employee can experience organizational commitment dimensions at different levels. While an employee feels a strong desire or necessity to stay in the organization, s/he may feel a low-level obligation. Another employee may have a low level of desire, a medium level of necessity, and a high level of obligation. Therefore, it can be said that three dimensions of organizational commitment affect behavior interactively and a researcher who wants to better understand the employee's relationship with the organization should consider these three dimensions together (Meyer & Allen, 1997).

Considering educational organizations, we can state that teachers' commitment is important for the success of educational reforms and the effectiveness of the school and teaching (Adeyemo, 2007; Celep, 2000; Devos et al., 2014; Firestone & Pennell, 1993; Hamid et al., 2013; Kushman, 1992). Educational organizations need teachers with high organizational commitment to create/maintain a competitive edge and perform at a higher level (Bashir & Gani, 2020). Croswell (2006) stated that teaching is not limited to activities carried out in the classroom; therefore, teacher commitment should be considered from a broader perspective.

As a matter of fact, three types of commitment are mentioned in terms of the teaching profession in the literature (Celep, 2000; Croswell, 2006; Firestone & Pennell, 1993; Firestone & Rosenblum, 1988; Fresko et al., 1997; Kushman, 1992) which are commitment to the students, teaching (profession) and school. According to Firestone and Pennell (1993), teachers need to feel all these commitment types to professionalize and respond to the complex demands brought about by the changes in teaching practices while following them simultaneously. This study handles organizational commitment in terms of affective, continuance and normative dimensions (Meyer et al., 1993).

Teachers' organizational commitment can be defined as a considerable level of loyalty towards a particular school (Firestone & Rosenblum, 1988; Park, 2005). According to Park (2005), a consensus about the mission of the school, working conditions and social relations between teachers can contribute to the development of this loyalty. Tsui and Cheng (1999) described teachers' organizational commitment as the level of identification and involvement with the school. Teachers' organizational commitment can be characterized by a strong belief and acceptance of the school's goals, mission, and values; a willingness to make a considerable effort for the school; a strong desire to pursue a career in the current school; and a tendency to take on different roles on behalf of the school (Celep, 2000; Firestone & Rosenblum, 1988; Park, 2005; Sheikh, 2017; Tsui & Cheng, 1999). According to Kushman (1992) commitment in educational organizations can yield the effort required for the better learning of students who learn relatively difficult, the necessary loyalty to create a culture of continuous academic excellence and teacher professionalism, and a consensus among teachers towards the basic educational goals and values of the school. Additionally, Kushman stated that organizational commitment in schools can function as a powerful motivational tool when bureaucratic rules and external rewards are not appropriate. Sheikh (2017) indicated that teachers with high organizational commitment will have a low rate of absenteeism, a strong enthusiasm to come to school, and tend to display organizational citizenship behavior. In this sense, when schools create an environment to increase teachers' organizational commitment, they can have a more dedicated,

enthusiastic, and responsible teaching staff which in turn can contribute to better student learning.

Job Performance

As the realization of organizational goals depends largely on employee performance, the performance level of employees is of great importance for organizations (Ramos-Villagrasa et al., 2019). Job performance can be defined as employee actions and behaviors that contribute to or facilitate the achievement of organizational goals (Fogaça et al., 2018; Sackett & DeVore, 2005); the total value expected to provide the organization by different behavioral patterns the employee exhibits in a standard time period (Motowidlo & Kell, 2013). The most commonly referred dimensions of job performance in literature are task, contextual, and adaptive performance (Borman & Motowidlo, 1997; Griffin et al., 2000; Sonnentag et al., 2008). Task performance refers to the behaviors that directly include the production of products or services, or activities that indirectly support the core technical processes of the organization; contextual performance to behavioral patterns that support the psychological or social context in which task activities are carried out (Van Scotter et al., 2000); and adaptive performance to the ability to meet the demands of a dynamic environment (Charbonnier-Voirin & Roussel, 2012).

Educational organizations that train human capital, the most important asset of society, need teachers with high performance to achieve their goals. Since job performance is defined as fulfilling the requirements of a specific job successfully (Chaithra & Hiremath, 2018), there may be job-specific performance definitions (Koopmans et al., 2011). Thus, teacher job performance is related to how effectively a teacher performs his job (Polat & Abaslı, 2019) and the level of contribution s/he offers to school's goals (Duze, 2012; Özdemir & Gören, 2017; Özdemir & Yirmibeş, 2016). The success and quality of the educational service offered by the school is closely associated with the quality and performance levels of its teachers (Mgbere & Andrew, 2019). Therefore, it can be stated that teacher performance is among the main factors that contribute to the academic success of students, the ultimate goal of the school (Cerit, 2012; Osagie & Akinlosotu, 2017; Polat, 2019). For this reason, revealing the factors affecting teacher performance is important in terms of improving student learning, which is the purpose of the school's existence.

Conceptual Framework

Relationships between Empowering Leadership, Organizational Commitment, and Job Performance

There is a growing body of literature examining school principals' empowering leadership behaviors and teacher empowerment. These studies associate empowering leadership behaviors with some favorable outcomes at both organizational and individual levels. Among these are job satisfaction (Amoli & Youran, 2014; Atik & Celik, 2020; Bogler & Nir, 2012; Pearson & Moomaw, 2005; Vecchio et al., 2010); organizational citizenship behaviors (Bogler & Somech, 2004; Somech, 2005); perceived organizational support (Bogler & Nir, 2012); compliance with psychological contract (Koçak & Burgaz, 2017); innovative behavior (Gkorezis, 2016; Zhu et al., 2019); intention to stay at school (Ndoye et al., 2010); trust in school principal (Atik &

Celik, 2020) and the organization (Uygur & Arabacı, 2019). Empowering leadership creates an environment facilitating teachers' development and autonomy, contributing to the development of teachers' potential (Lee & Nie, 2013) and increasing teacher motivation (Davis & Wilson, 2000). These are all factors that can indirectly contribute to the commitment and performance of teachers. On the other hand, there are also studies that directly associate teacher performance (Özdemir & Gören, 2017; Somech, 2005; Vecchio et al., 2010) and commitment (Aliakbari & Amoli, 2016; Batugal & Tindowen, 2019; Bogler, 2005; Bogler & Somech, 2004; Boonyarit et al., 2010; Gordon, 2018; Gretkierewicz, 2020; Gümüş, 2013; Hamid et al., 2013; Holliman, 2012; Özdemir & Gören, 2017; Somech, 2005; Wu & Short, 1996) with empowerment. Based on the previous literature, the following hypotheses are suggested.

H_1: School principals' empowering leadership behaviors significantly predict teachers' organizational commitment.

H_2: School principals' empowering leadership behaviors significantly predict teachers' job performance.

Teachers' organizational commitment has significant implications for schools (Sheikh, 2017). For example, efficacy (Adeyemo, 2007), organizational citizenship behaviors (Çelik & Üstüner, 2020; Sheikh, 2017) and job satisfaction (Demirtaş, 2014; Önder et al., 2019) are associated with commitment. Teachers with a higher level of commitment will carry out their jobs more willingly, show extra effort on behalf of school, and have a lower level of absenteeism (Gordon, 2018; Sheikh, 2017; Singh & Billingsley, 1998). On the other hand, commitment is negatively associated with intention to leave school (Demir, 2019; Flynn, 2000; Sheikh, 2017). Similarly, the findings in literature indicate that organizational commitment increases teacher performance (Doğan & Çelik, 2019; Flynn, 2000; Laily & Wahyuni, 2017; Sheikh, 2017). These findings imply that when teachers are more committed to the school, they will exhibit a higher level of performance. Teachers may tend to devote to and stay in the school to accomplish the objectives of the school because they personally have same goals and values with it (Az, 2017). Drawing on these, the following hypothesis is suggested.

H_3: Teachers' organizational commitment significantly predicts their job performance.

As mentioned above, principals' empowering leadership behaviors affect both teachers' organizational commitment (Aliakbari & Amoli, 2016; Bogler, 2005; Bogler & Somech, 2004; Boonyarit et al., 2010; Gretkierewicz, 2020; Gümüş, 2013; Hamid et al., 2013; Holliman, 2012; Özdemir & Gören, 2017; Somech, 2005) and job performance (Özdemir & Gören, 2017; Somech, 2005; Vecchio et al., 2010). On the other hand, organizational commitment is a significant predictor of teacher job performance (Doğan & Çelik, 2019; Flynn, 2000; Sheikh, 2017). Thus, based on the previous literature it can be anticipated that empowering leadership may increase teachers' organizational commitment which in turn positively contribute to performance. This implies that organizational commitment could play a mediating role on the relationship between empowering leadership and job performance. Based on this, the fourth hypothesis of this study is as follows.

H_4: Teachers' organizational commitment mediates the relationship between principals' empowering leadership behaviors and teachers' job performance.

Method

This is a cross-sectional study (Cohen et al., 2005) following quantitative design to reveal the relationships between principals' empowering leadership behavior, teachers' organizational commitment and job performance. Cross-sectional studies explore the instantaneous situation of the sample at a certain time.

Sample

The sample of the study consisted of 324 teachers employed through convenience sampling method (Mertens, 2010) and the sample size can be considered satisfactory for a study in which structural equation modelling is used (Kline, 2011). This sampling method was chosen because it offers some advantages in terms of cost of locating participants, the geographic distribution of the sample and obtaining data from the selected elements. On the other hand, in this sampling method the researchers do not put as much focus on the representativeness of the sample as in purposive sampling (Lavrakas, 2008). This is also an internal validity study which aims to validate a model including predictive relationships between variables, so it was not carried out on a sample. Internal validity seeks to demonstrate that the explanation of a particular event, issue or set of data which a piece of research provides can actually be sustained by the data while external validity refers to the degree to which the results can be generalized to the wider population, cases, or situations (Cohen et al., 2005). So, teachers from different cities were included in the study. Of the participants, 187 were women (57.7%) and 137 men (42.3%). Of the participants 312 were working in public (96.3%) and 12 in private schools (3.7%). 11 participants were working in pre-schools (3.4%), 60 in primary schools (28.5%), 81 in secondary schools (25%), 160 in high schools (49.4%) and 12 in other educational institutions (3.7%). The average age of teachers participating in the study is 39.27 (*SD*=7.62); of teaching experience is 15.31 years (*SD*=7.77), duration of working with current school principals is 2.51 years (*SD*=2.53) and duration of working at current schools is 5.42 years (*SD*=4.43).

Data Collection

Ethical approval for this study was obtained from Batman University Ethics Committee dated 20th November 2020 and numbered 2020/5-14. The study employed an online data collection procedure. First of all, an online form including scales was created via Google Forms. The researcher copied and sent the link to the school administrators and teachers with whom he is acquainted with in different cities. They shared the link on their schools' Whatsapp groups. The teachers could have access to the form by clicking this link and responded the scales online. Their personal information was kept confidential.

Data Analysis

SPSS 25 and AMOS 23 package programs were used in data analysis (Arbuckle, 2019). First of all, the data set was scanned for missing values and there were none of them since data were collected online. In the second step, the univariate distribution of data set was checked through skewness and kurtosis values. The skewness values were

(-.627; -.293; -.544) and kurtosis (.321; -.034; .484) for empowering leadership, organizational commitment, and job performance, respectively which indicate univariate normal distribution of the data (Field, 2009). Within the scope of descriptive statistics, minimum, maximum values, arithmetic means, and standard deviation values were calculated and the correlations among variables were calculated through Pearson correlation coefficient.

The predictive relationships among the variables were investigated through a structural equation model including all observed variables. Structural equation models allow researchers to test the relationships between variables simultaneously (Collier, 2020). In the present study, empowering leadership of principals was the independent variable, organizational commitment was the mediator and teacher job performance was the dependent variable. Firstly, it was examined whether there was a multicollinearity problem between empowering leadership and organizational commitment as variables that predict teacher job performance. The findings (Tolerance=.661; *VIF*=1.513; *r*=.586) showed that there was no multicollinearity between predictor variables (Field, 2009). Multivariate normality assumption was checked through "*multivariate kurtosis and its critical ratio*". The findings indicated that the data did not satisfy multivariate normality assumption (Multivariate Kurtosis=219.629; *CR*=36.795). Thus, non-parametric *"bootstrapping"* method (Byrne, 2016), which does not require the normal distribution of data, was employed to reveal direct and indirect relationships. The steps suggested by Hair et al. (2014) were followed during the structural model analysis procedure which can be summarized as follows: *(1) Identification of measurement tools, (2) Development of measurement model, (3) Testing the measurement model, (4) Evaluation of the findings regarding the measurement model, (5) Development of the structural model, (6) Evaluation of the findings regarding the structural model.*

Data Collection Tools

Empowering Leadership Scale

This scale was developed by Konczak et al. (2000) and adapted into Turkish by Aras (2013). It was used by Koçak and Burgaz (2017) to measure the empowering leadership behaviors of school principals based on teachers' perceptions. The scale consists of 18 items and its dimensions are "delegation of authority and responsibility (4 items)", "decision making (3 items)", "knowledge sharing (3 items)", "skill development (3 items)" and "coaching for innovative performance (5 items)". A sample item is as follows "My principal contributes to my ability to identify and solve problems at school." It is a five-point Likert type scale and item responses range from "(1) Strongly disagree" to "(5) Strongly agree". Koçak and Burgaz (2017) reported the Cronbach's alpha internal consistency coefficients of the scale and its dimensions between .86-.92.

Organizational Commitment Scale

The scale developed by Meyer et al. (1993) and adapted into Turkish by Dağlı et al. (2018) was employed to measure teachers' commitment level. The scale consists of 18 items loading on three dimensions: "affective commitment (6 items)", "continuance commitment (6 items)" and "normative commitment (6 items)". It measures teachers'

organizational commitment based on self-report. A sample item is as follows "It would make me very happy to spend the rest of my professional career in this school.". It is a five-point Likert type scale and item responses range from "(1) Strongly disagree" to "(5) Totally agree". Cronbach's alpha internal consistency coefficients of the scale and its dimensions were reported between .73 and .88 (Dağlı et al., 2018).

Job Performance

The "Employee Performance Scale" (Kirkman & Rosen, 1999; Sigler & Pearson, 2000) was used to measure teachers' self-reported job performance level. The adaptation study of the scale into Turkish was conducted by Çöl (2008). This is a uni-dimensional scale consisting of four items. A sample item is as follows "I complete my tasks just on time.". It is a five-point Likert type scale and item responses range from "(1) Strongly disagree" and "(5) Strongly agree". Cronbach's alpha internal consistency coefficient of the scale was reported as .82 (Çöl, 2008).

The validity and reliability of data collection tools were also evaluated within the scope of the present study. Confirmatory factor analysis was conducted to test the validity and Cronbach's alpha internal consistency coefficients were calculated. The findings of the first confirmatory factor analysis showed that an item on the empowering leadership scale (*EL4*=.319) and two items on organizational commitment scale (*OC3*=.398; *OC5*=.483) had low factor loadings. Thus, they were discarded (Hair et al., 2014) from data analysis. Consequently, 17 items remained on the empowering leadership scale, and the factor loadings ranged from .708 to .914. As for organizational commitment scale, the remaining 16 items had factor loadings ranging from .493 to .855. On the other hand, the factor loadings for items on job performance scale ranged from .535 to .735. Table 1 below presents Cronbach's alpha internal consistency coefficients and the fit indices of scales and measurement model.

Table 1

Fit Indices and Cronbach's Alpha Coefficients of Scales

Scale	x^2/df	*p*	*RMSEA*	*NFI*	*NNFI*	*CFI*	*GFI*	*AGFI*	*SRMR*	Alpha
EL	2.551	.000	.069	.948	.959	.967	.911	.875	.027	.968
OC	3.781	.000	.093	.854	.866	.887	.886	.812	.064	.912
JP	1.729	.189	.048	.996	.991	.998	.997	.973	.010	.820
MM	2.218	.000	.061	.851	.905	.912	.807	.780	.067	-

Note: EL: Empowering leadership; OC: Organizational commitment; JP: Job performance; MM: Measurement model

As shown in Table 1, the fit indices of the scales and measurement model in which all the observed variables are included satisfied the cut off values in literature (Hair et al., 2014; Sharma et al., 2005). On the other hand, Cronbach's Alpha internal consistency coefficients of the scales, which are >.75, indicate reliability (Singh, 2007). Based on these findings, it can be said that the validity and reliability were ensured.

Findings

Descriptive Findings and Correlations among Variables

In this section, descriptive findings and correlations among variables are presented.

Table 2

Descriptive Statistics and Correlations among Variables

	Descriptives				Correlations		
Scale	Min.	Max.	*M*	*SD*	1	2	3
(1) EL	1.06	5.00	3.62	.80	1.00		
(2) OC	1.00	5.00	3.22	.73	.586**	1.00	
(3) JP	2.00	5.00	4.15	.59	.135*	.184**	1.00

$^{**}p<.01$; $^{*}p<.05$

As shown in Table 2, based on teachers' perceptions empowering leadership behaviors of school principals is relatively high *M*=3.62 (*SD*=.80). Self-reported organizational commitment is *M*=3.22 (*SD*=.73) and job performance is *M*=4.15 (*SD*=.59). On the other hand, there were statistically significant positive correlations among variables. Accordingly, the correlation between empowering leadership and organizational commitment was (*r*=.586; *p*<.01); empowering leadership and job performance (*r*=.135; *p*<.05) and organizational commitment and job performance (*r*=.184; *p*<.01).

Findings on Structural Model

The structural equation model investigated the mediating role of organizational commitment on the relationship between empowering leadership and job performance. Fit indices regarding the structural equation model were as follows (x^2/df *=2.218, p=.000; CFI=.912; RMSEA=.061; NFI=.851; NNFI=.905; GFI=.807; AGFI=.780; RMR .075; SRMR=.067*) indicating good fit. The model can be seen in Figure 1 below.

As shown in Table 3 below, empowering leadership significantly predicted organizational commitment (β=.654; *p*=.000) and organizational commitment predicted job performance (β=.312; *p*=.000). The direct effect of empowering leadership on job performance was not statistically significant (β=-.057; *p*=.511). However, total indirect effect of empowering leadership on job performance (β=.148; *p*=.024) was statistically significant. Lastly, the findings indicated organizational commitment mediated the relationship between empowering leadership and job performance (β=.204; *p*=.000; 95% CI, *LB*=.090, *UB*=.333). The indirect effect of empowering leadership on organizational commitment was statistically significant at *p*<.01 level, and the upper and lower bounds did not include "0" within 95% confidence interval. When the direct and indirect effects are evaluated together, the findings indicated "*indirect only mediation*" (Zhao et al., 2010).

Table 3

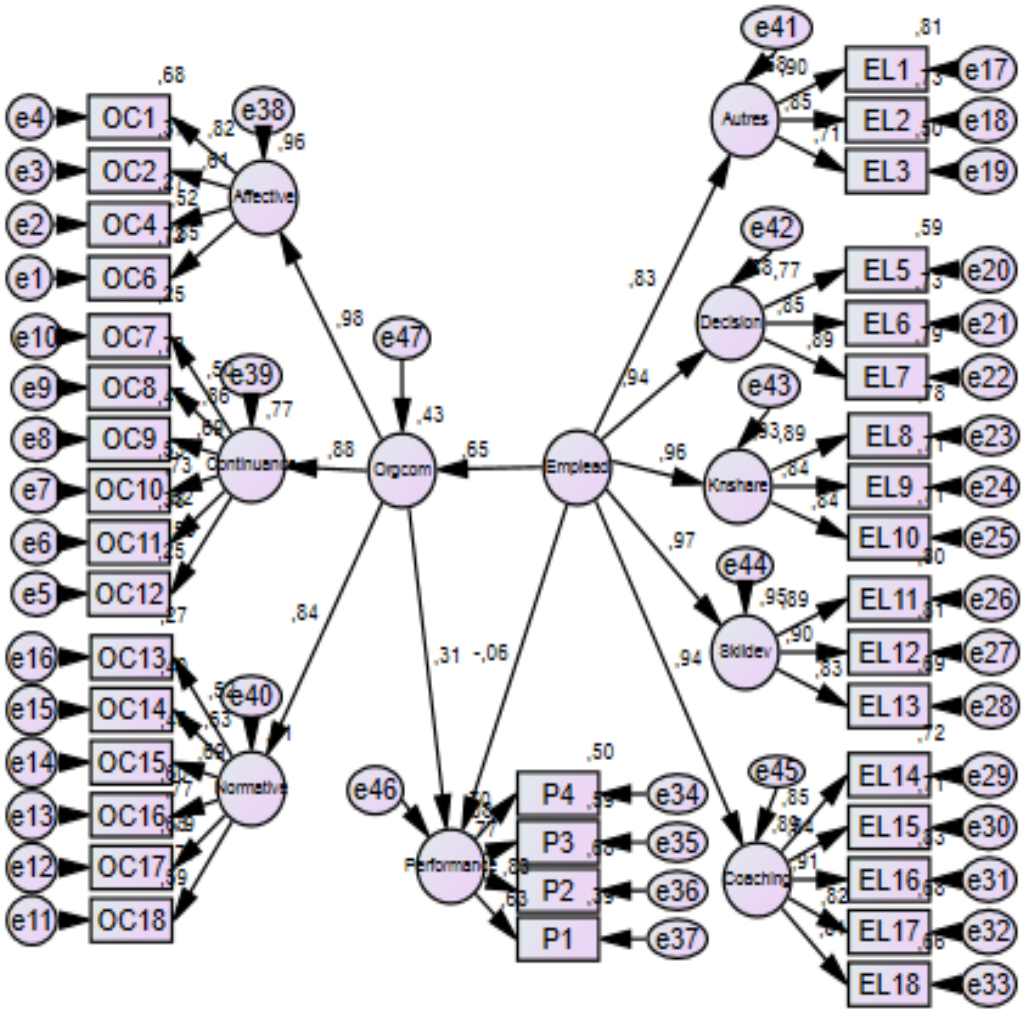
Standardized Direct and Indirect Effects

	Coefficient		Bootstrap 5000 (95% CI)		
Paths	Estimate	*SE*	Lower Bound	Upper Bound	*p*
Direct effects					
EL→OC (H1)	.654	.044	.562	.736	.000
EL→JP (H2)	-.057	.083	-.220	.105	.511
OC→JP (H3)	.312	.090	.139	.492	.000
Indirect effect					
EL→OC→JP (H4)	.204	.062	.090	.333	.000
Total indirect effect					
EL → JP	.148	.066	.025	.285	.024

Note: EL: Empowering leadership; OC: Organizational commitment; JP: Job performance

Figure 1

Structural Model



Discussion

This study focused on the relationships between principals' empowering leadership behaviors, teachers' organizational commitment, and job performance. The literature indicates statistically significant relationships between variables. Based on the existing literature, the main suggestion of the current study was that principals' empowering leadership behaviors increase teachers' job performance through organizational commitment. The hypotheses were investigated through structural equation model.

The first hypothesis of the study was that school principals' empowering leadership behaviors predicted teachers' organizational commitment. Previous research showed that empowering leadership positively contributed to organizational commitment by providing employees with autonomy and development opportunities (Kim & Beehr, 2020). The findings confirmed the first hypothesis, which was consistent with previous literature. Accordingly, principals' empowering leadership behaviors increase teachers' organizational commitment (Aliakbari & Amoli, 2016; Batugal & Tindowen, 2019; Bogler, 2005; Bogler & Somech, 2004; Boonyarit et al., 2010; Gordon, 2018; Gretkierewicz, 2020; Gümüş, 2013; Hamid et al., 2013; Holliman, 2012; Özdemir & Gören, 2017; Somech, 2005; Wu & Short, 1996). A school environment in which the principal delegates authority and responsibility, enables teachers to participate in decisions, effectively shares information with the teacher, enables them to develop their professional skills, and coaches for innovative performance, can contribute to the teachers' adoption of the values and goals of the school and continue her/his career in school. Teacher empowerment will increase the school's effectiveness and the attractiveness of the school as an organization to work for (Kõiv et al., 2019). Additionally, it is stated that teachers who are empowered to take the initiative and responsibility related to their duties by school principals will have higher professional satisfaction through self-realization (Boonyarit et al., 2010), which can contribute to the commitment to the school as an organization.

The second hypothesis of the study suggested that principals' empowering leadership behaviors could be associated with job performance positively. The previous literature suggested that empowered employees would develop a sense of belonging to their jobs, which would reflect positively on their performance (Kundu et al., 2019). The findings showed that the direct effect of empowering leadership on job performance was not significant; however, the total indirect effect was significant supporting the second hypothesis. Based on this, we can say that empowering leadership predicted teachers' job performance. This finding is consistent with previous literature (Özdemir & Gören, 2017; Somech, 2005; Vecchio et al., 2010; Yao et al., 2020). These studies revealed that teacher empowerment increased performance. Empowerment enables teachers to realize their own potential and limitations and they gain competence in terms of professional development (Balyer et al., 2017), which can be regarded as a factor enhancing their performance. Balkar (2015) stated that schools with empowering cultures had an environment convenient for increasing the professional performance of teachers. When empowered, teachers feel a higher level of responsibility (Kim & Beehr, 2020) and motivation (Boonyarit et al., 2010). Shortly, we can argue that teachers who are empowered exert greater effort to show a higher level of performance as suggested by findings.

The third hypothesis of the study suggested that there was a significant association between teachers' organizational commitment and their performance. Committed and dedicated teachers are the most important assets of schools, and both quality and quantity of performance are closely related to commitment and dedication (Absar & Das Swain, 2009). The findings in this study indicated that organizational commitment significantly predicted teachers' job performance. In other words, as organizational commitment increases, teacher job performance will also increase. This is consistent with previous literature (Doğan & Çelik, 2019; Flynn, 2000; Laily & Wahyuni, 2017; Sheikh, 2017). Teachers who adopt the values, goals and objectives of the school and regard themselves as a part of the organization tend to exhibit both in-role and extra-role behaviors more (Töre, 2019). Committed teachers will feel considerable loyalty to the school and will be willing to fulfill the organizational tasks assigned to them (Firestone & Rosenblum, 1988) and spend effort on behalf of the school (Park, 2005; Sheikh, 2017).

The last hypothesis of the study was that principals' empowering leadership behaviors had an indirect effect on job performance through organizational commitment. The findings confirmed the hypothesis, which means that empowering leadership increases teachers' organizational commitment, enhancing performance. The finding is consistent with the previous research suggesting indirect relationship between empowerment and performance (Bogler & Somech, 2004; Kariuki & Kiambati, 2017; Lestari & Yunianto, 2015; Muhammad & Abdullah, 2016). Additionally, studies conducted in other sectors provide empirical evidence that empowering leadership has an indirect effect on job performance through such variables as self-efficacy (Ahearne et al., 2005); harmonious passion for work (Hao et al., 2018); team cohesion and knowledge sharing (Tung & Chang, 2011).

Conclusion

This study concluded that principals empowering leadership behaviors enhance teachers' organizational commitment and job performance. On the other hand, a higher organizational commitment means a higher level of job performance. Additionally, empowering leadership has an indirect effect on teacher job performance through organizational commitment. In other words, the commitment of the teachers who are empowered increases, which has a positive effect on their performance. If principals desire to increase teachers' commitment and performance, they should empower them by delegating authority and responsibility, sharing knowledge, facilitating professional development, involving teachers in decision making processes and providing them with guidance for innovative performance.

The current study also extended our existing knowledge regarding the effects of teacher empowerment on organizational outcomes. A thorough literature review did not yield a study examining the relationships among these variables, which means that this study has contributed considerably to educational leadership literature.

Implications

The findings revealed that there are statistically significant associations among empowering leadership, teacher commitment, and job performance. Based on the findings, the current study implies the following:

- Principals should be provided with training on how to empower teachers.
- Particularly for countries with highly centralized educational systems, such as Turkey, where this study was carried out, principals should be legally supported to empower teachers.
- Principals, on the other hand, should strive to create an empowering school culture.
- They should act as a facilitator for teachers and help teachers' professional development.
- They should also create a school environment in which teachers feel valuable and realize their personal goals and organizational ones to enhance organizational commitment.
- Schools should find incentives to retain committed teachers.

Limitations

Although it has considerable implications, the current study was conducted within some limitations. Firstly, teachers' organizational commitment and job performance levels were measured using self-reported scales, which may bring social desirability into question. However, while social desirability may cause mean scores to increase, it does not pose a significant problem in terms of the relationships between variables (Luyten & Bazo, 2019). Secondly, since this was a cross-sectional study, it does not provide evidence for causal relationships between variables. Further research may overcome this limitation by conducting studies in experimental and longitudinal design. Finally, the model tested in the study is limited to Turkish cultural context. Cross-cultural validation of the model may provide information regarding the cultural sensitivity of proposed model.

Conflicts of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Dr. İbrahim Limon works as an English teacher in Sakarya Mithatpaşa Anatolian High School. He got his Phd degree from Abant İzzet Baysal University in 2019. His doctoral thesis was on teachers' change fatigue, demoralization, and job performance. He published several articles in both national and international journals. The author developed and adapted scales into Turkish. He presented many papers at conferences and edited an international book in English. His research interests are school leadership, organizational behavior, and educational change. He is the language editor of an international journal and among the editorial team of national ones. Dr. Limon works as one of the organizing committee members of an international conference which was held in different countries during the past few years.

References

Abdurrezzak, S., & Uğurlu, C. T. (2016). Okul liderliği davranış ve uygulamalarının okul etkililiğini sağlamadaki rolüne ilişkin öğretmen algılarının incelenmesi. *Cumhuriyet Üniversitesi Sosyal Bilimler Dergisi, 40*(1), 215-242.

Absar, S., & Das Swain, R. (2009). Organizational commitment of university teachers across discipline and designation. *Management and Professionalisation of Higher Education Conference*. https://doi.org/10.13140/2.1.4625.8246

Adeyemo, D. A. (2007). The predictive effects of job satisfaction and organizational commitment on teaching efficacy of secondary school teachers in Ibadan, Nigeria. *Zimbabwe Journal of Educational Research, 19*(3), 207-219.

Ahearne, M., Mathieu, J., & Rapp, A. (2005). To empower or not to empower your sales force? An empirical examination of the influence of leadership empowerment behavior on customer satisfaction and performance. *Journal of Applied Psychology, 90*, 945-955. https://doi.org/10.1037/0021-9010.90.5.945

Aliakbari, M., & Amoli, F. A. (2016). The effects of teacher empowerment on teacher commitment and student achievement. *Mediterranean Journal of Social Sciences, 7*(4), 649-657. https://doi.org/10.5901/mjss.2016.v7n4p649

Al Jabri, B., & Ghazzawi, I. (2019). Organizational commitment: A review of the conceptual and empirical literature and a research agenda. *International Leadership Journal, 11*(1), 78-119.

Amoli, F. A., & Youran, M. (2014). Delving the relationship between teacher empowerment and job satisfaction among Iranian EFL teachers in Tehran Aviation University. *Theory and Practice in Language Studies, 4*(4), 771-777. https://doi.org/10.4304/tpls.4.4.771-777

Amundsen, S., & Martinsen, Ø. L. (2014). Empowering leadership: Construct clarification, conceptualization, and validation of a new scale. *The Leadership Quarterly, 25*(3), 487-511. https://doi.org/10.1016/j.leaqua.2013.11.009

Aras, G. (2013). *Personel güçlendirme yönetiminde güçlendirici liderlik davranişları uygulamasi: Kemer bölgesi beş yıldızlı otel işletmeleri örneği* [Yayımlanmamış yüksek lisans tezi]. Gümüşhane Üniversitesi.

Arbuckle, J. L. (2019). *IBM SPSS Amos 20 user's guide*. New York (NY): IBM Corporation.

Arnold, J. A., Arad, S., Rhoades, J. A., & Drasgow, F. (2000). The empowering leadership questionnaire: The construction and validation of a new scale for measuring leader behaviors. *Journal of Organizational Behavior, 21*, 249-269.

Atik, S., & Celik, O. T. (2020). An investigation of the relationship between school principals' empowering leadership style and teachers' job satisfaction: The role of trust and psychological empowerment. *International Online Journal of Educational Sciences, 12*(3), 177-193.

Audenaert, M., & Decramer, A. (2018). When empowering leadership fosters creative performance: The role of problem-solving demands and creative personality. *Journal of Management & Organization, 24*(1), 4-18. https://doi.org/10.1017/jmo.2016.20

Az, H. (2017). Relationship between organizational commitment and employee's performance evidence from banking sector of Lahore. *Arabian Journal of Business and Management Review, 7*(2), 1-7.

Balkar, B. (2015). The relationships between organizational climate, innovative behavior and job performance of teachers. *International Online Journal of Educational Sciences, 7*(2), 81-92. http://dx.doi.org/10.15345/iojes.2015.02.007

Balyer, A., Özcan, K., & Yıldız, A. (2017). Teacher empowerment: School administrators' roles. *Eurasian Journal of Educational Research, 70*, 1-18. http://dx.doi.org/10.14689/ejer.2017.70.1

Bashir, B., & Gani, A. (2020). Correlates of organisational commitment among university teachers in India: An empirical investigation. *Asia-Pacific Journal of Management Research and Innovation, 16*(1), 7-20. https://doi.org/10.1177/2319510X19872632

Bastian, K. H. (1995). *Empowering principal leadership in democratic schools* [Unpublished doctoral dissertation]. Texas Tech University.

Batugal, L. C., & Tindowen, D. J. C. (2019). Influence of organizational culture on teachers' organizational commitment and job satisfaction: The case of catholic higher education institutions in the Philippines. *Universal Journal of Educational Research 7*(11), 2432-2443. https://doi.org/10.13189/ujer.2019.071121

Beycioğlu, K., & Aslan, B. (2010). Öğretmen liderliği ölçeği: Geçerlik ve güvenirlik çalışması. *İlköğretim Online, 9*(2), 764-775.

Blase, J., & Blase, J. (1996). Facilitative school leadership and teacher empowerment: Teacher's perspectives. *Social Psychology of Education, 1*, 117-145.

Blase, J., & Blase, R. R. (2001). *Empowering teachers: What successful principals do (2nd ed.)*. Thousand Oaks, CA: Corwin Press.

Bogler, R. (2005). The power of empowerment: Mediating the relationship between teachers' participation in decision making and their professional commitment. *Journal of School Leadership, 15*(1), 76-98. https://doi.org/10.1177/105268460501500104

Bogler, R., & Berkovich, I. (2020). A systematic review of empirical evidence on teachers' organizational commitment 1994-2018. *Leadership and Policy in Schools,* https://doi.org/10.1080/15700763.2020.1774783

Bogler, R., & Nir, A. E. (2012). The importance of teachers' perceived organizational support to job satisfaction. *Journal of Educational Administration, 50*(3), 287-306. https://doi.org/10.1108/09578231211223310

Bogler, R., & Somech, A. (2004). Influence of teacher empowerment on teachers organizational commitment, professional commitment and organizational citizenship behavior in schools. *Teaching and Teacher Education, 20*, 277-289. https://doi.org/10.1016/j.tate.2004.02.003

Boonyarit, I., Chomphupart, S., & Arin, N. (2010). Leadership, empowerment, and attitude outcomes. *The Journal of Behavioral Science, 5*(1), 1-14.

Borman, W. C., & Motowidlo, S. J. (1997). Task performance and contextual performance: The meaning for personnel selection research. *Human Performance, 10*(2), 99-109.

Boz, D., Duran, C., & Uğurlu, E. (2021). Örgütsel bağlılığın iş performansına etkisi. *MANAS Sosyal Araştırmalar Dergisi, 10*(1), 345-355.

Byrne, B. M. (2016). *Structural equation modeling with Amos: Basic concepts, applications, and programming.* New York: Routledge.

Carter, A. (2016). Empowering middle leaders - trends in school leadership research on the principal's impact on school effectiveness. *Australian Educational Leader, 38*(1), 37-41.

Celep, C. (2000). Teachers' organizational commitment in educational organizations. *National FORUM of Teacher Education Journal, 10E*(3), 2-21.

Çelik, O. T., & Konan, N. (2020). Okul müdürlerinin güçlendirici liderliği ile öğretmenlerin özyeterliği ve örgütsel vatandaşlık davranışları arasındaki ilişki. *Eğitim ve Bilim, Erken Görünüm*, 1-21. https://doi.org/10.15390/EB.2020.8841

Çelik, O. T., & Üstüner, M. (2020). Ortaokul öğretmenlerinin örgütsel politika algıları ile örgütsel bağlılıkları ve örgütsel vatandaşlık davranışları arasındaki ilişki. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 35*(1), 120-135. https://doi.org/10.16986/HUJE.2018044109

Cerit, Y. (2012). Lider-üye etkileşimi ile öğretmenlerin performansları arasındaki ilişki. *Balıkesir University the Journal of Social Sciences Institute, 15*(28), 33-45.

Cerit, Y., & Yıldırım, B. (2017). İlkokul müdürlerinin etkili liderlik davranışları ile okul etkililiği arasındaki ilişki. *Bartın Üniversitesi Eğitim Fakültesi Dergisi, 6*(3), 902-914. https://doi.org/10.14686/buefad.312405

Chaithra, V. K., & Hiremath, U. S. (2018). Job Performance of primary and secondary school teachers. *International Journal of Pure & Applied Bioscience, 6*(2), 854-860. https://doi.org/10.18782/2320-7051.6387

Charbonnier-Voirin, A., & Roussel, P. (2012). Adaptive performance: A new scale to measure individual performance in organizations. *Canadian Journal of Administrative Sciences, 29*, 280-293.

Cheong, M., Spain, S. M., Yammarino, F. J., & Yun, S. (2016). Two faces of empowering leadership: Enabling and burdening. *Leadership Quarterly, 27*, 602-616. https://doi.org/10.1016/j.leaqua.2016.01.006

Cohen, L., Manion, L., & Morrison, K. (2005). *Research methods in education (5th Ed.).* London: Routledge Falmer.

Çöl, G. (2008). Algılanan güçlendirmenin işgören performansı üzerine etkileri. *Doğuş Üniversitesi Dergisi, 9*(1), 35-46.

Collier, J. E. (2020). *Applied structural equation modeling using AMOS*. New York: Routledge.

Croswell, L. (2006). *Understanding teacher commitment in times of change* [Unpublished doctoral dissertation]. Queensland University of Technology.

Dağlı, A., Elçiçek, Z., & Han, B. (2018). Örgütsel bağlılık ölçeği'nin Türkçeye uyarlanması: Geçerlik ve güvenirlik çalışması. *Elektronik Sosyal Bilimler Dergisi , 17*(68), 1788-1800 . https://doi.org/10.17755/esosder.445932

Davis, J., & Wilson, S. M. (2000). Principals' efforts to empower teachers: effects on teacher motivation and job satisfaction and stress. *The Clearing House: A Journal*

of Educational Strategies, Issues and Ideas, 73(6), 349-353. https://doi.org/10.1080/00098650009599442

Demir, S. (2019). Etik iklim ve okuldan ayrılma niyeti arasındaki ilişki: Örgütsel bağlılığın aracılık rolü. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 34*(3), 824-838. https://doi.org/10.16986/HUJE.2018040551

Demirtaş, Z. (2014). The relationship between job satisfaction and organizational commitment: A study on elementary schools. *Kastamonu Eğitim Dergisi, 23*(1), 253-268.

Dennerlein, T. (2017). *Empowering leadership and employees' achievement motivations: The role of self-efficacy and goal orientations in the empowering leadership process* [Unpublished doctorate dissertation]. Erasmus University Rotterdam.

Devos, G., Tuytens, M., & Hulpia, H. (2014). Teachers' organizational commitment: Examining the mediating effects of distributed leadership. *American Journal of Education*, *120*(2), 205-231.

Dilekçi, Ü., & Sezgin Nartgün, Ş. (2020). Güçlendirici liderlik. In K. Yılmaz (Ed.), *Liderlik, kuram-uygulama-araştırma* (pp.293-309). Pegem Akademi.

Doğan, H., & Çelik, K. (2019). The relation between school administrators' use of power styles and teachers' organizational commitment and their job performance. *Eğitim ve Bilim, 44*(198), 37-55. https://doi.org/10.15390/EB.2019.7943

Duze, C. O. (2012). Leadership styles of principals and job performance of staff in secondary schools in delta state of Nigeria. *An International Journal of Arts and Humanities*, *1*(2), 224-245.

Elmazi, E. (2018). The role of principal's power and teacher empowerment. *European Scientific Journal October*, *14*(28), 1-14.

Field, A. (2009). *Discovering statistics using SPSS*. Los Angeles: Sage Publications.

Firestone, W. A., & Pennell, J. R. (1993). Teacher commitment, working conditions, and differential incentive policies. *Review of Educational Research*, *63*(4), 489-525.

Firestone, W. A., & Rosenblum, S. (1988). Building commitment in urban high schools. *Educational Evaluation and Policy Analysis*, *10*(4), 285-299.

Flynn, A. A. (2000). *Dimensions of faculty organizational commitment related to tenure, performance and turnover intention* [Unpublished doctorate dissertation]. University of Illinois.

Fogaça, N., Rego, M. C. B., Melo, M. C. C., Armond, P. L., & Coelho, F. A. (2018). Job performance analysis: Scientific studies in the main journals of management and psychology from 2006 to 2015. *Performance Improvement Quarterly*, *30*(4), 231-247. https://doi.org/10.1002/piq.21248

Fresko, B., Kfir, D., & Nasser, F. (1997). Predicting teacher commitment. *Teaching and Teacher Education*, *13*(4), 429-438.

Gkorezis, P. (2016). Principal empowering leadership and teacher innovative behavior: a moderated mediation model. *International Journal of Educational Management*, *30*(6), 1030-1044. https://doi.org/10.1108/IJEM-08-2015-0113

Gordon, S. D. (2018). *Leadership's role in teachers' commitment and retention: A case study analysis* [Unpublished doctorate dissertation]. Delaware State University.

Gretkierewicz, K. G. (2020). *Relationships of empowerment and experience with organizational commitment in Arizona middle school teachers* [Unpublished doctorate dissertation]. Grand Canyon University.

Griffin, M. A., Neal, A., & Neale, M. (2000). The contribution of task performance and contextual performance to effectiveness: Investigating the role of situational constraints. *Applied Psychology: An International Review, 49*(3), 517-533.

Gümüş, A. (2013). *İlkokul yöneticilerinde güçlendirici liderlik davranışları ile öğretmenlerde örgütsel bağlılık ilişkisi: Psikolojik güçlendirmenin aracılık rolü* (Ankara ili örneği) [Yayımlanmamış yüksek lisans tezi]. Gazi Üniversitesi.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis*. Essex: Pearson.

Hamid, S. F., Nordin, N., Adnan, A. A., & Sirun, N. (2013). A study on primary school teachers' organizational commitment and psychological empowerment in the district of Klang. *Procedia - Social and Behavioral Sciences, 90*(2013), 782-787. https://doi.org/10.1016/j.sbspro.2013.07.152

Hao, P., He, W., & Long, L. (2018). Why and when empowering leadership has different effects on employee work performance: The pivotal roles of passion for work and role breadth self-efficacy. *Journal of Leadership & Organizational Studies, 25*(1) 85-100 https://doi.org/10.1177/1548051817707517

Holliman, S. L. (2012). *Exploring the effects of empowerment, innovation, professionalism, conflict, and participation on teacher organizational commitment* [Unpublished doctorate dissertation]. University of Iowa.

Humborstad, S. I. W., Nerstad, C. G. L., & Dysvik, A. (2014). Empowering leadership, employee goal orientations and work performance: A competing hypothesis approach. *Personnel Review, 43*(2), 246-271. https://doi.org/10.1108/PR-01-2012-0008

Kariuki, A., & Kiambati, K. (2017). Empowerment, organizational commitment, organization citizenship behavior and firm performance. *Management Studies, 5*(4), 290-300. https://doi.org/10.17265/2328-2185/2017.04.003

Kim, M., & Beehr, T. A. (2020). Empowering leadership: leading people to be present through affective organizational commitment? *The International Journal of Human Resource Management*. 31(16), 2017-2044, https://doi.org/10.1080/09585192.2018.1424017

Kirkman, B. L., & Rosen, B. (1999). Beyond self-management: Antecedents and consequences of team empowerment. *Academy of Management Journal, 42*(1), 58-74.

Kline, R. B. (2011). *Principles and practice of structural equation modeling (3rd ed.)*. New York: Guilford Press.

Knezovic, E., & Musrati, M. A. (2018). Empowering leadership, psychological empowerment, and employees' creativity: A gender perspective. *International Journal of Innovation, Creativity and Change, 4*(2), 51-72.

Koçak, S., & Burgaz, B. (2017). Ortaöğretim kurumlarındaki psikolojik sözleşme üzerinde güçlendirici liderlik davranışlarının rolü. *Eğitim ve Bilim, 42*(191), 351-369. https://doi.org/10.15390/EB.2017.7101

Kõiv, K., Liik, K., & Heidmets, M. (2019). School leadership, teacher's psychological empowerment and work-related outcomes. *International Journal of Educational Management, 33*(7), 1501-1514. https://doi.org/10.1108/IJEM-08-2018-0232

Konan, N., & Çelik, O. T. (2018). Güçlendirici liderlik ölçeğinin eğitim örgütleri için Türkçe'ye uyarlaması: Geçerlik ve güvenirlik çalışması. *Kastamonu Education Journal, 26*(4), 1043-1054. https://doi.org/10.24106/kefdergi.434140

Konczak, L. J., Stelly, D. J., & Trusty, M. L. (2000). Defining and Measuring Empowering Leader Behaviors: Development of an upward feedback. Educational and *Psychological Measurement, 60*(2), 301-313. https://doi.org/10.1177/00131640021970420

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., Vet, H. C., & Beek, A. J. (2011). Conceptual frameworks of individual work performance: A systematic review. *Journal of Occupational and Environmental Medicine, 53*(8), 856-866. https://doi.org/10.1097/JOM.0b013e318226a763

Kundu, S. C., Kumar, S., & Gahlawat, L. (2019). Empowering leadership and job performance: mediating role of psychological empowerment. *Management Research Review, 42*(5), 605-624. https://doi.org/10.1108/MRR-04-2018-0183

Kushman, J. W. (1992). The organizational dynamics of teacher workplace commitment: A study of urban elementary and middle schools. *Educational Administration Quarterly, 28*(1), 5-42.

Laily, N., & Wahyuni, D. U. (2017). Teacher performance based on stress and organizational commitment. *International Journal of Scientific and Research Publications, 7*(12), 192-199.

Lavrakas, P. J. (Ed.) (2008). *Encyclopedia of survey research methods* (Volume 1 & 2). Sage.

Lee, A. N., & Nie, Y. (2013). Development and validation of the school leader empowering behaviours (SLEB) scale. *The Asia-Pacific Education Researcher, 22*(4), 485-495. https://doi.org/10.1007/s40299-012-0047-8

Lee, A. N., & Nie, Y. (2016). Teachers' perceptions of school leader empowering behaviors on psychological empowerment: A moderated path analysis. *New Waves Educational Research & Development, 19*(2), 36-58.

Lestari, L., & Yunianto, A. (2015). The effect of empowerment on employee performance with organizational commitment as mediating variable and organizational culture as moderation variable. *2nd Conference in Business, Accounting and Management*, 2(1), 335-343.

Liu, Y. (2015). The Review of empowerment leadership. *Open Journal of Business and Management,3*, 476-482. https://doi.org/10.4236/ojbm.2015.34049

Lutsilili, A. S., Daniel, W., & Benson, M. (2014). Effect of teacher empowerment on public secondary school performance in Nakuru Town East Constituency, Kenya. *International Journal of Science and Research, 3*(5), 1517-1522.

Luyten, H., & Bazo, M. (2019). Transformational leadership, professional learning communities, teacher learning and learner centered teaching practices: Evidence on their interrelations in Mozambican primary education. *Studies in Educational Evaluation, 60*(2019), 14-31. https://doi.org/10.1016/j.stueduc.2018.11.002

Mailool, J., Kartowagiran, B., Retnowati, T. H., Wening, S., & Putranta, H. (2020). The effects of principal's decision-making, organizational commitment and school climate on teacher performance in vocational high school based on teacher perceptions. *European Journal of Educational Research, 9*(4), 1675-1687. https://doi.org/10.12973/eu-jer.9.4.1675

Manz, C. C., & Sims, H. P., Jr. (1989). *Superleadership: Leading others to lead themselves*. Englewood Cliffs, NJ: Prentice-Hall.

Manz, C. C., & Sims, H. P., Jr. (1991). Superleadership: Beyond the myth of heroic leadership. *Organizational Dynamics, 19*, 18-35.

Maxfield, C. R., & Flumerfelt, S. (2009). The empowering principal: leadership behaviors needed by effective principals as identified by emerging leaders and principals. *International Journal of Teacher Leadership, 2*(2), 39-48.

May, H., & Supovitz, J. A. (2011). The scope of principal efforts to improve instruction. *Educational Administration Quarterly, 47*(2), 332-352. https://doi.org/10.1177/0013161X10383411

Mertens, D. M. (2010). *Research and evaluation in education and psychology (3rd Edition).* Los Angeles: Sage.

Meyer, J. P., & Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Human Resource Management Review, 1*(1), 61-89.

Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: theory, research and application*. Thousand Oaks: Sage Publications.

Meyer, J. P., Allen, N. J., & Smith, C. A. (1993). Commitment to organizations and occupations: extension and test of a three-component conceptualization. *Journal of Applied Psychology, 78*(4), 538-551.

Mgbere, B. C., & Andrew, M. V. (2019). Time management and female teachers' job performance in junior secondary schools in Rivers State. *International Journal of Innovative Psychology & Social Development, 7*(1), 50-56.

Moran, K. A. (2015). *Teacher empowerment: School administrators leading teachers to lead* [Unpublished doctorate dissertation]. Youngstown State University.

Motowidlo, S., & Kell, H. J. (2013). Job performance. In N. W. Schmitt, & S. *Highhouse, handbook of psychology: Industrial and organizational psychology* (Volume 12) (pp. 82-103). New Jersey: John Wiley & Sons.

Muhammad, I. G., & Abdullah, H. H. (2016). Assessment of organizational performance: Linking the motivational antecedents of empowerment, compensation, and organizational commitment. *International Review of Management and Marketing, 6*(4), 974-983.

Muhammad, N., & Hussain Ch., A. (2020). Relationship of teachers' empowerment and organizational commitment at secondary school level in Punjab. *Bulletin of Education and Research, 42*(2), 69-80.

Muzvidziwa, I. (2014). Principalship as an empowering leadership process: The experiences of women school heads in Zimbabwe. *The Anthropologist, 17*(1), 213-221. https://doi.org/10.1080/09720073.2014.11891431

Ndoye, A., Imıg, S. M., & Paker, M. A. (2010). Empowerment, leadership, and teachers intentions to stay in or leave the profession or their schools in North Carolina charter schools. *Journal of School Choice, 4*, 174-190. https://doi.org/10.1080/15582159.2010.483920

Önder, M. E., Akçıl, U., & Cemaloğlu, N. (2019). The relationship between teachers' organizational commitment, job satisfaction and whistleblowing. *Sustainability. 11*(21), 1-22. https://doi.org/10.3390/su11215995

Osagie, C. I., & Akinlosotu, N. T. (2017). Causal relationship between teachers' job performance and students' academic achievement in secondary schools in Nigeria. *African Research Review, 11*(4), 45-54. https://doi.org/10.4314/afrrev.v11i4.5

Özdemir, M., & Gören, S. Ç. (2017). Mediating role of organizational commitment in leadership coherence, psychological empowerment, and teacher performance relationship. *Elementary Education Online, 16*(1), 342-353. https://doi.org/10.17051/io.2017.47449

Özdemir, M., & Yirmibeş, A. (2016). Okullarda liderlik ekibi uyumu ve öğretmen performansı ilişkisinde iş doyumunun aracı etkisi. *Gazi Üniversitesi Eğitim Fakültesi Dergisi, 36*(2), 323-348.

Özgenel, M., & Koç, M. H. (2020). An Investigation on the relationship between teachers' occupational commitment and school effectiveness. *International Journal of Eurasian Education and Culture*, 5(8), 494-530.

Pan, H. L. W. (2007). Principal leadership which empowers teachers. *5th International Conference on Education and Information Systems, Technologies, and Applications*. Orlando, Florida, U.S.A.

Park, I. (2005). Teacher commitment and its effects on student achievement in American high schools. *Educational Research and Evaluation: An International Journal on Theory and Practice, 11*(5), 461-485. https://doi.org/10.1080/13803610500146269

Pearce, C. L., Sims, H. P., Cox, J. F., Ball, G., Schnell, E., Smith, K. A., & Trevino, L. (2003). Transactors, transformers and beyond: A multi-method development of a theoretical typology of leadership. *Journal of Management Development, 22*(4), 273-307. https://doi.org/10.1108/02683941311300252

Pearson, L. C., & Moomaw, W. (2005). The relationship between teacher autonomy and stress, work satisfaction, empowerment, and professionalism. *Educational Research Quarterly, 29*(1), 38-54.

Polat, Ş. (2019). Öğretim doyumu ve iş performansı ilişkisinin öğretmen görüşlerine göre incelenmesi. *Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 19*(2), 641-651.

Polat, Ş., & Abaslı, K. (2019). Öğretmen algılarına göre örgütsel özdeşleşme, iş performansı ve psikolojik kırılganlık arasındaki ilişki. S. Olkun, M. E. Deniz, M.Toran, M. H. Sarı, H. Kamışlı (Ed.) *İlköğretim çalışmaları: Bütünsel açıdan çocuk* içinde (ss. 451-475). Pegem Akademi: Ankara.

Princy, K., & Rebeka, E. (2019). Employee commitment on organizational performance. *International Journal of Recent Technology and Engineering, 8*(3), 891-895. https://doi.org/10.35940/ijrte.C4078.098319

Ramos-Villagrasa, P. J., Barrada, J. R., Fernández-del-Río, E., & Koopmans, L. (2019). Assessing job performance using brief self-report scales: The case of the Individual Work Performance Questionnaire. *Journal of Work and Organizational Psychology, 35*(3), 195-205. https://doi.org/10.5093/jwop2019a21

Reitzug, U. C. (1994). A case study of empowering principal behavior. *American Educational Research Journal, 31*(2), 283-307.

Sackett, P. R., & DeVore, C. J. (2005). Counterproductive behaviors at work. In N. Anderson, D. S. Ones, H. K. Sinangil, C. Viswesvaran (eds.), *Handbook of industrial, work and organizational psychology* (pp. 145-164). London: Sage Publications.

Selamat, N., Nordin, N., & Adnan, A. A. (2013). Rekindle teacher's organizational commitment: The effect of transformational leadership behavior. *Procedia-Social and Behavioral Sciences, 90*(2013), 566-574. https://doi.org/10.1016/j.sbspro.2013.07.127

Setwong, R., & Prasertcharoensuk, T. (2013). The influence of instructional leadership of school administrators on school effectiveness. *Procedia - Social and Behavioral Sciences, 106*(2013), 2859-286. https://doi.org/10.1016/j.sbspro.2013.12.331.

Sharma, S., Mukherjee, S., Kumar, A., & Dillon, W. R. (2005). A simulation study to investigate the use of cutoff values for assessing model fit in covariance structure models. *Journal of Business Research, 58*(7), 935-943. https://doi.org/10.1016/j.jbusres.2003.10.007

Sheikh, L. (2017). Antecedents and consequences of organizational commitment of teachers: Case of University of the Punjab. *Pakistan Economic and Social Review, 55*(2), 391-414.

Short, P. M. (1994). Defining teacher empowerment. *Education, 114*(4), 488-492.

Short, P. M., Greer, J. T., & Melvin, W. M. (1994). Creating empowered schools: Lessons in change. *Journal of Educational Research, 32*(4), 38-52.

Short, P. M., & Rinehart, J. S. (1992). School participant empowerment scale: Assessment of level of empowerment within the school environment. *Journal of Educational and Psychological Measurement, 52*(4), 951-960.

Sigler, T. H., & Pearson, C. M. (2000). Creating an empowering culture: Examining the relationship between organizational culture and perceptions of empowerment. *Journal of Quality Management, 5*, 27-52.

Singh, K. (2007). *Quantitative social research methods.* New Delhi: Sage Publications.

Singh, K., & Billingsley, B. (1998). Professional support and its effects on teachers' commitment. *Journal of Educational Research, 91*, 229-239.

Slater, R. O., & Teddlie, C. (1992). Toward a theory of school effectiveness and leadership. *School Effectiveness and School Improvement, 3*(4), 247-257. https://doi.org/10.1080/0924345920030402

Somech, A. (2005). Teachers' personal and team empowerment and their relations to organizational outcomes: Contradictory or compatible constructs? *Educational*

Administration Quarterly, 41(2), 237-266. https://doi.org/10.1177/0013161X04269592

Sonnentag, S., Volmer, J., & Spychala, A. (2008). *Job Performance*. In J. Barling, & C. L. Cooper, The Sage Handbook of Organizational Behavior: Volume 1 Micro Perspectives (pp. 427-447). London: Sage Publications.

Tatlah, I. A., & Iqbal, M. Z. (2012). Leadership styles and school effectiveness: Empirical evidence from secondary level. Procedia - Social and Behavioral Sciences, 69(2012), 790-797. https://doi.org/10.1016/j.sbspro.2012.11.474

Terry, P. M. (1995). Empowerment. *National Forum of Education Administration and Supervision Journal, 12*(3), 13-24.

Thung, H-L., & Chang, Y-H. (2011). Effects of empowering leadership on performance in management team: Mediating effects of knowledge sharing and team cohesion. *Journal of Chinese Human Resource Management, 2*(1), 43-60. https://doi.org/ 10.1108/20408001111148720.

Töre, E. (2019). Öğretmenlerin örgüte duydukları duygusal bağlılıklarının tanımlanmış ve tanımlanmamış rol davranışları üzerindeki etkisinin incelenmesi. *Kastamonu Eğitim Dergisi, 27*(5), 2015-2025. https://doi.org/10.24106/kefdergi.3242

Tsui, K. T., & Cheng, Y. C. (1999). School organizational health and teacher commitment: A contingency study with multi-level analysis. *Educational Research and Evaluation, 5*(3), 249-268. https://doi.org/10.1076/edre.5.3.249.3883

Tung, H. L., & Chang, Y. H. (2011). Effects of empowering leadership on performance in management team: Mediating effects of knowledge sharing and team cohesion. *Journal of Chinese Human Resources Management, 2*(1), 43-60. https://doi.org/10.1108/20408001111148720

Uygur, K., & Arabacı, İ. (2019). Lise öğretmenlerinin personel güçlendirme algıları ile örgütsel güven algıları arasındaki ilişki: Elazığ ili örneği. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi, 16*(1), 744-770. https://doi.org/10.23891/efdyyu.2019.140

Van Scotter, J. R., Motowidlo, S. J., & Cross, T. C. (2000). Effects of task performance and contextual performance on systematic rewards. *Journal of Applied Psychology, 85*(4), 526-535.

Vecchio, R. P., Justin, J. E., & Pearce, C. L. (2010). Empowering leadership: An examination of mediating mechanisms within a hierarchical structure. *The Leadership Quarterly, 21*(2010), 530-542. https://doi.org/10.1016/j.leaqua.2010.03.014

Visanh, P., & Xu, H. (2018). Factors affecting organizational commitment of employees of Lao development bank. *Sociology International Journal, 2*(6), 809-818. https://doi.org/10.15406/sij.2018.02.00141

Wu, V., & Short, P. M. (1996). The relationship of empowerment to teacher job commitment and job satisfaction. *Journal of Instructional Psychology, 23*(1), 85-89.

Yao, J., You, Y., & Zhu, J. (2020). Principal-teacher management communication and teachers' job performance: The mediating role of psychological empowerment and affective commitment. *Asia-Pacific Education Researcher, 29*(4), 365-375. http://dx.doi.org/10.1007/s40299-019-00490-0

Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: The influence of psychological empowerment, intrinsic motivation, and creative process engagement. *Academy of Management Journal, 53*(1), 107-128.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research, 37*(2), 197-206. https://doi.org/10.1086/651257

Zhu, J., Yao, J., & Zhang, L. (2019). Linking empowering leadership to innovative behavior in professional learning communities: The role of psychological empowerment and team psychological safety. *Asia Pacific Education Review, 20,* 657-671. https://doi.org/10.1007/s12564-019-09584-2

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Mindfulness, Problem-solving Skills and Academic Achievement: Do Perceived Stress Levels Matter?

Bilinçli Farkındalık, Problem Çözme Becerisi ve Akademik Başarı: Algılanan Stres Düzeyi Önemli Mi?

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ABSTRACT: This study examines the relationship between higher education students' perceived stress levels, and their problem solving skills, awareness levels and academic achievement. Also, the mediating role of mindfulness levels and problem-solving skills on the association between perceived stress level and academic achievement was investigated. The research was designed according to the correlational research design, one of the quantitative research methods. The participants of the study consisted of 938 higher education students. For data collection, three different questionnaires were administered to the participants. In addition, the personal information form prepared by the researcher was used to obtain the students' demographic characteristics and grade point averages (GPA). The results showed that there was a significant negative relationship between perceived stress levels of higher education students and their mindfulness, problem solving skills, and academic achievement. Also, it was found that mindfulness and problem-solving skills had a mediating role in the association between perceived stress level and academic achievement. Based on the findings of the study, it was concluded that mindfulness-based approaches and problem-solving skills are important for higher education students to reduce their stress levels and increase academic success. The limitations and recommendations for future research are discussed.

Keywords: Academic achievement, problem-solving skills, mindfulness, perceived stress, higher education students.

ÖZ: Bu çalışma yükseköğretim öğrencilerinin algılanan stres düzeyleri ile problem çözme becerileri, bilinçli farkındalık düzeyleri ve akademik başarıları arasındaki ilişkiyi incelemeyi amaçlamaktadır. Ayrıca algılanan stres düzeyi ile akademik başarı arasındaki ilişkide bilinçli farkındalığın ve problem çözme becerisinin aracılık rolü araştırılmıştır. Araştırma, nicel araştırma yöntemlerinden ilişkisel tarama modeline göre tasarlanmıştır. Araştırmanın katılımcıları 938 yükseköğretim öğrencisinden oluşmaktadır. Veri toplama aracı olarak katılımcılara üç farklı ölçek uygulanmıştır. Ayrıca araştırmada öğrencilerin demografik özelliklerini ve yılsonu not ortalamalarını (GNO) elde etmek için araştırmacı tarafından hazırlanan kişisel bilgi formu kullanılmıştır. Sonuçlar, yükseköğretim öğrencilerinin algılanan stres düzeyleri ile bilinçli farkındalıkları, problem çözme becerileri ve akademik başarıları arasında anlamlı negatif bir ilişki olduğunu göstermiştir. Ayrıca algılanan stres düzeyi ile akademik başarı arasındaki ilişkide bilinçli farkındalık ve problem çözme becerilerinin aracı rolü olduğu bulunmuştur. Araştırmanın bulgularına göre farkındalık temelli yaklaşımların ve problem çözme becerilerinin yükseköğretim öğrencilerinin stres düzeylerini azaltarak akademik başarılarının artması açısından önemli olduğu belirlenmiştir. Gelecekteki araştırmalar için bazı sınırlılıklar ve öneriler tartışılmıştır.

Anahtar kelimeler: Akademik başarı, problem çözme becerileri, bilinçli farkındalık, algılanan stres, yükseköğretim öğrencileri.

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Stress has become a common denominator in dynamic, more developed, and complex societies. According to Lazarus and Folkman (1984), "stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being". The effects of stress are directly related to one's threat perceptions, vulnerability, and coping skills. Although stress helps individuals achieve success at a normal level, it causes many physiological and psychological issues when it becomes chronic (Patel, 1989). More specifically, performance loss is observed in the execution of neural systems related to learning and memory in the brain when individuals produce a response to high stress (Gürbüzer, 2016), which results in a negatively influenced learning process. Therefore, high level of stress not only impairs the health and well-being of an individual but also causes a decrease in academic success (Bernal-Morales et al., 2015; Elias et al., 2011). In addition, stress causes a decrease in motivation (Liu, 2015) and an increase in dropout rates (Walburg, 2014). Studies indicated that higher education students' stress levels are critically high (Pascoe et al., 2020), which can negatively influence the learning process in those higher education institutions.

There exist many factors that affect students' stress levels. According to the transactional stress model of Lazarus and Folkman (1984), individuals experience stress based on how they evaluate the situation they are in. According to the model, when individuals face a stressor, they evaluate it to determine whether it is stressful, positive, controllable, or irrelevant. If it is stressful, then they examine their coping skills by considering balance of demands (e.g., risks, challenge, and uncertainty) and available resources (e.g., social support and expertise). Stress increases in situations when demands are more than resources (Lazarus & Folkman, 1984). Another situation that causes higher education students to feel stress is their separation from family and increased academic demands (Pascoe et al., 2020). Also, a significant relationship was observed between low life quality and well-being and stress (Ribeiro et al., 2018). Students' high stress levels are also related to serious health problems such as depression and anxiety (Moylan et al., 2013). In addition, major stressful life events are one of the predictors of the onset of depression (Kessler, 1997). In a study conducted in the United States, it was determined that students who reported constant stress regarding the admission process in higher education institutions and academic expectations during higher education tend to use drugs and alcohol at a high rate (Leonard et al., 2015). Stress also is related to sleep disorder among adolescents (Curcio et al., 2006; Wallace et al., 2017). The abovementioned studies revealed that stress has negative effects on higher education students.

One of the most commonly used methods in studies focusing on stress is to determine the perceived stress levels of individuals (Vallejo et al., 2018). Perceived stress is related to the individual's personal feelings or thoughts about to what extent he/she is under stress in a certain time period (Phillips, 2013). The concept of perceived stress has a dynamic and multidimensional structure due to the fact that perceptions include physical, psychological, and psychosocial aspects and have both cultural and social dimensions (Moore & Cooper, 1996). In this context, individuals' perceived stress levels and reactions are directly influenced by various variables, including their personality traits, lifestyles, social support, life events, socio-demographic characteristics, and occupation (Feizi et al., 2012). As a result, the variation in

individuals' stress levels and their reactions to similar situations is explained by the concept of perceived stress (Cohen et al., 1983). The studies in the literature reveal that perceived stress is negatively associated with mindfulness (Atanes et al., 2015), problem-solving skills (Largo-Wight et al., 2005), self-efficacy (Han, 2005; Park et al., 2008), life satisfaction (Lee et al., 2016), happiness (Schiffrin & Nelson, 2010), and academic achievement. Therefore, individuals' perceived stress levels include individual differences and may have negative effects on them.

Considering the negative effects of stress on learners, it is critical to diagnose stress and investigate its relation with certain factors, one of which is individuals' mindfulness levels. Perhaps the most widely used definition of mindfulness is "paying attention in a particular way: on purpose, in the present-moment and non-judgmentally" (Kabat-Zinn, 1990). Mindfulness helps people reduce their negative thoughts and feelings without making any judgment and decrease their emotional difficulties and distress (Gilbert, 2005). It encourages individuals to react less emotionally to external stressors (Arch & Craske, 2010) and repetitive thoughts (Feldman et al., 2010). As a result, individuals tend to accept them as they are rather than attempting to change their emotional experiences (Lutz et al., 2008). A high level of mindfulness contributes positively to individuals' mental health, relationship satisfaction, and coping with stress (Brown et al., 2009). Mindfulness is also related to psychological well-being (Deniz et al., 2017). Mindfulness, which is also effective in regulating emotions, supports individuals to perceive and regulate their or others' emotions appropriately (Koole, 2009). Moreover, Mindfulness-based Stress Reduction Methods (MBSR) effectively reduce individuals' stress levels (Kabat-Zinn, 1990; Shapiro et al., 2005). As a result of the "Mindfulness-Based Stress Reduction" program applied by Miller et al. (1995) to patients with anxiety disorders, it was found that individuals' stress levels and anxiety symptoms significantly decreased. Furthermore, it is stated that students with high level of mindfulness are more successful in coping with stress (Weinstein et al., 2009) and experience less depression and anxiety issues (Allen et al., 2017; Egan & Mantzios, 2018). Mindfulness also has a positive influence on one's well-being both physically and mentally (Horan & Taylor, 2018). Conversely, a low level of mindfulness can cause, for instance, a lower level of motivation, which can result in depression or anxiety (Keng et al., 2011). Thus, intervention programs focusing on mindfulness and compassion can support individuals to overcome some mental health issues (Wamsler, 2018). Based on the discussions above, it is considered that mindfulness is a critical factor that influences individuals' stress levels.

Another variable that is effective on stress is individuals' problem-solving skills (Abdollahi et al., 2018). Specifically, interventions on learners' problem solving skills can decrease students' stress levels and increase self-efficacy (Moattari et al., 2001). The problem-solving process includes cognitive and behavioral dimensions that contain higher order thinking, such as determining, choosing, and making decisions about effective solutions (D'Zurilla & Nezu, 2001). There can be individual differences in the organization and execution of these dimensions (Lazarus & Folkman, 1984), resulting in individuals reacting differently to problems they encounter. For instance, in case of a problematic situation, individuals may pretend that there is no problem, delay decisions, ask others to find solutions, and/or wait for the problem to be solved on its own (Korkut, 2002). When the problem-solving skills are not developed sufficiently or are

not used effectively, psychological disorders such as depression, anxiety, and stress can develop (D'Zurilla & Nezu, 2007). In addition, problem solving skills are significantly related to individuals' stress perceptions (Heppner et al., 2004) and stress levels (Abdollahi et al., 2018). Moreover, problem solving skills serve as a shield in negative situations to protect individuals (Klaassens, 1992). Studies in the literature show that stress and problem solving skills are interrelated.

As seen above, mindfulness (Bishop, 2002; Carmody & Baer, 2008; Grossman et al., 2004; Janssen et al., 2018; Shapiro et al., 2005) and problem-solving skills (Braun-Lewensohn et al., 2014; Largo-Wight et al., 2005; Tan et al., 2019; Yu, 2018) have an important effect in reducing the stress level of students. However, there can be a two-way relationship between mindfulness and problem-solving skills and stress. While it is thought that an individual with a high level of mindfulness can keep the stress level under control, the mindfulness level of an individual with a high level of stress can decrease and this decrease can cause more stress (Arslan, 2018). Similarly, the relationship between problem-solving skills and stress levels can differ in terms of cause and effect. While problem-solving skills can be a factor in reducing stress levels, an increase in stress level can be associated with a decrease in problem-solving skills. The perceived stress level can cause students' important skills, including mindfulness (Von der Heyde, 2017) and problem-solving skills (Hittinger, 2018), to be dysfunctional, which results in uncontrollable and increasing stress. This situation can negatively affect academic achievement (Khan et al., 2013) and, as a result, career planning (Infantolino, 2017) and future expectations (Florêncio et al., 2017). While an optimal level of stress can advance individuals' learning skills (Kaplan & Sadock, 2000), high levels of stress can cause physical and mental health problems (Niemi & Vainiomäki, 1999) and decrease students' academic achievement (Elliot et al., 2005; Hofer, 2007; Trautwein et al., 2006). Although a number of strategies are used to control students' stress levels, in some cases, it is very difficult to administer stress-reducing interventions. Especially, the current COVID-19 epidemic has significant influences on individuals' stress level (Brooks et al., 2020) and, in turn, affects their academic achievement (Marinoni et al., 2020). This may be explained through the fact that high level of stress negatively stimulates learning and memory, which negatively influences academic achievement (Mehfooz & Haider, 2017; Sindhu, 2016; Sohail, 2013). Therefore, it is critical to determine the effective factors in controlling high stress. Many studies in the literature focus on mindfulness (Hede, 2017; Olendzki et al., 2020; Sagui-Henson et al., 2018) and problem-solving skills (Chew-Graham et al., 2003; Gupta et al., 2015) and their effects on stress. However, the possible effects of stress on mindfulness and problem-solving skills were not examined sufficiently. In addition to this, examining whether mindfulness and problem-solving skills are effective in reducing the negative effect of stress on academic achievement may be important in terms of the efficiency of teaching and learning activities.

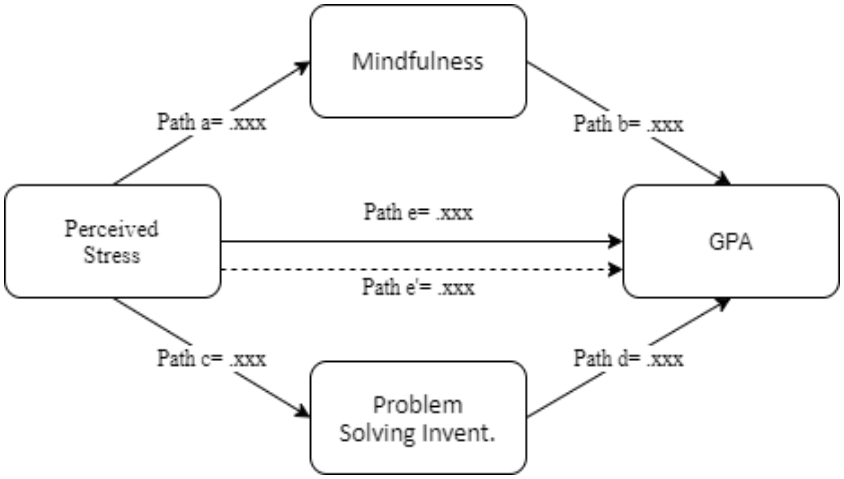
Current Research

Based upon the aforementioned theoretical and empirical literature, several questions need to be investigated regarding the relationship between perceived stress, academic achievement, mindfulness, and problem-solving skills in the context of higher education students. Consequently, the primary aim of the current study is to examine the

association among stress level, mindfulness, problem-solving skills, and academic achievement. In addition, the mediating role of problem solving skills and mindfulness in the relationship between perceived stress and academic achievement is tested. In the literature, it is seen that there are studies examining the relationship of perceived stress with academic achievement (Elliot et al., 2005; Hofer, 2007), problem solving skills (Largo-Wight et al., 2005), and mindfulness (Atanes et al., 2015). However, no research has been found in which any structural model has been tested on the mediating effect of mindfulness and problem-solving skills in the relationship between stress and academic achievement. In this respect, the research results may be important in reducing the negative effects of stress and increasing academic achievement. As a matter of fact, it was stated that mindfulness-based approaches can effectively reduce stress (Kabat-Zinn, 1990) and increase academic achievement (Caballero et al., 2019). Moreover, it was found that problem solving skills were effective in reducing perceived stress (Abdollahi et al., 2018) and there was a positive significant correlation between problem solving skills and academic achievement (Perveen, 2010). In this context, seven research question have been proposed: (i) is there any relationship between perceived stress and academic achievement? (ii) does perceived stress significantly predict academic achievement? (iii) is there any relationship between perceived stress and mindfulness? (iv) does perceived stress significantly predict mindfulness? (v) is there any relationship between perceived stress and problem solving skills? (vi) does perceived stress significantly predict problem solving skills? (vii) is there any mediating role of mindfulness and problem solving skills on the association between perceived stress and academic achievement? Accordingly, the proposed model for the path analysis is presented in Figure 1.

Figure 1

Simple Mediation Model



Method

This quantitative study was designed based on a correlational research design by using independent and dependent variables within the scope of the study. In correlational study, "the researcher examines whether and to what degree a statistical relationship exists between two or more variables" (Mertler, 2016). Before conducting the study, a model that presents the expected associations among the variables should be

proposed and, then, the model is tested (Glasow, 2005). In the current study, while perceived stress level (X) is considered an independent variable, academic achievement (Y) is considered a dependent variable. In addition, problem solving skills (M1) and mindfulness (M2) were treated as moderator variables in the association between the dependent and independent variables.

Participants

Participants of the study were recruited through a snowball sampling method. In order to employ the snowball sampling method, a connection is made to any unit in the universe. This unit encourages others to participate in the study, which results in an increase in sample size. This continues as a chain until a sufficient number of participants is recruited (Gürbüz, 2018). The rationale of using the snowball sampling method in this research is the difficulty of reaching out to the subjects in the universe to assemble them as participants. Also, through this method, data saturation (Kerlinger & Lee, 1999) was ensured. Turkey is divided into seven regions geographically. From each region, one university was identified. Then, the participant selection procedure was started. According to Flick (2014), researchers should reach people whom they think have the most information about the phenomenon researchers are interested in and investigate. Thus, one research assistant at the Faculty of Education in each university was reached. A total of seven research assistants were introduced about the study and confidentiality of the study. The participants of the study were recruited through these research assistants. As a result, a total of 938 students from seven public universities were reached out. Descriptive statistics of the participants are presented in Table 1.

Table 1

Descriptive Statistics of the Participants

Variable	Statistics
Age	Age range: 18-26; average age=23.04, *SD*=2.89
Sex	Male=445 (47.4%), Female=493 (52.6%)
Field Type	Natural Applied Sciences=253 (52.3%) Humanities & Social Sciences=496 (41.9%) Healthcare Sciences=387 (5.8%)

The age range of the students in this study was between 18 and 26. There were 445 (47.4%) male and 493 (52.6%) female students. Also, based on the preliminary analysis, it was found that 687 (73.1%) were undergraduate students and the rest (26.8%) were community college students. In addition, there were 496 students from the social studies-related departments, 55 students from the health-related departments, and 387 students from the natural applied sciences departments. In this direction, students from various fields were included in the study.

Instruments

In this study, a demographic information form and three scales were administered for data collection. The participants were asked to report their gender, field, and grade point averages (GPA) through the demographic information form. The

first scale of the study was the mindful attention awareness scale (MAAS) developed by Brown and Ryan (2003) and adapted into Turkish by Özyeşil et al. (2011). This scale consists of fifteen items. An example item from the scale is that "I could be experiencing some emotion and not be conscious of it until sometime later." The scale has one dimension and is designed as a six-point Likert type ranging from 1 (almost always) to 6 (almost never). A higher score refers to higher mindfulness. While the Cronbach's alpha value was calculated as .90 by Özyeşil et al. (2011), it was .82 in this particular study.

The second scale in this study was the perceived stress scale (PSS) developed by Cohen et al. (1983) and adapted into Turkish by Eskin et al. (2013). The five-point Likert type scale ranging from 0 (never) to 4 (very often) consists of fourteen items. An example item from the scale is that "how many times did you feel angry and stressful last month?" The scale has two dimensions: perceived insufficient self-efficacy (PISE) and perceived stress/ distress (PSD). While the Cronbach's alpha value was calculated as .84 by Eskin et al. (2013), it was found to be .91 in this particular study.

The last scale was the problem-solving skills inventory (PSSI) developed by Heppner and Petersen (1982) and adapted to Turkish by Taylan (1990). The six-point Likert type inventory includes thirty-five questions ranging from 1 (never) to 6 (always). An example item is that "When confronted with a problem, I tend to do the first thing that I can think of to solve it." The scale has three dimensions: confidence in problem-solving (CPS), approach avoidance attitude (AAA), and ability to maintain personal control (AMPC). While Taylan (1990) calculated the Cronbach Alpha value as .86, it was .89 for this study.

Data Collection Process

The questionnaires used in this study were transferred into electronic format via Google Forms. The link and the consent forms were sent out to the participants. The consent form included a general description of the study and confidentiality and privacy issues. The students willing to participate in the study filled out the data collection tools in an online environment. The study was carried out in the fall semester of the 2020-2021 academic year. This study received ethics approval from the Social and Human Sciences Research Committee of Fırat University (dated 28.05.2020, E-97132852-302.14.01-48437).

Data Analysis

There were a total of 972 cases for preliminary analysis. Before the data analysis process, the data was checked to determine any missing or invalid data. There were 34 cases with missing or invalid data. Therefore, they were dropped out from the analysis, which left 938 cases. In the next step, Mahalanobis distance and z scores were calculated to determine the outliers in the data set. The results revealed that there were no outliers since z scores between -3 and +3 are accepted as an indication that there is no extreme value in the data set (Osborne & Amy, 2004). In order to examine the correlations among the variables, Pearson product-moment correlation analysis was performed. Also, a linear regression analysis was run in order to determine the predictability of stress on mindfulness, problem solving skills, and academic achievement. For regression analysis, there exist assumptions to be met: the absence of

linearity, normality and multicollinearity problem. In this context, the data was examined for normality and linearity. According to Tabachnick and Fidell (2007), the skewness and kurtosis values need to be between -1.5 and +1.5 for the data to be considered normally distributed. The preliminary analysis of the data revealed that the normality assumption was met. Moreover, in order to identify whether multicollinearity exists in the data set, the correlation levels of the variables were examined by using variance inflation factor (VIF). An acceptable VIF value needs to be <5.0 (Hair et al., 2010). It was determined that there were no multiple associations between variables. For structural equation modeling, various fit indices are taken into account. Specifically, the RMSEA value is accepted as a good fit if it is 0.05 or below and it is considered as an acceptable fit if it is between .05 and 0.1 Also, GFI, AGFI, CFI, and IFI values close to 1 indicate a good fit (Schermelleh-Engel et al., 2003). Mediation analyses were performed using the PROCESS program developed by Hayes (2013). PROCESS contains macros (template models) for 92 different models that help calculate mediating and regulatory effects (Hayes, 2018). PROCESS is a program that works as an add-on to SPSS. In the research, structural equation modeling was performed to evaluate the fit of the proposed model using the AMOS 22. Data were analyzed using the SPSS 22 package.

Results

First, the descriptive statistics for the scales and the correlations among them were obtained. The results are provided in Table 2.

Table 2

Means, Standard Deviations, and Correlation Results

Variables	*M*	*SD*	1	2	3
1: PSS	27.77	7.22	-		
2: GPA	69.53	13.63	-133**	-	
3: MAAS	56.12	10.66	-.497**	.137**	-
4: PSSI	126.37	15.16	-.406**	.166**	.375**

**<.001

As seen in Table 2, it was determined that participants' perceived stress level was 27.77± 7.22, overall GPA was 69.53 ± 13.63. In addition, the mean score for the MAAS was 56.12 ± 10.66 and the mean score for the PSSI was 126.37 ± 15.16. The analysis results revealed that the perceived stress levels had a moderate and negative correlation with mindfulness (*r*=-.497) and problem-solving skills (*r*=-.406), and a small and negative correlation with GPA (*r*=-.133). In addition, small and positive correlations were found between GPA and mindfulness (*r*=.137) and problem-solving skills (*r*=.166). It was also found that there was a moderate and positive correlation between mindful awareness and problem-solving skills (*r*=.375). The correlation among dependent, independent, and mediating variables was found to be significant at the .001 level.

In line with the study's purpose, it aimed to determine the predictive power of the perceived stress levels on mindfulness, problem-solving skills, and GPA. The preliminary analysis results revealed that the data was suitable for regression analysis. The results are provided in Table 3.

Table 3

The Regression Analysis Results

Predictive	Predicted	*R*	R^2	*B*	*SE*	*β*	*t*	*p*	*F*	*p*
PSS →	GPA	.14	.02	-.263	.061	-.140	43.811	.000	18.575	.000
PSS →	MAAS	.50	.25	-.733	.042	-.497	63.649	.000	306.67	.000
PSS →	PSSI	.41	.17	-.852	.063	-.406	83.40	.000	184.48	.000

As seen in Table 3, students' perceived stress levels negatively predicted students' GPA, mindfulness level, and problem-solving skills. According to the results, perceived stress predicts 2% of the variance related to GPA, 25% of the variance for mindfulness level, and 17% of the variance for problem-solving skills. When the standardized coefficient (*β*) and t values are examined, it is seen that the increase in the perceived stress levels of the students had a significant negative effect on their GPA, mindfulness levels, and problem-solving skills. In order to better interpret the findings, the regression plots were created and are presented in Figure 2.

Figure 2

The Regression Plots

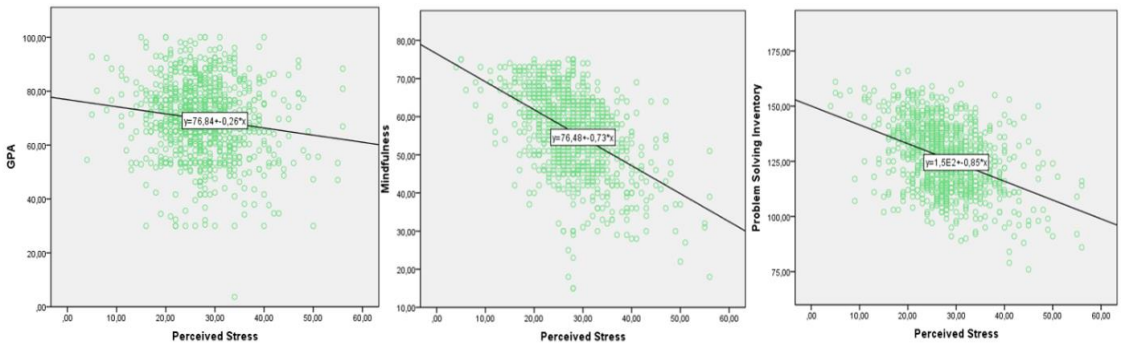
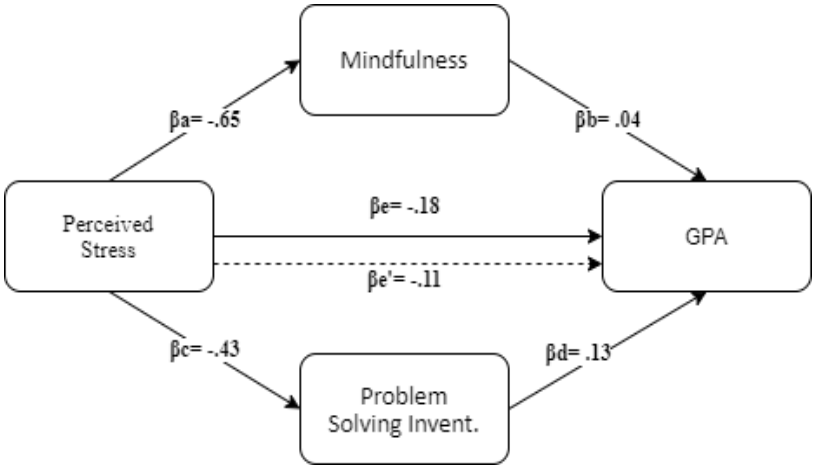


Figure 2 shows that as students' perceived stress levels increase, their GPA, mindfulness levels, and problem-solving skills decrease linearly, proving that the perceived stress levels negatively predict academic achievement, mindfulness levels, and problem-solving skills.

Structural equation modeling was performed to evaluate the fit of the proposed model. No modifications were made to the model for the path analysis (Figure 3).

Figure 3

Multiple Mediation Model



It was determined that the perceived stress levels negatively predicted GPA (*βe*=-.18, *SE*=.011, *t*=-3.101, *p*=.002). In the new model established with mediator variables, perceived stress levels were found to negatively predict mindfulness (*βa*=-.65, *SE*=.262, *t*=-11.503, *p*<.001) and problem-solving skills (*βc*=-.43, *SE*=.270, *t*=-5.352, *p*<.001). When the perceived stress levels, problem-solving skills, and mindfulness were taken into the model simultaneously, it was determined that the relationship between perceived stress levels and GPA changed from -.18 to -.11, which supports the mediation hypothesis. Specifically, the negative effect of perceived stress levels on GPA was reduced by mindfulness (*βb*=.04) and problem-solving skills (*βd*=.13). The results of the analysis showed that the mediation effect was significant and within the expected confidence interval (*CI*=-.010, -.003). If this confidence interval does not contain zero, mediation is considered to be present (Field, 2013).

The fit indices of the models related to the mediating role of mindfulness (Model 1) and problem-solving skills (Model 2) in the relationship between perceived stress levels and GPA are presented in Table 4.

Table 4

Summary of Goodness of Fit Statistics for Two Models

	df	X^2	*AGFI*	*GFI*	*CFI*	*TLI*	*RMSEA*	*SRMR*
Model 1	1	2.271	.99	.99	.99	.98	.04	.01
Model 2	1	4.396	.98	.99	.99	.95	.06	.02

As seen in Table 4, fit indices for both models were at an acceptable level (Schermelleh-Engel et al., 2003).

Discussion and Conclusion

This study examined the association among higher education students' perceived stress levels, mindfulness, problem solving skills, and academic achievement. The results revealed that there was a significant and negative relationship between perceived stress levels and academic achievement. Also, the perceived stress levels negatively

predicted academic achievement. These findings are parallel to the findings of the other studies in the literature (Choi et al., 2007; Elias et al., 2011; Herath, 2019; Rafidah et al., 2009). In a study, Veena and Shastri (2016) stated that students' stress levels with high and low academic performance differ significantly. In this context, it is concluded that there is a significant negative relationship between students' stress levels and their academic achievement. Accordingly, it can be said that as the perceived stress levels of higher education students increase, academic achievement may decrease.

In the study, a significant negative relationship was found between perceived stress levels and mindfulness. Also, the perceived stress levels are a significant negative predictor of mindfulness. In other words, as higher education students' perceived stress levels increased, their mindfulness levels decreased. Similar findings were observed in other studies as well (Cash & Whittingham, 2010; Cenkseven-Önder & Utkan, 2018; De Lissnyder et al., 2012; Weinstein et al., 2009). In line with the study results, the perceived stress levels can be seen as a cause or as a result of the decrease in mindfulness. In other words, a decrease in the level of mindfulness can negatively affect individuals to contend with stress, which may result in an increase in stress level, or a high level of stress can make mindfulness dysfunctional. This indicates a negative linear structure.

Another finding of the study is the significant and negative relationship between perceived stress levels and problem-solving skills of higher education students. Also, the perceived stress levels were a significant negative predictor of problem-solving skills. In other words, as students' perceived stress levels increase, their problem-solving skills decrease. Similar results were reported in other studies (Abdollahi et al., 2018; Demir, 2019; Largo-Wight et al., 2005). The results of the study revealed how to control the association between stress and academic achievement through mindfulness and problem solving skills. A recent study reported that mindfulness-based interventions are effective in reducing anxiety, depression, and stress (Geiger et al., 2016). In a study conducted by Teodorczuk (2013), a significant relationship was found between the mindfulness levels of university students and their academic achievement. Similarly, experimental studies emphasize that a high level of mindfulness positively affects students' academic achievement (Biegel & Brown, 2010; Franco et al., 2010; Franco et al., 2011). There are many studies reporting how mindfulness decreases stress. In a systematic-review study, out of 17 studies, 16 studies reported that mindfulness resulted in positive changes in psychological or physiological outcomes related to anxiety or stress (Sharma & Rush, 2014). Mindfulness teaches individuals to analyze situations and thoughts in a non-judgmental manner without reacting to them thoughtlessly. In addition, it helps people develop a more automatic awareness of experience and can be an effective tool to relieve stress (Baer et al., 2006; Kabat-Zinn, 1994). The findings of the current study and the other studies provide evidence that the direct negative effect of stress on academic achievement can be reduced indirectly through mindfulness. Similar to mindfulness, in the study, it was found that problem-solving skills also reduced the negative effects of perceived stress on higher education students' academic achievement. This finding also supports the findings of other studies in the literature (Olgun et al., 2010; Özyazıcıoğlu et al., 2009). The problem-solving process includes high-level thinking skills such as questioning, comparing, analyzing, and synthesizing (Cabanilla-Pedro et al., 2004). Therefore, a student who develops

problem-solving skills can be more successful in the learning process that consists of a comprehensive and complex structure. More specifically, Hassan and Rahman (2017) stated that students with advanced problem-solving skills can better understand the problem statement, plan the solution in detail, and use more metacognitive processes. The perceived stress levels of students with high problem-solving skills decreased significantly compared to those with low level of problem-solving skills (Abdollahi et al., 2018). Therefore, it can be concluded that problem-solving skills are an important factor in controlling stress and increasing academic success.

The findings of the current study indicated that as students' perceived stress level increases, their mindfulness, problem-solving skills, and academic achievement decrease. It can be said that mindfulness and problem solving skills are effective mechanisms against the negative effect of stress on academic achievement. In other words, mindfulness and problem solving skills enable individuals to generate new solutions and new perspectives in case of difficulties they encounter. This, in turn, can help individuals to control repetitive and non-productive thoughts that cause stress and increase their academic success.

Implications

There exist several limitations. The first limitation is the snowball sampling method employed to recruit participants. Researchers can encounter problems finding the right subject who reaches out to other subjects due to some difficulties, including cost, time, and process issues. In addition, the first subjects have effects on the selection of the other subjects due to their networking skills and ability to find suitable samples. Therefore, future studies must consider employing other sampling methods as well. The second limitation is that the present study is a cross-sectional study and the data was collected within a four-week interval. Thus, longitudinal studies must be designed to obtain more information about the associations among perceived stress, mindfulness, problem solving skills, and academic achievement. The third limitation of the study is that the data was collected during the COVID-19 epidemic. Brooks and colleagues (2020) revealed that the epidemic has influences on stress level. Therefore, the study should be replicated after the epidemic ends. Another limitation is related to the data collection process. The participants filled out the questionnaires online. Since there was no direct contact with the participants (face-to-face communication), there might be misconceptions about the importance of the study and data privacy. Tuncer (2017) states that online questionnaires should be used with extra care due to difficulty understanding some complex expressions in online environments. Therefore, it is suggested to test the model by collecting data in face-to-face environments. Another limitation is related to the culture of the participants. Culture is a key variable that influences the research process and the findings of a study (Lee et al., 2007). Future studies must re-test the model presented in this study by including participants from different cultures. The next limitation is the nature of path analysis and its assumptions identified by researchers. Therefore, new models must be designed and tested using different assumptions about perceived stress, mindfulness, problem solving skills, and academic achievement. In addition, the results of the study are particularly limited to the dimensions measured by the scales. Therefore, future research may test the same model with different measurements. The last limitation is the reported GPA scores. In terms of

ethical principles, it was impossible to get school records or students' grades. Therefore, the GPA had to be reported by the students, which raise an issue about the possibility of students' misrepresentations when reporting GPA. Although numerous research found relatively high correlations between self-reported and actual GPA in the range of .70 to .90 (Kuncel et al., 2005), the reliability of self-reported grades is still a subject of debate. In this particular study, the participants were asked to fill out the demographic information form two times with a two-week interval. The data was examined in terms of the correlation between the reported GPA scores and a high correlation was found between the scores. Future studies can consider obtaining actual GPA scores through students' records from the school systems.

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References

Abdollahi, A., Abu Talib, M., Carlbring, P., Harvey, R., Yaacob, S. N., & Ismail, Z. (2018). Problem-solving skills and perceived stress among undergraduate students: The moderating role of hardiness. *Journal of Health Psychology*, *23*(10), 1321-1331. https://doi.org/10.1177/1359105316653265

Allen, T., Henderson, T., Mancini, V., & French, K. (2017). Mindfulness and meditation practice as moderators of the relationship between age and subjective well-being among working adults. *Mindfulness, 8*, 1055-1063. https://doi.org/10.1007/s12671-017-0681-6

Arch, J. J., & Craske, M. G. (2010). Laboratory stressors in clinically anxious and non-anxious individuals: The moderating role of mindfulness. *Behaviour Research and Therapy*, *48*, 495-505. https://doi:10.1016/j.brat.2010.02.005

Arslan, I. (2018). The relationship between mindfulness, depression and perceived stress. *Individual and Society Journal of Social Science*, *8*(2), 73-86.

Atanes, A. C., Andreoni, S., Hirayama, M. S., Montero-Marin, J., Barros, V. V., Ronzani, T. M., Kozasa, E. H., Soler, J., Cebolla, A., Garcia-Campayp, J., & Demarzo, M. M. P. (2015). Mindfulness, perceived stress, and subjective well-being: a correlational study in primary care health professionals. *BMC Complementary and Alternative Medicine, 15(*1), 1-7. https://doi.org/10.1186/s12906-015-0823-0

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27-45. https://doi.org/10.1177/1073191105283504

Bernal-Morales, B., RodríguezLanda, J. F., & Pulido-Criollo, F. (2015). *Impact of anxiety and depression symptoms on scholar performance in high school and university students, a fresh look at anxiety disorders*. IntechOpen. https://doi.org/10.5772/60711

Biegel, G., & Brown, K. (2010). *Assessing the efficacy of an adapted in-class mindfulnessbased training program for school-age children: A pilot study.* http:// www.mindfulschools.org

Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction?. *Psychosomatic Medicine*, *64*(1), 71-83. https://doi.org/10.1097/00006842-200201000-00010

Braun-Lewensohn, O., Sagy, S., & Al Said, H. (2014). Stress reactions and coping strategies among Bedouin Arab adolescents exposed to demolition of houses. *Stress and Health: Journal of the International Society for the Investigation of Stress, 30*(4), 333-342. https://doi.org/10.1002/smi.2519

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet, 395*(10227), 912-920. https://doi.org/10.1016/S0140-6736(20)30460-8

Brown, K. W., Kasser, T., Ryan, R. M., Linley, P. A., & Orzech, K. (2009). When what one has is enough: Mindfulness, financial desire discrepancy, and subjective well-

being. *Journal of Research in Personality*, *43*(5), 727-736. https://doi.org/10.1016/j.jrp.2009.07.002

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, *84*(4), 822-848. https://doi:10.1037/0022-3514.84.4.822

Caballero, C., Scherer, E., West, M. R., Mrazek, M. D., Gabrieli, C. F., & Gabrieli, J. D. (2019). Greater mindfulness is associated with better academic achievement in middle school. *Mind, Brain, and Education, 13*(3), 157-166. https://doi.org/10.1111/mbe.12200

Cabanilla-Pedro, L. A., Acob-Navales, M., & Josue, F. T. (2004). Improving analyzing skills of primary students using a problem solving strategy. *Journal of Science and Mathematics Education in S.E Asia, 27*(1), 33-53.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine*, *31*(1), 23-33. https://doi.org/10.1007/s10865-007-9130-7

Cash, M., & Whittingham, K. (2010). What facets of mindfulness contribute to psychological well-being and depressive, anxious, and stress-related symptomatology? *Mindfulness, 1*(3), 177-182. https://doi.org/10.1007/s12671-010-0023-4

Cenkseven-Önder, F., & Utkan, Ç. (2018). The mediatory role of rumination and negative mood regulation in the relationship between mindfulness and perceived stress. *Mersin University Journal of the Faculty of Education*, *14*(3), 1004-1019.

Chew-Graham, C. A., Rogers, A., & Yassin, N. (2003). 'I wouldn't want it on my CV or their records': medical students' experiences of help-seeking for mental health problems. *Medical Education, 37*(10), 873-880. https://doi.org/10.1046/j.1365-2923.2003.01627.x

Choi, Y. B., Abbott, T. A., Arthur, M. A., & Hill, D. (2007). Towards a future wireless classroom paradigm. *International Journal of Innovation and Learning, 4*(1), 14-25.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 385-396. https://doi.org/10.2307/2136404

Curcio, G., Ferrara, M., & De, G. L. (2006). Sleep loss, learning capacity and academic performance. *Sleep Medicine Reviews, 105,* 323-337. https://doi.org/10.1016/j.smrv.2005.11.001

De Lissnyder, E., Koster, E. H., Goubert, L., Onraedt, T., Vanderhasselt, M. A., & De Raedt, R. (2012). Cognitive control moderates the association between stress and rumination. *Journal of Behavior Therapy and Experimental Psychiatry, 43*(1), 519-525. https://doi.org/10.1016/j.jbtep.2011.07.004

Demir, M. (2019). *Examining the relationship between problem solving, perceived stress and life satisfaction among college students* [Unpublished master's thesis]. Istanbul Sabahattin Zaim University.

Deniz, M. E., Erus, S. M., & Büyükcebeci, A. (2017). Relationship between mindfulness and psychological well-being: The mediating role of emotional intelligence. *Turkish Psychological Counseling and Guidance Journal*, *7*(47), 17-31.

D'Zurilla, T. J., & Nezu, A. M. (2001). Problem-solving therapies. In K. S. Dobson (Eds.), *Handbook of cognitive-behavioral therapies* (pp. 211–245). Guilford Press.

D'Zurilla, T. J., & Nezu, A. M. (2007). *Problem-solving therapy: A positive approach to clinical intervention* (3rd ed). Springer Publishing Company.

Egan, H., & Mantzios, M. (2018). A qualitative exploration of self-kindness and "treating oneself" in contexts of eating, weight regulation and other health behaviors: Implications for mindfulnessbased eating programs. *Frontiers in Psychology*, *9*, 880. https://doi.org/10.3389/fpsyg.2018.00880

Elias, H., Ping, W. S., & Abdullah, M. C. (2011). Stress and academic achievement among undergraduate students in Universiti Putra Malaysia. *Procedia-Social and Behavioral Sciences*, *29*, 646-655. https://doi.org/10.1016/j.sbspro.2011.11.288

Elliot, A. J., Shell, M. M., Henry, K. B., & Maier, M. A. (2005). Achievement goals, performance contingencies, and performance attainment: An experimental test. *Journal of Educational Psychology, 97*(4), 630–640. https://doi.org/10.1037/0022-0663.97.4.630

Eskin, M., Harlak, H., Demirkıran, F., & Dereboy, Ç. (2013, October). The adaptation of the perceived stress scale into Turkish: A reliability and validity analysis. *In New Symposium Journal, 51*(3), 132-140.

Feizi, A., Aliyari, R., & Roohafza, H. (2012). Association of perceived stress with stressful life events, lifestyle and socio-demographic factors: A large-scale community-based study using logistic quantile regression. *Computational and Mathematical Methods in Medicine*, 151865. https://doi.org/10.1155/2012/151865

Feldman, G., Greeson, J., & Senville, J. (2010). Differential effects of mindful breathing, progressive muscle relaxation, and loving-kindness meditation on decentering and negative reactions to repetitive thoughts. *Behaviour Research and Therapy*, *48*,1002-1011. https://doi:10.1016/j.brat.2010.06.006

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.

Flick, U. (2014). *An introduction to qualitative research.* Sage.

Florêncio, C. B. S., Ramos, M. F. H., & Silva, S. S. D. C. (2017). Adolescent perceptions of stress and future expectations. *Paidéia (Ribeirão Preto), 27*(66), 60-68. https://doi.org/10.1590/1982-43272766201708

Franco, C., Mañas, I., Cangas, A. J., & Gallego, J. (2011). Exploring the effects of a mindfulness program for students of secondary school. *International Journal of Knowledge Society Research*, *2*(1), 14-28. https://doi:10.4018/jksr.2011010102

Franco, C., Soriano, E. Y., & Justo, E. (2010). Effect of a psychoeducational program in mindfulness on self-concept and academic performance of students American immigrants residing in Spain. *Revista Iberoamericana de Educación, 53*(6), 1-13.

Geiger, P. J., Boggero, I. A., Brake, C. A., Caldera, C. A., Combs, H. L., Peters, J. R., & Baer, R. A. (2016). Mindfulness-based interventions for older adults: A review of

the effects on physical and emotional well-being. *Mindfulness, 7*(2), 296-307. https://doi.org/10.1007/s12671-015-0444-1

Gilbert, P. (2005). *Compassion: Conceptualizations, Research and use in psychotherapy*. Brunner Routledge.

Glasow, P. A. (2005). *Fundamentals of survey research methodology*. https://www.mitre.org/sites/default/files/pdf/05_0638.pdf

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*(1), 35-43. https://doi.org/10.1016/s0022-3999(03)00573-7

Gupta, M., Pasrija, P., & Kavita. (2015). Effect of problem solving ability on academic achievement of high school students: A comparative study. *Bhartiyam International Journal of Education & Research, 4*, 46-59.

Gürbüz, B. (2018). *Universe and sample.* https://acikders.ankara.edu.tr/pluginfile.php/105487/

Gürbüzer, M. (2016). *Effects of stress on learning and student.* http://www.konyayenigun.com/stresin-ogrenme-ve-ogrenci-uzerindeki-etkileri-makale,5301.html

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7 ed.). Prentice-Hall, Inc.

Han, K. S. (2005). Self-efficacy, health promoting behaviors, and symptoms of stress among university students. *Journal of Korean Academy of Nursing, 35*(3), 585-592. https://doi.org/10.4040/jkan.2005.35.3.585

Hassan, N. M., & Rahman, S. (2017). Problem solving skills, metacognitive awareness, and mathematics achievement: A mediation model. *The New Educational Review, 49*(3), 201-212. https://doi.org/10.15804/tner.2017.49.3.16

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. The Guilford Press

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Second Edition). The Guilford Press.

Hede, A. J. (2017). Using mindfulness to reduce the health effects of community reaction to aircraft noise. *Noise & Health, 19*(89), 165-173. https://doi.org/10.4103/nah.nah_106_16

Heppner, M. J., Lee, D., & Paul Heppner, P. (2004). The role of problem-solving appraisal in the process and outcome of career counseling. *Journal of Vocational Behavior 65*(2), 217-238. https://doi.org/10.1016/s0001-8791(03)00100-3

Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem solving inventory. *Journal of Counseling Psychology, 29*, 66-75. https://doi.org/10.1037/0022-0167.29.1.66

Herath, H. M. W. (2019). *Relationship between academic stress and academic achievements of the undergraduate students in Sri Lanka - A case study of undergraduates in Uva Wellassa University*. https://socialscienceresearch.org/index.php/GJHSS/article/view/2884/2773

Hittinger, S. M. (2018). *The relationship between stress, social problem solving, and psychological distress in mothers of daughters with eating disorders* [Doctoral dissertation]. Philadelphia College.

Hofer, M. (2007). Goal conflict and self-regulation: A new look at pupils' off-task behavior in the classroom. *Educational Research Review, 2*(1), 28-38. https://doi.org/10.1016/j.edurev.2007.02.002

Horan, K., & Taylor, M. (2018). Mindfulness and self-compassion as tools in health behavior change: An evaluation of a workplace intervention pilot study. *Journal of Contextual Behavioral Science, 8*, 8-16. https://doi.org/10.1016/j.jcbs.2018.02.003

Infantolino, M. (2017). *High school seniors' perceived stress of the college and career decision-making process* [Master thesis]. State University of New York.

Janssen, M., Heerkens, Y., Kuijer, W., Van Der Heijden, B., & Engels, J. (2018). Effects of Mindfulness-Based Stress Reduction on employees' mental health: A systematic review. *PloS one, 13*(1), 1-37. https://doi.org/10.1371/journal.pone.0191332

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness.* Random House, Inc.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life.* NY: Hyperion.

Kaplan, H. I., & Sadock, B. J. (2000). *Learning theory: Synopsis of psychiatry: Behavioral sciences/clinical psychiatry.* Lippincott Williams and Wilkins

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*(6), 1041-1056. https://doi.org/10.1016/j.cpr.2011.04.006

Kerlinger, F. N., & Lee, H. B. (1999). *Foundations of behavioral research.* Harcourt College Publishers.

Kessler, R. C. (1997). The effects of stressful life events on depression. *Annual Review of Psychology, 48*(1), 191-214.

Khan, M. J., Altaf, S., & Kausar, H. (2013). Effect of perceived academic stress on students' performance. *FWU Journal of Social Sciences, 7*(2), 146-151.

Klaassens, E. (1992). Strategies to enhance problem solving. *Nurse Education, 17*(3), 28-31. https://doi.org/10.1097/00006223-199205000-00014

Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition & Emotion, 23*(1), 4-41. https://doi.org/10.1080/02699930802619031

Korkut, L. (2002). Problem solving skills of high school students. *Hacettepe University Journal of Education Faculty 22*, 177-184.

Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research, 75*(1), 63-82. https://doi.org/10.3102/00346543075001063

Largo-Wight, E., Peterson, P. M., & Chen, W. W. (2005). Perceived problem solving, stress, and health among college students. *American Journal of Health Behavior, 29*(4), 360-370. https://doi.org/10.5993/ajhb.29.4.8

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

Lee, J., Kim, E., & Wachholtz, A. (2016). The effect of perceived stress on life satisfaction: The mediating effect of self-efficacy. *Ch'ongsonyonhak Yongu, 23*(10), 29.

Lee, J., Tran, T. T., & Lee, K. P. (2007, July). Cultural difference and its effects on user research methodologies. *In International Conference on Usability and Internationalization* (pp. 122-129). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-540-73287-7_16

Leonard, N. R., Gwadz, M. V., Ritchie, A., Linick, J. L., Cleland, C. M., Elliott, L., & Grethel, M. (2015). A multi-method exploratory study of stress, coping, and substance use among high school youth in private schools. *Frontiers in Psychology*, *6*, 1028. https://doi.org/10.3389/fpsyg.2015.01028

Liu, Y. (2015). The longitudinal relationship between Chinese high school students' academic stress and academic motivation. *Learning and Individual Differences*, *38*, 123-126. https://doi.org/10.1016/j.lindif.2015.02.002

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*, *12*, 163-169. https://doi.org/10.1016/j.tics.2008.01.005

Marinoni, G., Van't Land, H., & Jensen, T. (2020). *The impact of Covid-19 on higher education around the world*. IAU Global Survey Report.

Mehfooz, Q. U. A., & Haider, I. S. (2017). Effect of stress on academic performance of undergraduate medical students. *Journal of Community Med Health Education*, *7*(6), 566.

Mertler, C. A. (2016). *Introduction to educational research.* Sage publications.

Miller, J. J., Fletcher, K., & Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. *General Hospital Psychiatry*, *17*(3), 192-200. https://doi.org/10.1016/0163-8343(95)00025-m

Moattari, M., Abedi, H. A., Amini, A., & Fathi, A. E. (2001). The effect of reflection on critical thinking skills of nursing students in Tabriz medical university. *Iranian Journal of Medical Education*, *1*(4), 55-64.

Moore, K. A., & Cooper, C. L. (1996). Stress in mental health professionals: A theoretical overview. *International Journal of Social Psychiatry*, *42*(2), 82-89. https://doi.org/10.1177/002076409604200202

Moylan, S., Maes, M., Wray, N. R., & Berk, M. (2013). The neuroprogressive nature of major depressive disorder: Pathways to disease evolution and resistance, and therapeutic implications. *Molecular Psychiatry*, *185*, 595-606. https://doi.org/10.1038/mp.2012.33

Niemi, P. M., & Vainiomäki, P. T. (1999). Medical students' academic distress, coping, and achievement strategies during the preclinical years. *Teaching and Learning in Medicine*, *11*(3), 125-134. https://doi.org/10.1207/s15328015tl110302

Olendzki, N., Elkins, G. R., Slonena, E., Hung, J., & Rhodes, J. R. (2020). Mindful hypnotherapy to reduce stress and increase mindfulness: A randomized controlled

pilot study. *International Journal of Clinical and Experimental Hypnosis, 68*(2), 151-166. https://doi.org/10.1080/00207144.2020.1722028

Olgun, N., Öntürk, Z., Karabacak, Ü., Aslan, F., & Serbest, Ş. (2010). Problem solving skills of the nursing students: Results of the 1-year observation problem solving skills of the students. *Acıbadem University Journal of Health Sciences, 1*(4),188-194.

Osborne, J. W., & Amy, O. (2004). The power of outliers (and why researchers should always check for them). *Practical Assessment, Research & Evaluation, 9*(1), 6.

Özyazıcıoğlu, N., Aydınoğlu, N., & Aytekin, G. (2009). The investigation of the problem solving and empathetic skills of the students in a school of health. *Journal of Atatürk University School of Nursing. 12*(3), 46-53.

Özyeşil, Z., Arslan, C., Kesici, Ş., & Deniz, M. E. (2011). Adaptation of the Mindful Attention Awareness Scale into Turkish. *Education and Science, 36*(160), 224-235.

Park, H. J., Kim, M. Y., & Jung, D. Y. (2008). The effect of stress, social support and self-efficacy on the mental health of female undergraduate students. *Journal of Korean Academy of Fundamentals of Nursing, 15*(4), 513-521.

Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2020). The impact of stress on students in secondary school and higher education. *International Journal of Adolescence and Youth, 25*(1), 104-112. https://doi.org/10.1080/02673843.2019.1596823

Patel, C. (1989). *Stress management.* Vermilion Pres.

Perveen, K. (2010). Effect of the problem-solving approach on academic achievement of students in mathematics at the secondary level. *Contemporary Issues in Education Research (CIER), 3*(3), 9-14. https://doi.org/10.19030/cier.v3i3.181

Phillips, A. C. (2013). Perceived stress. In: Gellman M.D., Turner J.R. (Eds.) *Encyclopedia of behavioral medicine.* Springer. https://doi.org/10.1007/978-1-4419-1005-9_479

Rafidah, K., Azizah, A., Norzaidi, M. D., Chong, S. C., Salwani, M. I., & Noraini, I. (2009). Stress and academic performance: Empirical evidence from university students. *Academy of Educational Leadership Journal, 13*(1), 37-51.

Ribeiro, I. J., Pereira, R., Freire, I. V., De Oliveira, B. G., Casotti, C. A., & Boery, E. N. (2018). Stress and quality of life among university students: A systematic literature review. *Health Professions Education, 4*(2), 70-77. https://doi.org/10.1016/j.hpe.2017.03.002

Sagui-Henson, S. J., Levens, S. M., & Blevins, C. L. (2018). Examining the psychological and emotional mechanisms of mindfulness that reduce stress to enhance healthy behaviours. *Stress and Health, 34*(3), 379-390. https://doi.org/10.1002/smi.2797

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Test of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23-74.

Schiffrin, H. H., & Nelson, S. K. (2010). Stressed and happy? Investigating the relationship between happiness and perceived stress. *Journal of Happiness Studies, 11*(1), 33-39. https://doi.org/10.1007/s10902-008-9104-7

Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-based stress reduction for health care professionals: Results from a randomized trial. *International Journal of Stress Management, 12*(2), 164-176. https://doi.org/10.1037/1072-5245.12.2.164

Sharma, M., & Rush, S. E. (2014). Mindfulness-based stress reduction as a stress management intervention for healthy individuals: A systematic review. *Journal of Evidence-Based Complementary & Alternative Medicine*, *19*(4), 271-286. https://doi.org/10.1177/2156587214543143

Sindhu, P. (2016). Impact of depression on academic achievement among engineering students. *The International Journal of Indian Psychology 4*, 49-50.

Sohail, N. (2013). Stress and academic performance among medical students. *J Coll Physicians Surg Pak*, 23(1), 67-71.

Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA* (p. 724). Belmont, CA: Thomson/Brooks/Cole.

Tan, C. S., Tan, S. A., Mohd Hashim, I. H., Lee, M. N., Ong, A. W. H., & Yaacob, S. N. B. (2019). Problem-solving ability and stress mediate the relationship between creativity and happiness. *Creativity Research Journal*, *31*(1), 15-25. https://doi.org/10.1080/10400419.2019.1568155

Taylan, S. (1990). *Adaptation, reliability and validity study of Heppner's problem solving inventory* [Unpublished master's thesis]. Ankara University.

Teodorczuk, K. (2013). *Mindfulness and academic achievement in South African university students* [Doctoral dissertation]. Johannesburg University.

Trautwein, U., Ludtke, O., March, H. W., Koller, O., & Baumert, J. (2006). Tracking, grading, and student motivation: Using group composition and status to predict self-concept and interest in ninth-grade mathematics. *Journal of Educational Psychology*, *98*(4), 788-806. https://doi.org/10.1037/0022-0663.98.4.788

Tuncer, M. (2017). A critical question: Can we trust smartphone survey data?. *Journal of Education and Training Studies, 5*(6), 33-43. https://doi.org/10.11114/jets.v5i6.2337

Vallejo, M. A., Vallejo-Slocker, L., Fernández-Abascal, E. G., & Mañanes, G. (2018). Determining factors for stress perception assessed with the Perceived Stress Scale (PSS-4) in Spanish and other European samples. *Frontiers in Psychology, 9*, 37.

Veena, N., & Shastri, S. (2016). Stress and academic performance. *The International Journal of Indian Psychology*, *3*(4), 71-82.

Von der Heyde, E. M. (2017). *The relationship between mindfulness and stress among college students* [Doctoral dissertation]. Rowan University.

Walburg, V. (2014). Burnout among high school students: A literature review. *Children and Youth Services Review*, *42*, 28-33. https://doi.org/10.1016/j.childyouth.2014.03.020

Wallace, D. D., Boynton, M. H., & Lytle, L. A. (2017). Multilevel analysis exploring the links between stress, depression, and sleep problems among two-year college students. *Journal of American College Health*, *653*, 187-196. https://doi.org/10.1080/07448481.2016.1269111

Wamsler, C. (2018). Mind the gap: The role of mindfulness in adapting to increasing risk and climate change. *Sustainability Science, 13*, 1121-1135. https://doi.org/10.1007/s11625-017-0524-3

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-being. *Journal of Research in Personality, 43*(3), 374-385. https://doi.org/10.1016/j.jrp.2008.12.008

Yu, M. O. (2018). The influence of nursing students' stress coping styles on problem solving ability. *Journal of the Korea Academia-Industrial Cooperation Society*, *19*(3), 291-300.

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Understanding of Geometric Reflection: John's Learning Path For Geometric Reflection*

Geometrik Yansımayı Anlama: John'un Geometrik Yansıma İçin Öğrenme Yolu

Murat AKARSU**

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ABSTRACT: This study explores the development of a pre-service teacher's mental structure from a motion view to a mapping view of geometric reflection. Many pre-service secondary mathematics teachers' (PTs) understand geometric reflection as a motion rather than a mapping of a domain containing points in a plane relative to a reflection line, which is an essential understanding needed for teaching mathematics. Dubinsky's action, process, object and schema (APOS) framework to document the transition of the PT's (John's) mental structures from a motion to a mapping view. Data from interview transcripts, videos, and written artifacts were analyzed using. Results indicated that John's initial motion view of geometric reflection informed his evolving mapping view by developing sub-concepts of the reflection line, domain and plane. It is argued that the mapping view evolves from the motion view as the sub-concepts develop through successive challenges using figures and questioning. The study is a part of a larger study and was conducted with six PTs. However, it focuses on one of the PTs, John, who reached the mapping view of geometric reflection. The other PTs also demonstrated a similar mental structure.

Keywords: Geometric transformations, pre-service teachers, geometric reflection, motion view, mapping view.

ÖZ: Bu çalışma, bir öğretmen adayının geometrik yansımayı anlamada ki zihinsel yapısının, hareket perspektifinden eşleştirme perspektifine gelişiminin araştırılması amacıyla yapılmıştır. Birçok ortaöğretim matematik öğretmeni adayı, geometrik yansımayı anlamada önemli olan yansıma ekseni, yansımanın etki alanı ve düzlem alt konseptlerine göre eşleştirme perspektifi yerine hareket perspektifine sahiptirler. Dubinsky'nin eylem, süreç, nesne ve sema (APOS) teorik çerçevesi kullanılarak bir öğretmen adayının (John) geometrik yansımayıanlamada ki zihinsel yapılarının hareket perspektifinden eşleştirme perspektifine gelişimleri incelenmiştir. Veri toplama araçları olarak mülakat transkriptleri, videolar ve çalışma kağıtları analiz edilmiştir. Bulgulara göre, John'un geometrik yansımayı anlamada sahip olduğu yansıma ekseni, yansımanın etki alanı ve düzlem hareket perspektifinden eşleştirme perspektifine geçişini hazırlanan mülakat soruları ve mülakat sürecinde sorulan açık-uçlu sorular kolaylaştırmıştır. Çalışma daha büyük bir çalışmanın parçasıdır ve altı öğretmen adayı ile yürütülmüştür. Diğer katılımcılarda hareket perspektifinden eşleştirme perspektifine benzer zihinsel yapı gelişimleri gösterdikleri için, çalışmada bir katılımcının zihinsel yapı gelişimleri detaylarıyla anlatılmıştır.

Anahtar kelimeler: Geometrik dönüşümler, öğretmen adayları, geometrik yansıma, hareket perspektifi, eşleştirme perspektifi.

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The study of geometric transformations (e.g., translation, reflection, rotation) has gained importance in recent years (Akarsu, 2018; Flanagan, 2001; Glass, 2001; Yanik & Flores, 2009). According to the National Council of Teachers of Mathematics [NCTM] (2000), it is important for students to learn and apply geometric transformations and symmetry in order to deeply examine mathematical situations. Studying and understanding these topics can improve their mathematical thinking, reasoning, and problem-solving skills by enabling them to understand such topics as functions, symmetry, and congruence (Clements et al., 1997; Hollebrands, 2003; Portnoy et al., 2006; Yanik, 2011). The most important geometric transformation to understand is geometric reflection because it plays a crucial role in forming other geometric transformations (e.g., translation and rotation) (Yanik, 2006). For instance, if a student were asked to reflect a triangle using two parallel lines of reflection, the student would need to identify that after two reflections, the first image and final image would be geometric translations. This means that the composition of two geometric reflections produces other geometric transformations such as geometric translations. To effectively teach the concept of geometric reflection, teachers need to understand its meaning and role in geometric transformation.

The term geometric reflection has several meanings in mathematics, of which the main distinction is between the motion view and the mapping view (Akarsu, 2018; Edwards, 2003; Hollebrands, 2003; Yanik, 2011). According to the motion view, a geometric reflection refers to a transformation representing a flip of figures around a point, line, or plane (Boyd et al., 2004). According to the mapping view, which is informed by formal mathematics and derived from the definition of function, a geometric reflection on a plane is, as Martin (1982) describes, "a one-to-one correspondence from the set of points in the plane onto itself" (p. 1). From this viewpoint, understanding the domain and range of a geometric reflection involves understanding that all points in the plane are mapped to other points in the plane, so the transformation is not limited to a figure or a point. Instead, as Yanik and Flores (2009) state, one maps "all points in the plane to other points in the plane rather than moving images/points from their original locations to different locations" (p. 42).

To understand the difference between geometric reflection from a motion view and a mapping view, three important sub-concepts must be considered: reflection line, domain, and plane (Flanagan, 2001; Yanik, 2006). PTs with a motion view do not take equidistance and perpendicularity properties into account when they use a reflection line to reflect a geometric figure; they define domain only in terms of given points or geometric figures, and they consider the points or geometric figures as separate from the plane. On the other hand, PTs with a mapping view do take the properties of equidistance and perpendicularity into account when they use the reflection line to perform a geometric reflection; they consider the domain as a whole plane consisting of infinitely many points; and they consider the points or geometric figures as subsets of, not separate from, the plane.

While recent studies emphasize the importance of having a mapping view of geometric reflection, studies show that most students, including PTs, generally have a motion view which is likely to result in inadequate knowledge for understanding and, therefore, teaching geometric reflection (Hollebrands, 2003; Yanik, 2006). But despite the growing literature that supports the necessity for PTs to have a mapping view of

geometric reflection, there has been little research on how to help them acquire it (Hollebrands, 2003; Yanik, 2006). To address this issue, I hypothesized that having a motion view of geometric reflection is a prerequisite to developing a mapping view of geometric reflection. Therefore, the research questions in the study are as follows:

1. How does a motion view of geometric reflection develop into a mapping view for a secondary mathematics PT?
2. What factors facilitate PTs' development of a motion view of geometric reflections into a mapping view?

Theoretical Framework

To investigate and analyze PTs' mental structures with regard to understanding geometric reflection, the Action, Process, Object and Schema (APOS) theoretical framework was used. This framework provides useful guidance for researchers to analyze the level of students' learning of a mathematical subject. Within this framework, I used Genetic Decomposition (GD) as a hypothetical model to identify the mental structures needed by PTs to learn a mathematical subject (Dubinsky, 1991). Specifically, a GD is preliminary model for describing how the mental structures of action, process and object form a schema for a mathematical concept. An inference drawn from the literature is that the mental structures of action and process are necessary and sufficient to create a mental structure for a mapping view of geometric reflection (Hollebrands, 2003; Yanik, 2006). Therefore, in this study I focused on the mental structures of action and process of the theory.

An action is a mental structure that is the first stage in understanding a concept. It starts with the organization or change of mental structures that have been built previously. When forming new mental structures at the action stage, external clues (e.g., a formula or similar example etc.) are needed. These clues should be used to clearly represent the formation of new mental structures (e.g., process) step by step. Therefore, the process of forming new mental structures is not possible without the initial formation and internalization of the mental structure of action (Dubinsky, 1991).

According to Flanagan (2001), first, students with the action structure of the reflection line that defines the geometric reflection have difficulty understanding the role of the reflection line (e.g., understanding the relations between corresponding pre-image and image points and the reflection line or the use of the equidistance and perpendicular properties of geometric reflection). Second, students with an action structure of domain assume that a geometric reflection is applied to a single point or figure. Third, students with an action structure of plane assume they may simply perform a reflection as a movement rather than mapping the plane onto itself. This view is erroneous because the plane is a set of infinite points, and geometric figures are not separate from the plane but a subset of points on it.

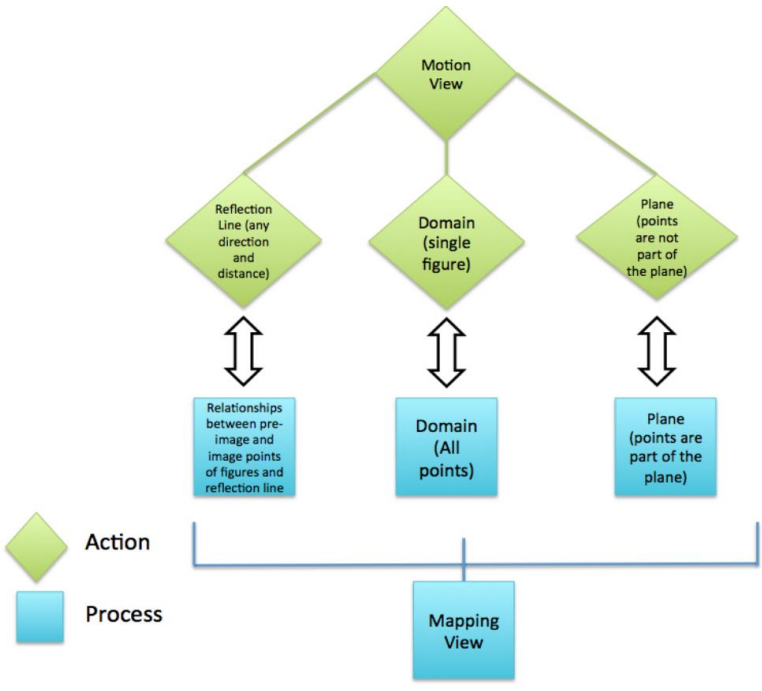
According to Dubinsky et al. (2005), the process mental structure is formed as a result of the iteration and interiorization of the mental structure of action. While a new mental structure is being formed, all the steps can be imagined without the need to be explicitly stated. According to Flanagan (2001), first, students with a process structure of reflection line know the role of the reflection line (e.g., understand the relations between corresponding pre-image and image points and the reflection line and the use

of the equidistance and perpendicular properties of geometric reflection). Second, students with the process structure of domain have started to think about all points in the plane rather than only the labeled points on a single figure within it. Third, students with the process structure of plane think of the geometric figures as a part of the plane rather than as separate from it.

I created a preliminary genetic decomposition (PGD) using the literature on mathematics education (Flanagan, 2001; Yanik & Flores, 2009) and inferences drawn from it. The PGD indicates my hypothesis about the PT's action and process structure of geometric reflection based on the motion and mapping view (see Figure 1). The PGD was used to design a series of interviews to develop the geometric reflection tasks to collect research data. Flanagan (2001) and Yanik (2006) have shown that the formation of a geometric reflection mental structure depends on the coordination of the mental structures of action and of process. Accordingly, as seen in Figure 1, I hypothesized that to make a meaningful transition from a motion view to a mapping view, a PT must undergo changes in his/her mental structures of action and process. However, the motion view of the reflection line, domain and plane indicates a different mental structure of action and of process from that of the mapping view of reflection line, domain and plane. For example, a PT with an action structure of motion view considers the domain as a single point or the figure, whereas a PT with a process structure of mapping view considers the domain as a whole plane. However, the existing mental structure of action associated with a motion view can develop into a new mental structure to reach a process structure of mapping view of the domain, as well as of the reflection line and plane. As illustrated in Figure 1, the formation of the mapping view depends on the structuring and organizing of all the relevant mental structures. I hypothesized that the PTs need an action structure of motion view before developing a process structure of a mapping view.

Figure 1

Preliminary Genetic Decomposition



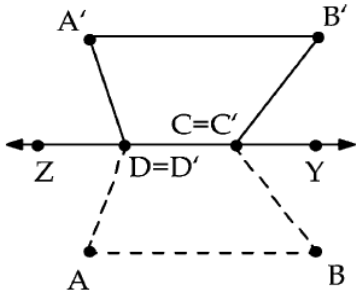
Research on Students' and Pre-Service Mathematics Teachers' Understanding of the Concept of Geometric Reflection

Studies of students' and pre-service teachers' understanding of geometric reflection show they have similar difficulties with accurately describing the role of the reflection line, considering the domain as a single figure or assemblage of points, and using the operational definition of the plane (Boulter & Kirby, 1994; Dixon, 1997; Hollebrands, 2003, 2004; Mhlolo & Schafer, 2013; Yanik, 2006). These studies document that both students and pre-service teachers have a motion view rather than a mapping view of geometric reflection.

Hollebrands (2003) implemented a 7-week unit to investigate how 4 tenth-grade students understood the concepts of translation, rotation, reflection, and dilation using the Geometer's Sketchpad (Jackiw, 2001). She found that all the students' understanding of domain indicated a motion view of geometric reflection. For instance, when asked to explore all points on a quadrilateral ABCD that would be fixed over the reflection line j (see Figure 2), a student said that "there were no fixed points in the figure except for the ones on line j, which is not a point of ABCD" (p. 62). This response indicated that the student focused on only the points on the figure rather than all points in the plane as the domain. Hence, it could be inferred that the student had an action structure of domain in understanding geometric reflection. To have a process structure of the domain, the student would need to consider the domain as comprising all points in the plane.

Figure 2

Student's Drawing of a Reflection on a Reflection Line (p. 62)



Mhlolo and Schafer (2013) examined 235 eleventh grade students' preconceptions about geometric reflection. When asked to reflect several points on a Cartesian plane over an oblique reflection line, none of the students reflected the points correctly by using the properties of equidistance and perpendicularity, from which it could be inferred that they had an action structure rather than a process structure of the reflection line in their understanding of geometric reflection.

Yanik (2006) conducted an 8-week teaching experiment to explore the development of four PTs' understanding of translation, reflection, rotation, and dilation using Geometer's Sketchpad and found they all had a motion view of geometric reflection based on their understanding of the role of the reflection line, their consideration of domain as a discrete figure, and using the operational definition of the plane. Specifically, the PTs had difficulty determining how to use the reflection line and

understanding the properties of equidistance and perpendicularity, which are important for identifying how to position the points or figure correctly.

Studies show that both students and PTs have a motion view rather than a mapping view of geometric reflection based on their understanding of the role of the reflection line, domain, and plane (Flanagan, 2001; Yanik, 2006). One reason for this problem might be the lack of content in textbooks (Zorin, 2011). In this section, I discuss my examination of the treatment of geometric reflection in terms of motion and mapping views in the middle-grade (6, 7, 8) textbooks of the National Science Foundation (NSF) funded Curriculum of Mathematics Project (CMP) Textbook series (including teacher's guides and student's editions). These books were selected based on their popularity in the USA.

Analysis of the definitions of geometric reflection in CMP textbooks indicates that they support a motion view rather than a mapping view. For instance, the CMP3 teacher's guide describes geometric reflection as occurring "if a reflection in a line maps the figure exactly onto itself" (p. 13). From this description, a student would likely infer that a geometric reflection involves only the given figure rather than all points in the plane. In this way, CMP textbooks may promote students' understanding of the domain as a single figure rather than as all points in the plane in performing a geometric reflection. Thus, while these textbooks were meant to support conceptual development, their focus on inductive reasoning may inadvertently support a motion rather than a mapping view of reflection. This suggests that explicitly providing formal mathematical definitions of concepts in textbooks rather than approaching them implicitly is important for helping students understand mathematical concepts (Tossavainen et al., 2017).

Methods

Participants

In the original study, six PTs in the Curriculum and Instruction Department of a large, public, Midwestern University in the United States were identified as potential participants for the study. After an initial interview with each, four PTs were selected based on their willingness and ability to explain their thought processes. These four participants were all in their last year of an undergraduate program in mathematics education. By the end of the third interview in the original study, all four participants had reached a mapping view of geometric reflection and demonstrated a similar transformation of mental structuring. Thus, it was considered sufficient to focus on mental structure development of one of the participants for the present case study.

Settings for Interviews

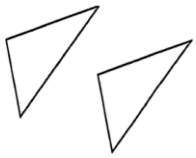
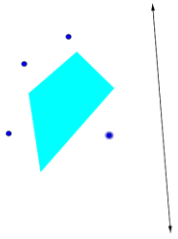
Each participant was interviewed individually three times to investigate their reasoning and thought processes in depth. The initial interview questions were identical for each participant, and the subsequent exploratory interview questions were individualized. All interview sessions were video-recorded, with one video camera focused on interactions between the participant and the researcher. A second video camera focused on the participant's work area and his/her utterances, gestures, manipulations, and speech characteristics.

Interviews

The purpose of the initial interviews was to gather background knowledge about participants in order to choose PTs to be further interviewed to collect evidence of their mental structures as they moved from a motion view to a mapping view of geometric reflection and developed an understanding of the sub-concepts of reflection line, domain, and plane. Some example tasks were shown in Table 1.

Table 1

Example Interview Tasks

The Task is About	Relevant Tasks
Defining geometric reflections	• Using your own words and any pictures or diagrams you need to express your ideas, define the term of geometric reflection. • Can you give an example of geometric reflection?
Recognizing geometric reflections	• Is this a reflection? Why or why not? 
Describing the role of reflection line	• Explain how you determined where to a place the figure. • What do you think about the role of reflection line? 
Describing domain	• What points did you reflect? • Are there any other points being reflected besides these points? • Are there any points inside the figure? If yes, where do these points inside the figure go when you reflect them? 
Describing plane	• Can you describe the plane? • Is there a movement you perform a geometric reflection?

In the first explanatory interviews, I explored PTs' mental structures associated with a motion view of geometric reflection line and domain. I designed the interview questions to determine PTs' thinking in terms of actions and processes. I hypothesized that to reach a mapping view, PTs must have the process structure of reflection line, domain, and plane. Specifically, I asked the PTs to identify whether two figures constituted a reflection and to justify their stance. Whether or not the participants responded correctly, I asked probing questions to better understand their reasoning. In addition, I gave the PTs a series of open and closed figures on which to perform a reflection of a line, triangle, trapezoid, rectangle, etc. I asked the PTs to perform a geometric reflection and explain how the image in the geometric reflection was positioned in the plane. This task targeted the participants' use of the reflection line, which was positioned in a variety of ways (e.g., vertical, horizontal, and oblique) relative to the bottom of the page.

For the second explanatory interview, I gave the PTs a set of tasks adapted from Yanik (2006), along with additional tasks I had created. The main purpose of the tasks was to collect evidence of PTs' mental structures for actions and processes with regard to the reflection line, domain, and plane. For example, I explored the concept of domain, and I asked, "Is there any point outside the figure?" If the answer was "yes," I asked, "Where do the points outside the figure go when you have a reflection?" If the PT's explanation of the position of the points in performing a geometric reflection took into account points both inside and outside the figure (i.e., the PT had begun to consider all points in the domain rather than view the domain as a single figure), I hypothesized that the PT was at the process structure for the concept of domain.

For the third explanatory interview, the PTs were given a set of tasks adapted from Flanagan (2001) and Yanik (2006) and other tasks that I created. The main purpose of these tasks was to gather evidence of the PTs' current mental structures of actions or processes of a mapping view and to determine how they coordinated and interrelated their schemas for the concepts of reflection line, domain, and plane, which are needed to develop a schema for a mapping view. I asked the PTs to reflect a circle with a yellow triangle inside over the reflection line. The reason behind this task was to see if they understood that the plane involves a set of points, and when they reflect a figure, they need to consider all points in the plane to map them under the reflection. For example, I asked, "Are there any points on the image? If yes, where do the points on the image go when you have a reflection?" "Are there any points on the white part of the plane? If yes, where do those points go when you have a reflection?"

Data Analysis

All of the data were analyzed using the APOS theoretical framework. I transcribed the audio and carefully viewed the video recordings to investigate whether the participant had an action or process structure of reflection line, domain, and plane for geometric reflection (see Table 2). During this process, I started to code based on participants' responses and interactions with the tasks to investigate which mental structures the participant had developed. Next, I created a table to identify evidence points (Arnon et al., 2014; Dubinsky, 1991). Then, I created a model for John based on my interpretation of his mental structures at the actions or processes related to reflection line, domain, and plane. In the model, I identified how a motion view of reflection line,

domain and plane as an action structure evolved to a mapping view of reflection line, domain and plane as a process structure.

Table 2

Sample Data Analysis

Codes	Transcript Excerpt	Reasons And comments	Notes
Action	R: find the image of the triangle after performing reflection over the line, and explain how you determined where to place the figure?	The PT' s answer shows that the PT seemed to understand the role of reflection line (e.g., mapping points over the reflection line) using perpendicularity and equidistance properties. Based on this explanation, the PT is at the process structure for reflection line. However, PT only selected vertices and sides, rather than all points in the domain to apply the reflection. At this point, the PT is at the action structure for domain.	The participant did not go through each step (e.g., mapping all points on the perimeter of the figure, inside and outside the figure) to perform a reflection. PT directly reflected vertices over the reflection line and explained the role of reflection. The participant had interiorized his action into a process structure.
Process	A PT: I selected three vertices and reflected over the reflection line. Then, I connected them together to draw triangle.		

After completing analyzing of data, I tested the preliminary genetic decomposition by using APOS theory. For example, my preliminary genetic decomposition indicated that John would have an action structure of the reflection line. After the first interview, I found that he had an action and a process structure of the reflection line. I also found that knowing equidistance and perpendicularity properties and the relationship between pre-image and image points of figures and the reflection line are important factors to help him to move from an action structure to a process structure. After testing the preliminary genetic decomposition, I created additional hypotheses to be tested in the subsequent interview. For instance, I hypothesized that John had an action structure of the domain. After the first interview, I found that he had an action structure of the domain because in that he considered single points of the figure in the plane to perform a geometric reflection. Therefore, I needed to create new hypotheses for the remaining interviews to test tasks again or add several tasks to ask him to move to the process structure. I repeated data analysis and testing of hypotheses after each interview.

To ensure the reliability of the data, I shared and discussed my inferences and interpretations of the participant's mental structure with a volunteer mathematics educator who was outside of the coding process but knew the APOS theoretical framework. Then, I asked him whether my inferences and interpretations were correct to code based on the participant's action and process mental structure. If our code matches, I move to the next level of analysis. If our codes are different, we have resolved all the differences by discussion. To ensure the validity of the collected data, I used

triangulation. The use of transcriptions, video recordings, and observation notes allowed the collected data to be validated. This evidence was used to construct models of the PT's actions and processes for geometric reflections in terms of motion and mapping perspective.

Ethical Procedures

This study was approved with the Meeting Date and Number 13.09.2017/1703019007 by the Social and Human Sciences Ethics Committee of Purdue University/USA.

Results

A Case Study of John

The purpose of this case study is to describe one PT's (John's) understanding of geometric reflection from the perspective of APOS theory. This case elucidates how John's motion view of geometric reflection evolved into a mapping view and the factors that facilitated this development. In this narrative, the term "R" refers to "Researcher."

John was selected based on his willingness and ability to explain his thought processes. I excluded other PTs because they did not meet the threshold for verbal expression of ideas, so I would not be able to obtain sufficient external evidence to hypothesize about their mental structures. John was a 21-year-old, third-year student majoring in mathematics education. He recalled receiving formal instruction on the concept of geometric reflection in his high school geometry course, but he had not learned any concepts related to geometric reflection in his college geometry course. John described geometric reflection as "[reflecting] across the y-axis [so] that it [referring to a figure] would have to look like in a mirror" (Initial Interview). In his description, he did not refer to any properties of geometric reflection. However, when directly asked, he correctly explained the role of the reflection line (i.e., to position points symmetrically over the reflection line). Therefore, John might have understood the reflection line in practice but was unsure how to use the reflection line to define geometric reflection.

John's descriptions of performing geometric reflection suggested that he considered the domain as a single figure as he focused on points of figures rather than on all points in a plane. For example, he described a reflection line as "the line in which you are reflecting your shape" (Initial Interview). He explained the role of the reflection line as "knowing where you are going to reflect" (Initial Interview). John did demonstrate awareness of some properties of geometric reflection, stating, for example, that geometric reflection preserved the length and the angles of the original image but not the orientation. However, in describing the process, he did not talk about such properties of geometric reflection as perpendicularity in his initial interview.

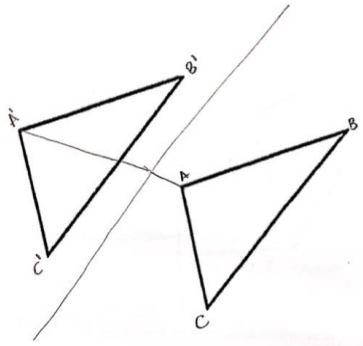
John's Understanding of Reflection Line

In his first interview, John demonstrated both an action and a process structure of the reflection line. He discussed the role of the reflection line in terms of the relations between pre-image and image points of figures and used the properties of equidistance and perpendicularity for performing geometric reflection. For instance, when given a task with two figures without a reflection line and whether it was a reflection, he said it

was not and drew a reflection line between the two figures and stated, “This distance [referring to the distance from point A to the reflection line] from the line [referring to reflection line that he drew] to the point [referring to the point A] is not the same as this distance from this point [referring to point A’] to the line of reflection” (Interview 1) (see Figure 3).

Figure 3

John’s Drawing of a Reflection Line between Given Figures



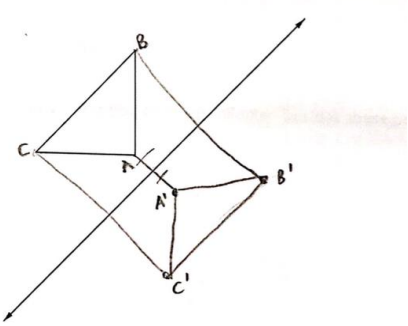
He knew that a reflection line is a useful tool for determining whether an image (A`B`C`) is the reflection of the pre-image (ABC). The drawing is also evidence that he had an action structure for the reflection line.

Later in the same interview, he was given a triangle with an oblique reflection line and asked to perform a geometric reflection (see Figure 4). John selected the closest point (referring to point A) to the line of reflection. After using an index card to measure the distance from A to the reflection line and from the reflection line to A`, he stated that the two distances would be the “same” and “perpendicular.” He then reflected the remaining vertices (points B and C) and connected them to make a triangle. When asked to explain how he determined where to place the figure, John explained:

I knew that these two vertices [referring to points B and C] of the triangles were the same distance away from the line [referring to the reflection line], so I made sure that they [referring to points B and C] were even together at the same line [referring to the BC segment], or on the same line, I guess. Then I decided that this [referring to point A] is the same distance from the line of reflection (Interview 1) (see Figure 4).

Figure 4

John’s Drawing of a Reflection on an Oblique Reflection Line

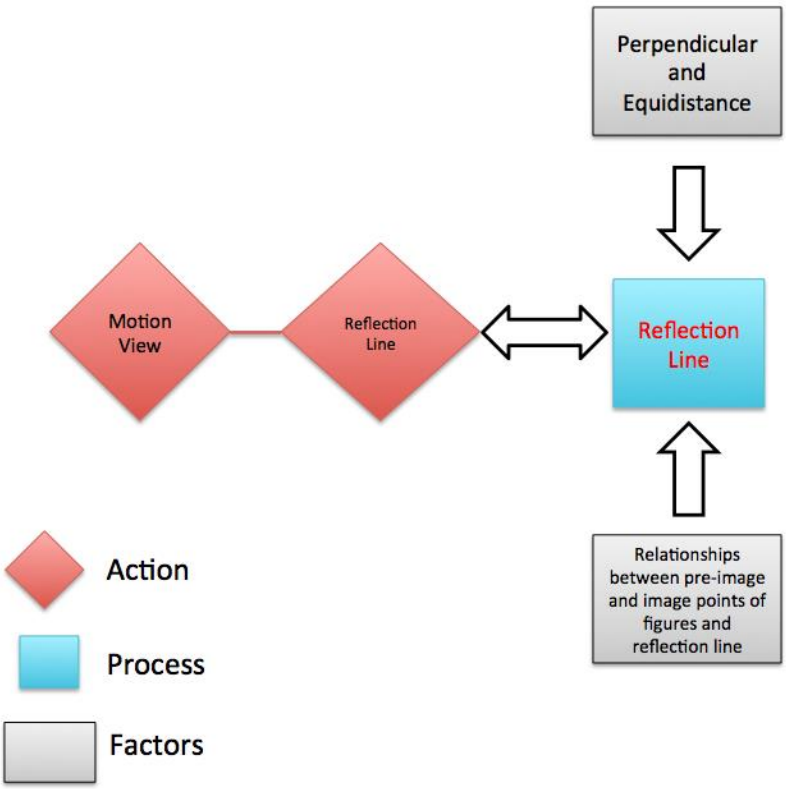


I interpreted his action of mapping the points as evidence that he had a process structure of the reflection line because he reflected the figure as a collection of parts (e.g., points, vertices, sides) rather than as a whole figure. Based on his drawing, I interpreted that he knew the relations between the pre-image and image points of the figures and the reflection line. He had progressed beyond simply identifying the reflection line as an essential component of reflection towards indicating that he needed particular points, mapped in a particular way, with several properties of geometric reflection (the equidistance and perpendicularity properties). This awareness suggested a process structure of a reflection line.

As previously mentioned in my preliminary genetic decomposition (PGD), I hypothesized that PTs begin with a motion view of the reflection line as an action structure in order to develop a mental structure for the reflection line as a process structure. My analysis identified two significant factors that facilitated John's performance of geometric reflection and his understanding: the relationships between the pre-image and image points of the figure and the reflection line, and the properties of equidistance and perpendicularity (see Figure 5). These two factors are sufficient to have a process structure of the reflection line in geometric reflection.

Figure 5

John's Mental Structures of the Reflection Line



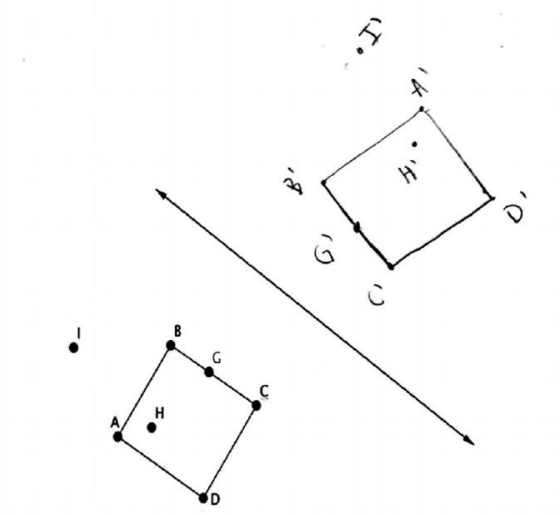
John's Understanding of Domain

The first interview revealed that John had an action structure of domain in geometric reflection because he thought of the domain as a single figure rather than all points in the domain and that geometric reflection was applied to vertices or the

perimeter of the figure. He had difficulty thinking about interior and exterior points in geometric reflection, possibly because of not operating with the concept of plane. For example, John was given a square with an oblique reflection line and asked to "find the figure after performing a reflection across the line" (see Figure 6). John reflected four vertices of a square by measuring the distance between each of the vertices to the reflection line using an index card (A, B, C, D) and then connected the vertices of the reflection to make the square. He again used an index card to position other points (G, H, I) to reflect.

Figure 6

John's Drawing of a Reflection on an Oblique Line



When asked to explain what points he reflected, he elaborated his ideas in the following dialogue:

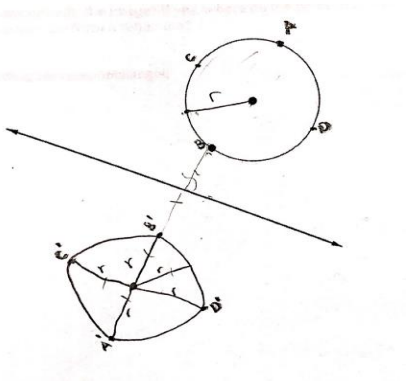
> J: I reflected A, B, C, and D, and then G came along on line BC because it was on the original line BC, and then I reflected H, and I as well.
>
> R: Okay, are there any other points being reflected beside those, like A, B, C, D, G, H, and I?
>
> J: All the other points on the lines A, B, C, [and] D.
>
> R: Okay. Are there any other points that are reflected beside [these] lines [referring to points on the segments AB, BC, CD, AD]?
>
> J: I do not believe so (Line 290-296; 09/19/2017, Interview 1).

I interpreted from his explanation that John considered only the vertices and the perimeter of the figure in performing this geometric reflection, which is evidence of an action structure of domain because he did not consider all points in the plane.

Further evidence of an action structure for domain emerged during the second interview. When I asked John to reflect a circle with an oblique reflection line (see Figure 7), he stated, "it was difficult to reflect the circle since there were no vertices to measure distance." (Interview 2). Using an index card, he measured the distance from point B on the circle to the reflection line and then reflected point B over the reflection line. He then measured the diameter of the circle and reflected point A over the reflection line, and he applied the same process for points C and D. He then drew the circle. Thus he used the properties equidistance and perpendicularity to perform the reflection. (Interview 2).

Figure 7

John's Drawing of a Reflection on a Circle Task



The following excerpt shows how John thought about this task when asked to explain his approach.

> R: How many points did you reflect?
>
> J: I reflected all the points on the circle.
>
> R: Okay. Are there any other points being reflected beside perimeter of the circle points?
>
> J: Nope. I do not believe so. Just on the circle. Oh, well, sorry, I guess the center of the circle I reflected. Reflected this [referring to the center point of the circle of the pre-image] as well if that is a point. I guess I reflected that [again referring to the center point of the circle of pre image] across the line of reflection.
>
> R: Okay. Did you reflect only the center point?
>
> J: No. So you would reflect all of the points inside the circle. (Lines 79-87; Interview 2).

John's explanations suggest that he had started to think of reflecting points interior to the circle. John explained his reasoning as follows:

> I thought to find the center of the circle, and reflecting that point [referring to the center of the circle], and then just finding the radius and then drawing the circle. So then I started to think about ... if you actually are going to reflect the center across then it would make sense because you would obviously reflect the center and if I were going to draw the radius, then I would reflect all the points on them and the perimeter of the circle as well (Lines 113-118; Interview 2).

John's conclusions about performing geometric reflection now included points interior to the figure, at least when the figure was a circle, which seemed to be a new insight. Reflecting a circle seemed to prompt him to think about the interior points of the image. But in response to the question, "is any point outside the figure reflected?" John replied, "no." Thus, he was aware that when a figure is visible on a plane, the points on both the perimeter and interior of the figure are contained within the plane. However, he did not consider the exterior points, which were also in the plane, which was evidence of an action structure of the domain in geometric reflection.

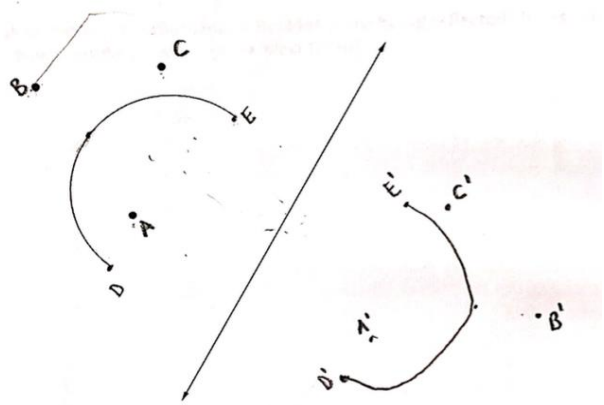
In hopes of provoking John to consider the exterior points, I posed a task using an open figure (see Figure 8). He had no difficulty using equidistance and perpendicularity properties to reflect the given figure. When I asked him what points were being reflected, he said,

> I reflected the three standing points [referring to points A, B, C] and then the end points [referring to points D, E] of this arc and then the top end point [referring to point F] of this parabola, if you think about it that way I guess. And then all of the points on this arc as well (Interview 2).

His explanation was consistent with what he did previously with other tasks.

Figure 8

John's Drawing of a Reflection on an Arc Task

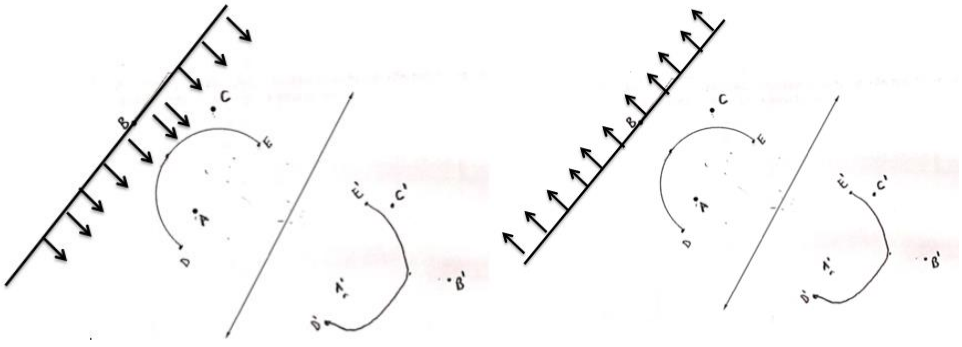


I then asked, "Are there any other points reflected beside those you mentioned?" which led to the following exchange:

> J: So when it was a circle, if this arc were complete then all the points inside the arc will be reflected but ... since this is an open figure ... so ... I would say yeah. So then I reflected all of the points from even I guess this point down [referring to point B]. And this area [referring to point B and all points below B]), I reflected across the line of reflection as well (see Figure 9a). Okay. I think ... Yeah.
>
> R: Okay. How about the other side [referring to the upper part of point B] (see Figure 9b)?
>
> J: So yeah ... Then yeah, all of these will be reflected as well, across the line of reflection then. Because this is an entire plane. That is a good way to think about it. And you are reflecting the plane onto the other side of the line of reflection.
>
> R: How did you start to think that you need to reflect entire plane?
>
> J: Because, well I saw this point [referring to point A] and it was inside my arc, and so I knew that I reflected this point [referring to point A] to this side [referring to image-figure plane], and so then I started to think about all the other points inside this arc [referring to the pre-image], and then I thought about how this point [referring to point A] could be over here [referring to the image-figure plane]. I will still reflect it [referring to point A] because it [referring to point A] was on this side [referring to the pre-image-figure plane] of the line of reflection. Then I saw that these points [referring to the points B, C] that were outside of the arc and how they were enclosed, and how they were reflected onto the other side [referring to image-figure plane] of the line of reflection as well (Interview 2).

Figure 9a and 9b

John's Drawing of a Reflection on a Semi-Circle Task

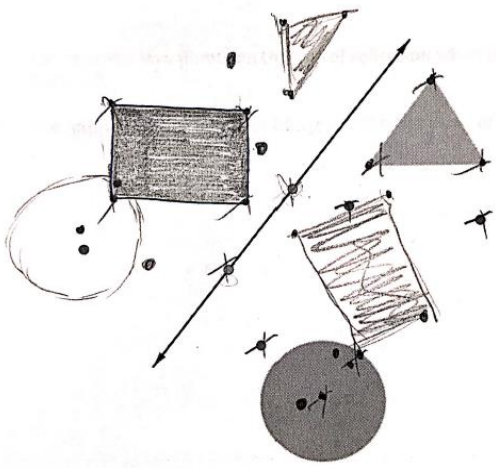


This excerpt shows that John considered and reflected more points in the plane because the figure's interior and exterior were not clearly defined for him. When he saw the two points "outside" of the arc figure (B, C), John started to think about the half plane, which I inferred to mean that he imagined that there was an infinite number of points inside and outside of the arc figure on which to perform a reflection. As evidence of this interpretation, after the arc task, he used his mathematical definition of a plane when he performed a reflection and described reflecting all the points in the pre-image plane (such as points on the perimeter, inside points and outside points of the figure). I interpreted this shift in his explanations as an indication that he had started to think of half of the plane as a non-empty space consisting of an infinite number of points when performing a geometric reflection. The task of reflecting a semi-circle seemed to trigger John to think about the exterior points of the semi-circle in the pre-image plane.

To provoke John to consider all points in the entire plane, I posed a geometric reflection task using multiple figures for both planes (see Figure 10). The task required John to reflect all points from the pre-image plane to the image plane, and all points from the image plane to the pre-image plane. John had no difficulty reflecting the given multiple figures for both planes. I then asked him to explain what points he reflected, to which he replied, "I reflected all the points in this plane [referring to pre-image plane] over to this side [referring to image plane] of the plane, and then reflected all the points from this side [referring to image plane] of the plane onto this side [referring to pre-image plane] of the plane." (Interview3).

Figure 10

John's Drawing of Geometric Reflection for both Sides of the Plane

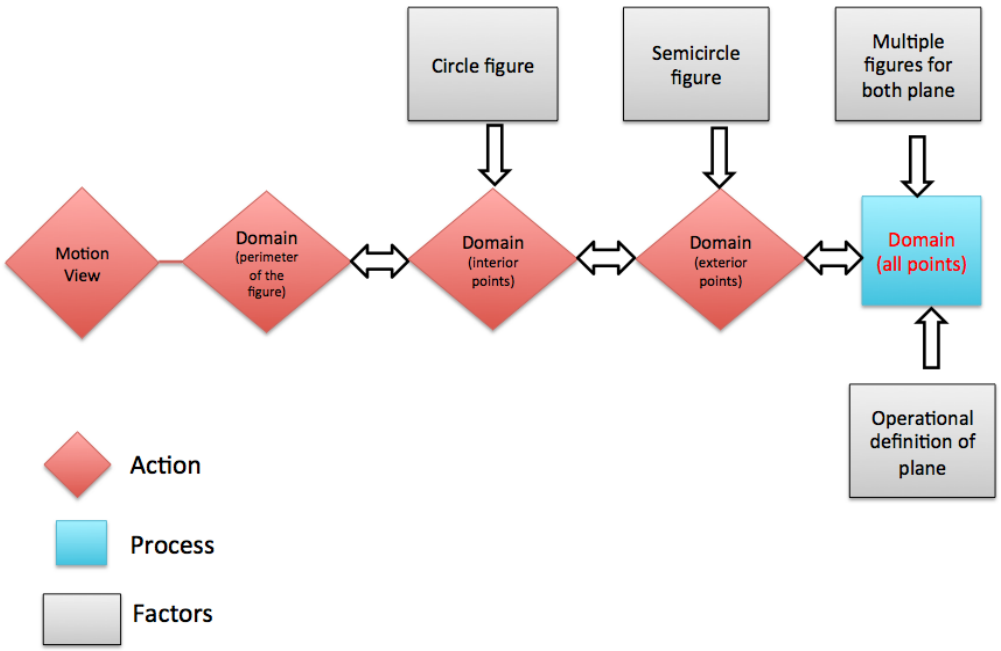


Thus, John had started to think about all points in the plane when performing a reflection. Although he did not consider physically reflecting unlabeled points, he showed that he understood that performing a geometric reflection requires reflecting both labeled and unlabeled points, that is, all points in the entire plane. The tasks with circle, arc, and multiple figures and my questions helped John consider "interior" and "exterior" points when performing a geometric reflection. I, therefore, inferred his explanations to mean that he had reached the process structure for the concept of domain in geometric reflection. Figure 11 shows the development of John's mental structures of domain throughout the first, second, and third interviews, illustrating how

he reached a process structure of domain by unpacking his mental structures through the lens of APOS theory.

Figure 11

John's Mental Structures of Domain



As previously mentioned in relation to my PGD, I hypothesized that PTs begin with a motion view of the domain as an action structure to develop a process structure. As illustrated in John's case, my analysis identified five significant factors in the development of their performance of geometric reflection and their understanding of domain: task involving a circle figure, task involving a semi-circle figure, task involving multiple figures for both planes, operationally defining plane, and questioning. These factors are sufficient to achieve a process structure of domain in geometric reflection.

John's Understanding of the Plane

The analysis of John's initial interview demonstrated that he considered the plane and figures as collections of infinitely many points. During the first and second interviews, John consistently used the verb "move" with regard to performing geometric reflection. He considered geometric figures as moveable on the plane rather than as subsets of the plane. For instance, when performing a reflection in the circle task, John viewed points as "separated from the plane," indicating that he could move points or figures to perform a reflection. The following episode illustrates this perspective:

> R: How about the outside points? Are there any outside points that you reflected?
>
> J: I guess I didn't have to do anything to these points [referring to outside points of the circle] in putting the points inside the circle *I had to move the surrounding* points[referring to other points inside the circle] to the other side of the line, I guess is what I am trying to say. (Interview 2).

John use of the word "move" suggested that he thought that points were located on the plane, which means that they were not part of the plane (Yanik & Flores, 2009), so the points or figures were relocated to a new position relative to other points in the other plane. This perception was evidence that he had an action structure of plane for performing geometric reflection.

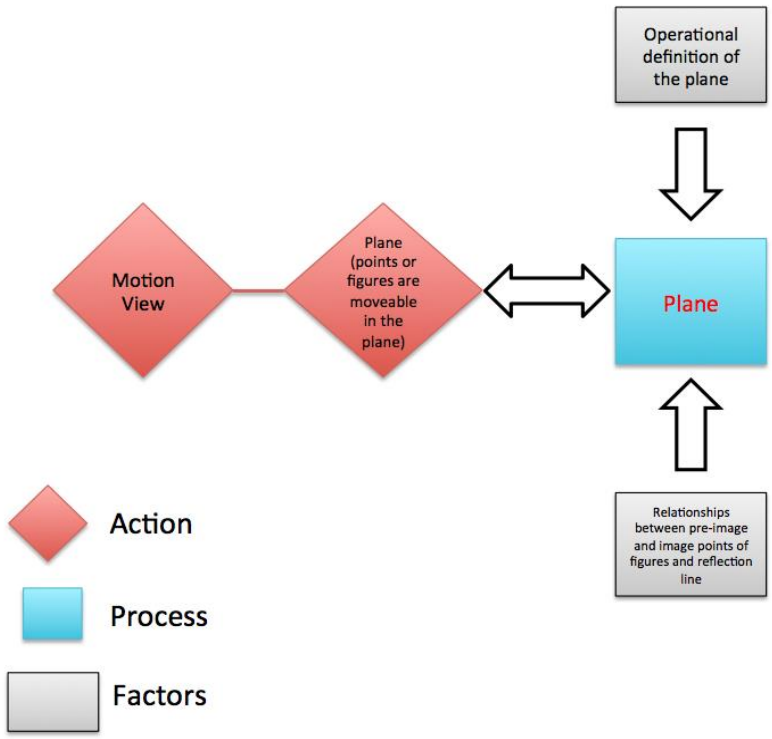
In the third interview, John was asked about the relationship between points/figures and the plane: "When you perform a reflection, is there any movement of the points or figures from one half of the plane to another half of the plane?" He explained his reasoning as follows:

> I believe that it stays on this side of the line of reflection because ... Well, it is still there now. But, it still existed. It still exists on this plane; I just reflected it over to this line. I did not pick it up and move it, but I like copied it. (Interview 3).

I interpreted from this explanation that John was now considering the points of figures to be part of the plane because when he performed a geometric reflection, there was no actual movement of points from the pre-image plane to the image plane. John's explanation demonstrated that his mathematical understanding of the relationship between the figures or points and the plane was accurate; that is, he knew that the points (and hence the figure) were embedded in the plane. Further, in practice he understood that the reflection generated a new image, although he had difficulty explaining this idea. This difficulty arose primarily because John found it easier to describe his thinking in colloquial terms that are easily relatable to how we operate with concrete objects in the real world, versus using technical mathematical language to describe the mental operation of performing reflection. Figure 12 shows John's mental structures of plane throughout the first, second, and third interviews.

Figure 12

John's Mental Structures of Plane



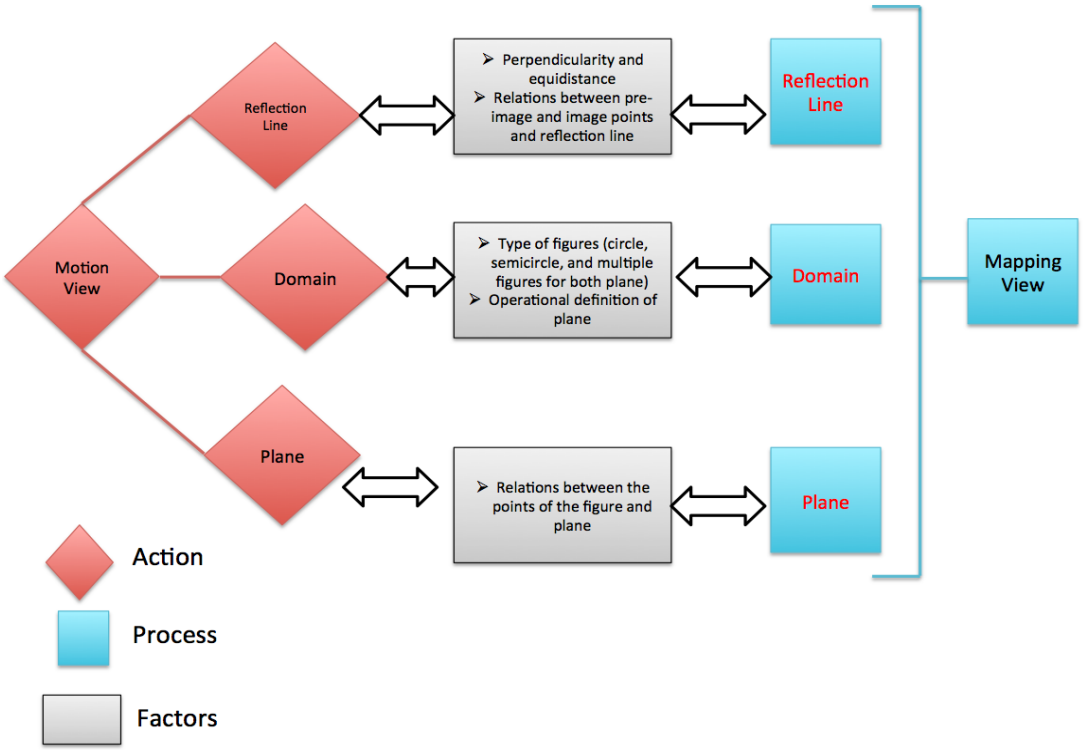
As previously mentioned in my preliminary genetic decomposition (PGD), I hypothesized that PTs begin with a motion view of plane as an action structure in order to develop a mental structure for plane as a process structure. John's model revealed that he had the process structure of plane at the end of the third interview.

Revised Genetic Decomposition

My preliminary genetic decomposition (PGD) of geometric reflection was based on the literature and inferences I drew from it. During my analysis of the data, my PGD evolved, and my final genetic decomposition (GD) is presented in Figure 13. Throughout my analysis of John's case, I looked for similarities and differences in his mental structures of three sub-concepts of geometric reflection. In the PGD, I hypothesized that to develop a mental structure for geometric reflection as a mapping view, PTs would begin with a motion view. My findings confirmed these hypotheses demonstrating that to move from a motion view of geometric reflection to a mapping view, having the process structure of reflection line, domain, and plane is sufficient.

Figure 13

PTs' Mental Structures of Plane



Briefly, in the course of the task-based interviews, John reached process structures in terms of reflection line, domain, and plane. The findings show that John knew that a reflection line is necessary to position where to place the reflected figure. He also knew that the reflection line maps every point in the plane onto itself for a geometric reflection. Additionally, the types of figures (i.e., circle, arc tasks and multiple figures for both plane) and questioning were crucial factors that helped him to think about all points in the domain rather than just a single figure. Using definitions

and understanding the relations between points or figures and the plane helped him to reach a process structure of plane.

Discussion

This study aimed to describe how a motion view can develop into a mapping view and what factors can facilitate this development. The findings from the task-based interviews with a PT (John) revealed that, based on their conceptions of the three sub-concepts of reflection line, domain, and plane, John initially had a motion view of geometric reflection. After three explanatory interviews, the motion view of geometric reflection of John had evolved into a mapping view. This development was related to a variety of factors, such as the properties of equidistance and perpendicularity, the role of the reflection line, the types of figures reflected, the relation between points or figures and the plane, the operational definition of the plane, and questioning.

Understanding of the Reflection Line

Boulter and Kirby (1994), Flanagan (2001), and Yanik (2006) all found that both students and pre-service teachers (PTs) tend to have difficulty with knowing how to use a reflection line to position the points or figures in a reflection and whether or not a reflection line was necessary for performing a geometric reflection, indicating an action structure of the reflection line. Also, when they reflected points or figures, they did not use the properties of equidistance and perpendicularity. In contrast, John in the present study demonstrated understanding of the roles that the reflection line and the properties of equidistance and perpendicularity played in performing geometric reflection during the first, second and third explanatory interviews. Possible reasons for this difference from previous studies might be the educational level of the participants, the nature of the tasks, and the purpose of the initial interview in the present study.

Boulter and Kirby (1994) worked with seventh and eighth-grade students, Flanagan (2001) with tenth-grade students, and Yanik (2006) with pre-service elementary teachers (PETs). However, the researcher worked with pre-service secondary mathematics teachers (PTs), who can be expected to have better knowledge of geometric reflection than PETs and K-12 students. Another reason might be the nature of the tasks and the questions designed to provoke and well as probe thinking. For example, I asked the John to identify whether two figures constituted a reflection and justify their stance without giving them the reflection line to see whether they knew that the reflection line is necessary for performing geometric reflection. Instead of using these kinds of tasks with missing information, Boulter and Kirby (1994), Flanagan (2001) and Yanik (2006) provided reflection lines for all the tasks they used, so their participants' thinking about the role of reflection line might not have surfaced.

To summarize, John knew of the role of the reflection line and the properties of equidistance and perpendicularity in geometric reflections. My findings generated two significant commonalities as factors that facilitated their performance of geometric reflection and the progression of their understanding from an action structure to a process structure of the reflection line: the role of the reflection line and the properties of equidistance and perpendicularity. Therefore, the reflection line is shown to be a significant sub-concept for the concept of geometric reflection and essential in the move from a motion view to a mapping view.

Understanding of Domain

Hollebrands (2003) and Yanik (2006) found that students and PTs had an action structure of domain as a single figure, and they identified consideration of the domain as all points in the plane as the most challenging sub-concept to grasp in performing geometric reflection. In alignment with these two authors, I also found that considering the domain as all points in the plane was a challenging sub-concept for the John, all of whom demonstrated an action structure of domain for geometric reflection in the first interview. Although John gave a correct formal definition of a plane in the initial interview, he considered that geometric reflection was applied to the vertices or the perimeter of the figure in the first explanatory interview. One reason for this difference might be that he seemed not to use the formal definition as his operational definition when performing geometric reflection. Rather he appeared to consider the plane as an empty space and did not attend to anything except the given points or figures. In short, John's conceptual definition of a plane was inconsistent with his performance of geometric reflection.

Another reason why John performed a geometric reflection as a single figure might be the way information is presented and the content emphasized in many textbooks, with which many educators have reported dissatisfaction (Ball, 1993; Jones, 2004; Ma, 1999; Zorin, 2011). Analysis of CMP textbook showed that they support a motion view by implying that certain points or figures are reflected rather than all points in the plane. Another likelihood is that the description "a reflection line maps the figure" may result in students' understanding the reflection line as reflecting a figure as a whole rather than the points that constitute the figure. I hypothesize from the literature that the perception that a figure is being reflected as a whole supports a motion rather than a mapping view, because to have a mapping view of performing a geometric reflection, students need to consider all points in the plane rather than only given figures (Akarsu, 2018; Boulter & Kirby, 1994; Flanagan, 2001; Yanik, 2006). A close analysis of the teacher's guide for CMP textbooks found not even one explanation of performing a geometric reflection that emphasizes reflecting all points in the plane rather than a single figure. I contend that asking, "Do any points remain unchanged under the reflection" would prompt students to make the long jump to considering all points in the plane when performing a geometric reflection. Before being asked this kind of question, however, students need practice with specific tasks (e.g., circle tasks, inside and outside colored tasks, etc.) to develop a mental structure of domain and plane. Hence, I inferred that all four PTs had never learned about reflecting all points in the plane when performing reflections in their previous geometry classes.

The second interview demonstrated the importance of the type of figure provided for encouraging consideration of more points for performing geometric reflection. For example, while working on circle and semi-circle tasks, John progressed from reflecting the vertices or the perimeter of the figure to reflecting all points in the half plane. As he was thinking about the center point of the circle, he started to consider the interior points of the figure. Also, the semi-circle (open figure) task encouraged John to consider all points in the half plane because the figure's interior and exterior were not clearly defined for him. Labeling points inside and outside the semi-circle helped him consider interior and exterior points to the figure, which ultimately includes all points in the half plane, while performing geometric reflection. I inferred that John

was now speculating that there could be an infinite number of points inside and outside of the semi-circle figure in the half plane on which to perform a reflection and was progressing toward conceptualizing the domain as comprising all points in the plane although he still had an action structure of domain for geometric reflection. Hence, it may be inferred that type of figure (here, half- or full-circle) is important for encouraging consideration of more points for performing geometric reflection.

By the end of the third interview, John was viewing geometric reflection as applicable to all points in the plane. Working with multiple figures in both the pre-image and image planes encouraged him to start thinking about geometric reflection as two-way, reflecting all points from the pre-image plane to the image plane and from the image plane to the pre-image plane. Working with multiple figures in both planes helped him to consider that both the image plane and the pre-image plane have an infinite number of unlabeled points and, therefore, to think about all points in the plane when performing a geometric reflection.

After all interviews, John had started to think about all points in the entire plane when performing a reflection. Although he did not physically demonstrate reflecting unlabeled points for geometric reflection, he understood that performing a reflection involves both labeled and unlabeled points, that is, all points in the plane. The tasks with circles, semi-circles, and multiple figures for both the pre-image and image planes and my questioning strategy helped John to consider all points in the plane. His operational definition of the plane in geometric reflection thus aligned with his mathematical definition of a plane, which I inferred as meaning that he had achieved a process structure for the concept of the domain in geometric reflection. Hence, considering the domain as all points in the plane was shown to be another significant sub-concept for the concept of geometric reflection and essential to move from a motion view to a mapping view.

Understanding of the Plane

Flanagan (2001) and Yanik (2006) found that students and PTs considered geometric reflection as a movement of points or figures, implying that when they performed geometric reflection, they considered the points or figures as separate from rather than as a subset of the plane, indicating an action structure of plane. In my study, in contrast, all the PTs achieved a process structure of plane. During the first and second interviews, John consistently used the verb "move" when performing geometric reflection, suggesting that he considered geometric points or figures as moveable on the plane rather than part of it. During the third interview, therefore, to ascertain his mental structures concerning the relationship between points or figures and the plane, I directly asked whether there was any movement of the points or figures from the pre-image to the image plane when he performed a reflection. In response, John indicated that he considered the points or figures as part of the plane rather than separate from it, which demonstrated that his mathematical understanding of the relationship between the figures or points and the plane was accurate and that he had a process structure of the plane.

John's example suggests that language may be a source of students' and PTs' difficulties with developing an understanding of the relationship between the points or figures and the plane as it is easier for them to describe their thinking in colloquial terms

that are easily relatable to how they operate in the real world than to use technical mathematical language to describe their thought processes. Such language use can affect how they think when performing geometric reflection. Another source of students' and PTs' difficulties might be textbooks. My CMP curriculum analysis indicated that the relationships between the points or figures and plane were not explicitly emphasized in the geometric reflection unit. There is no clear explanation or example that shows all points and figures as embedded in the plane, rather than separated from the plane.

The findings of this study offer some insight into a variety of factors involved as all the participants moved from a motion view to a mapping view, such as the role of reflection line, the properties of perpendicularity and equidistance, the relationships between pre-image and image points of the figures and the reflection line, the meaning of domain, the types of figures used for solving problems, questioning strategies, the nature of the plane, the relationship between figures and plane, and the definitions of all terms.

Implications

Flanagan (2001) and Yanik (2006) found that students and pre-service elementary teachers had a motion view of geometric reflection. No researcher has explicated a mapping view of geometric transformations in general or geometric reflection specifically. Also, there has been no clear evidence documenting how a learner's motion view evolves into a mapping view. This study outlined the progression of PTs' conceptualizations from a motion view into a mapping view of geometric reflection, and the factors that facilitated this change (see Figure 13). Also, the reflection line, domain, and plane were identified as important sub-concepts and they are required in facilitating the development of PTs' motion view into a mapping view. Therefore, the results support the importance of teaching these three sub-concepts to prepare students to accurately understand geometric reflection.

The findings of this study indicate that considering the domain as all points in the plane is a challenging concept for PTs. As shown in John's case, practicing with circle, semi-circle and multiple figures encouraged them to consider more points in the plane when they were performing geometric reflection, which led to a more accurate understanding. Therefore, textbooks should provide examples of and exercises with these types of figures to help learners view the domain as comprising all points in the plane rather than as a single figure. In addition, having an understanding of the points or figures and the plane is important for developing a mapping view. In order for learners to develop a mapping view of geometric reflection, teachers should emphasize the plane and its relationship to points and figures. This study provides useful insights that can be utilized to support PTs' understanding of reflection and thus prepare them to teach this topic more effectively. There has been limited research attention to geometric reflection, and this study was the first to document how PTs move from a motion view to a mapping view.

Limitations of the Study

This study has three limitations. First, because there is lack of tasks related to domain and plane for the geometric reflection in the United States mathematics curriculum, I adapted several tasks from previous studies to emphasize these concepts

of the domain and plane. Therefore, the findings were limited to the tasks that I used. Second, there were six participants for the initial interviews, and I selected four for subsequent interviews based on their willingness and ability to explain their thought processes. This criterion suggests the caveat that these four participants might be different from another sample. The third limitation is that the data consisted of verbal and nonverbal behaviors, idiosyncratic speech characteristics, gestures, and incomplete utterances, so I had to draw inferences from communications that often were not conventional, complete, and clear.

Conflicts of Interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

Akarsu, M. (2018). *Pre-service teachers' understanding of geometric reflections in terms of motion and mapping view* (Doctoral Dissertation, Purdue University, 2018). Dissertation Abstracts International: AAI10839226.

Arnon, I., Cottrill, J., Dubinsky, E., Oktac, A., Roa Fuentes, S., Trigueros, M., & Weller, K. (2014). *APOS theory: A framework for research and curriculum development in mathematics education*. New York, NY: Springer.

Ball, D. L. (1993). With an eye on the mathematical horizon: Dilemmas of teaching elementary school mathematics. *The elementary school journal, 93*(4), 373-397.

Boulter, D., & Kirby, J. (1994). Identification of strategies used in solving transformational geometry problems. *Journal of Educational Research, 87*, 298-303. https://doi.org/10.1080/00220671.1994.9941257

Boyd, C. J., Cummings, J., Malloy, C., Carter, J., & Flores, A. (2004). *Geometry* (Indian Edition). New York: McGraw-Hill/Glencoe.

Clements, D. H., Battista, M. T., Sarama, J., & Swaminathan, S. (1997). Development of students' spatial thinking in a unit on geometric motions and area. *The Elementary School Journal, 98*(2), 171-186.

Dixon, J. K. (1997). Computer use and visualization in students' construction of reflection and rotation concepts. *School Science and Mathematics, 97*(7), 352-358. https://doi.org/10.1111/j.1949-8594.1997.tb17376.x

Dubinsky, E. (1991). Reflective abstraction in advanced mathematical thinking. In D. Tall (Ed.), *Advanced mathematical thinking* (pp. 95-126). Boston, MA: Kluwer Academic Publishers.

Dubinsky, E., Weller, K., Mcdonald, M. A., & Brown, A. (2005). Some historical issues and paradoxes regarding the concept of infinity: An APOS-Based analysis: Part 1. *Educational Studies in Mathematics, 58*(3), 335-359. https://doi.org/10.1007/s10649-005-2531-z

Edwards, L. (2003, February). The nature of mathematics as viewed from cognitive science. *Paper presented at 3rd Congress of the European Society for Research in Mathematics*, Bellaria, Italy.

Flanagan, K. A. (2001). *High school students' understandings of geometric transformations in the context of a technological environment* (Doctoral Dissertation, The Pennsylvania State University, 2001). Dissertation Abstracts International: AAI3020450.

Glass, B. J. (2001). *Students' reification of geometric transformations in the presence of multiple dynamically linked representations* (Doctoral Dissertation, The University of Iowa, 2001). Dissertation Abstracts International, AAI3009596.

Hollebrands, K. F. (2003). High school students' understandings of geometric transformations in the context of a technological environment. *Journal of Mathematical Behavior, 22*, 55-72. https://doi.org/10.1016/S0732-3123(03)00004-X

Hollebrands, K. F. (2004). High school students' intuitive understandings of geometric transformations. *Mathematics Teacher, 97*, 207-214. https://doi.org/10.5951/MT.97.3.0207

Jackiw, N. (2001). *The Geometer's Sketchpad* (Version 4.0) [Computer software]. Emeryville, CA: Key Curriculum Press.

Jones, D. L. (2004). *Probability in middle grades mathematics textbooks: An examination of historical trends*, 1957-2004 (Doctoral Dissertation, University of Missouri-Columbia). Dissertation Abstracts International, AAT 3164516.

Ma, L. (1999). *Knowing and teaching elementary mathematics*. Mahwah, NJ: Lawrence Erlbaum.

Martin, G. E. (1982). *Transformation geometry: An introduction to symmetry*. New York: Springer-Verlag.

Mhlolo, M. K., & Schafer, M. (2013). Consistencies far beyond chance: an analysis of learner preconceptions of reflective symmetry. *South African Journal of Education*, *33*(2), 1-16. https://doi.org/10.15700/saje.v33n2a686

National Council of Teachers of Mathematics [NCTM]. (2000). *Principles and standards for school mathematics.* Reston, VA: NCTM.

Portnoy, N., Grundmeier, T., & Graham, K. J. (2006). Students' understanding of mathematical objects in the context of transformational geometry: Implications for constructing and understanding proofs. *Journal of Mathematical Behavior, 25*, 196-207. https://doi.org/10.1016/j.jmathb.2006.09.002

Tossavainen, T., Suomalainen, H., & Mäkäläinen, T. (2017). Student teachers' concept definitions of area and their understanding about two-dimensionality of area. *International Journal of Mathematical Education in Science and Technology*, *48*(4), 520-532. https://doi.org/10.1080/0020739X.2016.1254298

Yanik, H. B. (2006). *Prospective elementary teachers' growth in knowledge and understanding of rigid geometric transformations* (Doctoral Dissertation, Arizona State University, 2006). Dissertation Abstracts International: AAI3210254.

Yanik, H. B. (2011). Prospective middle school mathematics teachers' preconceptions of geometric translations. *Educational Studies in Mathematics*, *78*(2), 231-260. https://doi.org/10.1007/s10649-011-9324-3

Yanik, H. B., & Flores, A. (2009). Understanding rigid geometric transformations: Jeff's learning path for translation. *The Journal of Mathematical Behavior*, *28*(1), 41-57. https://doi.org/10.1016/j.jmathb.2009.04.003

Zorin, B. (2011). *Geometric transformations in middle school mathematics textbooks*. University of South Florida.

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Effect of Influential Cases on Factor Analysis Results

Etkili Vakaların Faktör Analizi Sonuçları Üzerindeki Etkisi

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ABSTRACT: When performing regression analysis, one way to examine the normality of data is to screen outliers. Outliers, on the other hand, do not always have an effect on regression results. In reality, cases with a large amount of residuals that affect regression analysis results are referred to as influential cases. It is important to detect them in the dataset because they can lead to erroneous conclusions. The influence of influential cases has already gotten a lot of attention in the regression literature, while it has gotten a lot less attention in factor analysis. The aim of this paper is to show how influential cases affect factor analysis results when they are detected using the Forward Search algorithm. The data was collected from 686 university students ranging in age from 17 to 30. The data was gathered using the Self-Regulation Scale (SRS). The results revealed that the removal of influential cases had an effect on the observed correlation matrice for the SRS items, the factorability results, the number of dimensions extracted, CFA fit indices, and the amount of factor loadings and associated errors. Later, in light of related literature, these results were discussed and the researchers were recommended to consider the effect of influential when applying factor analysis.

Keywords: Influential cases, factor analysis, forward search.

ÖZ: Regresyon analizi gerçekleştirirken verilerin normalliğini araştırmak için uç değerlerin incelenmesi kullanılan yaklaşımlardan bir tanesidir. Gerçekte ise, uç değerlerin regresyon sonuçları üzerinde etkili olması bir gereklilik değildir. Aslında, regresyon analizi sonuçlarını etkileyen gözlemler, büyük miktarda artık barındıran etkili vakalar olarak adlandırılır. Veri setinde yanıltıcı sonuçlara yol açabilecek yüksek artık içeren gözlemleri tespit etmek önemlidir. Etkili vakaların etkisi, regresyon alan yazını hâlihazırda dikkat çekmişken faktör analizinde ise daha az vurgulanmıştır. Gerçekleştirilen bu çalışmanın amacı, ileri arama algoritması kullanılarak etkili durumlar belirlendiğinde bu vakaların faktör analizi sonuçları üzerindeki etkilerini göstermektir. Veriler, yaşları 17 ile 30 arasında değişen 686 üniversite öğrencisinden toplanmıştır. Çalışmada veri toplama aracı olarak Öz Düzenleme Ölçeği (ÖDÖ) kullanılmıştır. Sonuçlar, etkili vakaların veri setinden kaldırılmasının ÖDÖ maddeleri için gözlemlenen korelasyon matrisini, faktörlenebilirlik sonuçlarını, çıkarılan boyutların sayısını, doğrulayıcı faktör analizi uyum indekslerini ve faktör yüklerinin miktarını ve yüklere ait hataları etkilediğini ortaya koymuştur. Bu bulgular daha sonra ilgili alanyazın kapsamında tartışılmış ve araştırmacılar faktör analizi gerçekleştirirken etkili vakaların etkilerini dikkate almaları önerilmiştir.

Anahtar kelimeler: Etkili vakalar, faktör analizi, ileri arama.

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The existence of outliers is a frequently encountered problem in studies involving data collection. Although various definitions have been proposed so far, outliers can simply be defined as a data point that is far outside the norm of observations of a universe and as a value with extreme relationships (Rasmussen, 1988). They are the observations that seem inconsistent with the rest of the data (Barnett & Lewis, 1994). Researchers must carefully consider the issue of outliers since any statistical test based on sample means and variance can provide biased estimations in the presence of outliers. As in other analyses techniques, regression modeling is not exempt from the effect of extreme values on the estimates. In the related literature, this effect has been well established (Dan & Ijeoma, 2013; Hadi & Simonoff, 1993; Liu et al., 2004). Outliers in the dataset lead to model misspecification, the inflated sum of squares, distorted p values, biased parameter estimated, and drawing wrong conclusions. In the context of regression analysis, outliers are values that cause a large number of residuals when the dependent variable is predicted or modeled (Fox, 2008).

When conducting regression analysis, one method for checking the normality of data is to screen outliers. The Mahalanobis distance (MD) statistic has long been used in regression analysis to detect outliers. (Fox, 2008). The MD statistics help researchers to detect the cases away from the centroid (which could be regarded as the overall mean of multivariate data) and determine whether an observation is a multivariate outlier with respect to a set of explanatory variables. The Cook Distance (CD) and the generalized distance of Cook (gCD) are the two other well-known outlier case detection statistics used in the regression analysis (Pek & MacCallum, 2011). These approaches are also known as deletion statistics since the impact of cases on the model is measured over the entire dataset, and outlier cases are removed sequentially, resulting in a "*clean*" dataset (Cook & Weisberg, 1982).

One of the drawbacks of deletion statistics is that if a dataset includes a large of outliers, one of the two very similar cases can mask each other, resulting in only one of the two cases being deleted (Bendre & Kale, 1987). Although these statistics have gained popularity in the identification of outlier cases, their efficacy against masking effects is limited. On the other hand, the forward search method (Poon & Wong, 2004), which was originally designed to detect aberrant cases in multivariate methods such as cluster and discriminant analysis (Atkinson, 1994) and was modified to be used in regression models, does not have this limitation (Atkinson et al., 2004). Residual-based approaches and Cook's statistics are known as backward methods, which begin by fitting all the data to the model and deleting one observation at a time until the model fit remains at an acceptable level. On the other hand, forward search begins by fitting the model to a subset of the total data and then iteratively adding all the observations maintaining the fit.

Briefly introducing, the forward search process continues by adding the observations that maintain the fit of the model by sorting the data units according to their contribution to the fitted model. In this process, the unit is selected primarily among the possible sub-units that are free of extreme values. These observations form the starting unit and are also referred to as the "*basic*" unit. The remaining units form "*non-basic*" units. Then, the process continues by adding observations from these "*non-basic*" units to the "basic unit" set one by one. Basic statistics such as model parameter estimates and goodness of fit statistics can be kept preserved in this method by adding

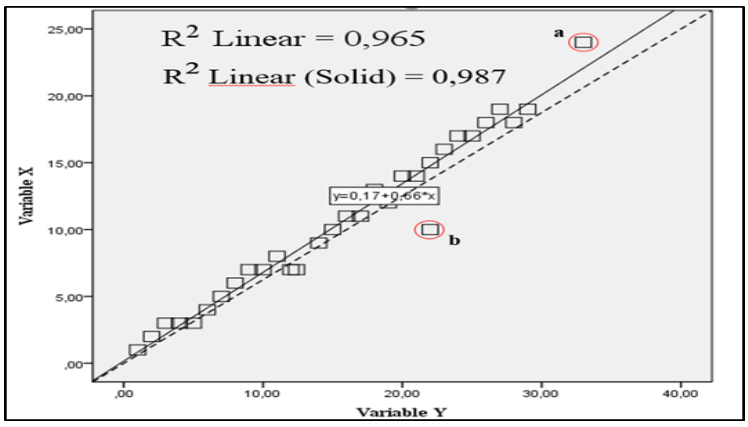
cases that maintain the model's fit (Mavridis & Moustaki, 2008). According to a recent study, the forward search method outperforms deletion statistics when it comes to preventing the masking effect (Riani et al., 2008).

Outliers, contrary to popular opinion, do not always have an effect on regression outcomes. In fact, it is expected that a regression outlier has an important effect on regression results depending on its influence. At this point, an important distinction has to be made between outliers and influential cases. Although some overlap is expected between outliers and influential cases, they are not exactly the same. In fact, outliers don't always have an effect on regression analysis' outcomes. Indeed, the cases that affect the results of regression analysis are called influential cases, which have a large number of residuals. As a result, some outliers are referred to as "*good*" because they have a minor influence on the outcome, whereas others are referred to as "*bad*" because of their excessive influences. Researchers should realize the importance of looking into the influence as well as the extremeness of the cases. Truncating or censoring outliers prior to model analysis is strongly discouraged because removing influential outliers improves model fit while removing non-influential cases reduces the data size and statistical power (Tabachnick & Fidell, 2001).

In this study, an artificial dataset with two variables (named variable X and variable Y) was simulated to better understand the difference between the outlier and influential cases. The relationship between them is shown with a scatter plot in Figure 1 below. The case "*a*" in the figure is most likely an extreme value for the X and Y variables, as well as their linear combination, but it has little effect on the relationship between the variables since it is close to the solid line representing the model. Case "*b*", on the other hand, is closer to the data center and would most likely not be recognized as an extreme value as strongly as case "*a*", but it does have an effect on modeling the relationship between the two variables. The dashed line shows the model calculated by including the case "b". As shown, adding it to the equation changes the line's slope. The exclusion of the case "*a*" has little influence on the model results, while dropping case "*b*" improves the model's fit. All in all, despite the fact that both cases "*a*" and "*b*" are outliers, only case "*b*" is influential and bad.

Figure 1

Scatter Plot of an Artificial Data Showing the Difference Between Influential and Non-Influential Case.



Note: Solid Line Represents the Model Fitted without Case b, Intermittent Line Represents the Model Fitted with All Cases.

A data analysis could result with higher or lower correlations and biased regression coefficients when influential cases are ignored (Dan & Ijeoma, 2013). Obviously, such influential observations should be identified and a decision needs to be given about their inclusion in statistical analysis. As previously mentioned, the effect of influential cases has received attention in regression literature, but it is less so in factor analysis. On the other hand, the basic principles of regression analysis can be applied to common factor analysis since the common factor model is a version of the linear regression model (Chalmers & Flora, 2015). Independent variable(s) are used to explain a dependent variable in regression models, while factors are used to explain the relationships between observed variables in factor analytic models. Hence, the regression diagnostics, for example, which is used to analyze problematic data for the model, is also applicable to Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) techniques (Flora et al., 2012). Although they are viewed as techniques involving very different processes, both techniques regard factors as independent variables and observed variables as dependent variables. Since the usage of Pearson correlations and covariances is still the main approach, normality and linearity are among the basic assumptions to conduct factor analysis. For this reason, strong relationships may not be captured when a dataset contains influential cases.

Influential cases are often ignored in factor analysis because researchers using factor analysis and structural equation models are more concerned with covariance or correlation matrices while residual values are at the heart of regression analysis. Since the researchers are primarily interested in these matrices, they pay no attention to the individual cases that generate them. The key explanation for this ignorance is that because some researchers mistakenly believe that the effect of assumption violations and the presence of influential cases in datasets is minimal when conducting factor analysis since factor analysis is performed with a large number of cases and is a robust technique to such cases (Flora et al., 2012). As a result, the application of influential case detection techniques to factor analytic models is relatively new (e.g., Lee & Wang, 1996; Tanaka et al., 1991). As a result, only a few studies investigating the impact of influential cases on factor analysis results have been published. For instance, Yuan and Zhong (2008) compared three robust MD-based statistics with the simulated datasets. Similarly, Liu et al. (2012) use simulated data and investigated how outliers affect the decisions about the number of factors in exploratory factor analysis.

Further, Koran and Jaffari (2020) studied the accuracy of conventional deletion statistics when they are applied to confirmatory factor models. Finally, Mavridis and Moustaki (2008) investigated the efficacy of the Forward Search approach in detecting influential cases when factor analysis was performed. According to that study, the forward search method is more efficient than deletion statistics in detecting influential events. This study was also conducted with simulated data. In summary, previous studies on this subject use simulated data and focus on methodological comparisons. I provided extensive technical information. Furthermore, only one study used the forward search algorithm that is more powerful technique for finding influential cases than conventional deletion statistics.

From this perspective, it was thought that an illustrative study, which uses real data and includes less technical terminology, would be useful for researchers who use factor analysis in social science studies. In this way, interested readers will be able to

see firsthand how powerful influential cases can be in determining construct dimensionality and model fit.

As a result, the aim of this paper is to show how influential cases affect factor analysis results when using the Forward Search algorithm. The Forward Search was used in this study because of its applicability for multivariate data and its superiority over deletion methods for a potential masking effect (Flora et al., 2012) and efficiency in finding influential cases. This study is expected to help researchers pay more attention to influential cases in their datasets and incorporate the forward search approach into their standard test validation processes.

Method

Participants

The participants of the current study were 686 university students ranging in age from 17 to 30 (*mean*=22.13; *ss*=2.84). Three hundred and seventy-six (54.8%) were enrolled in a public university located in a large metropolis, while 310 (45.2%) were enrolled in a private university located in a mid-sized metropolis. The convenient sampling was used to select the universities and the students. Furthermore, 559 (81.5%) of the students are female, while 127 (18.5%) are male. Participants were included in the research on a voluntary basis and were told that the information they provided would be kept confidential. The data collection process was done by an online data collection platform due to the 2020 pandemic outbreak.

Measurement Tool

A real dataset was used in this study to show the impact of influential cases in a more concrete way. As a result, the Self-regulation Scale was used to collect data (SRS). The scale was developed by Schwarzer et al. (1999). The scale consisted of seven items which are scored by rating each item on a 4-point Likert type (1=Completely wrong, 4=Completely correct) scale. A person's high score implies s/he has more ability to control and collect attention. The English version of the scale was adapted by Diehl et al. (2006) and the Turkish version was adapted by Demiraslan et al. (2015). For the adaptation study, the Exploratory and Confirmatory Factor Analysis methods were used to examine the construct validity of the Turkish version. Additionally, the internal consistency of the Demir Aslan SRS was evaluated by the Cronbach Alpha coefficient and the test-retest correlation coefficient was also computed to evaluate the stability of SRS scores. Furthermore, The General Self-Efficacy Scale and Academic Self-Efficacy Scale were utilized for investigating criterion-related validity. As a result of factor analysis, it was observed that the Turkish version of the SRS was unidimensional. Cronbach Alpha internal consistency coefficient of the scale was found to be .84, test-retest reliability coefficient was .67. It was found that the SRS scores showed a significant and positive relationship with the Demir Aslan scores obtained from the General Self-Efficacy Scale and Academic Self-Efficacy Scale. The analyzes showed that the Turkish form of the Self-Regulation Scale is a valid and reliable measurement tool for university students.

Statistical Analysis

The current study carried out the whole statistical procedures on the R statistical program (R Core Team, 2020). The analyses were repeated three times, and different sample sizes were used for each repetition. Each analysis depicts a variety of testing scenarios that are experienced in validation studies. The entire dataset was used for the first scenario that specifies a situation in which a researcher uses a factor analytic approach without removing any outliers. At the second step, the analysis was repeated by removing outlier cases based on MDs of the cases. This scenario describes a situation in which a researcher is aware of the impact of outlier cases. Nevertheless, it uses a traditional and less effective deletion statistic that is susceptible to masking effect. For this analysis, the R function of "*mahalanobis*" was used. At this stage, case removal was conducted by considering $p<.001$ significance level. As a result, influential cases still remain in the dataset. In the final stage, the forward search algorithm was used to remove influential cases that could be omitted in the previous step. This final step describes a scenario in which a researcher is aware of the impact of influential cases and employs the forward search approach to efficiently eliminate them. For this analysis, the "*forward.search*" command was used, which is available in the "*faoutlier*" package (Chalmers & Flora, 2015).

At each stage, both the EFA and CFA were conducted and the results were presented. The EFA was carried out with the R command the "*fa*," which is available in the "*psych*" package developed by (Revelle, 2015). The CFA was performed using the command "*cfa*" which is available in the "lavaan" package (Rosseel, 2012). The results of each step were compared in order to demonstrate how different scenarios produce different dimensional structures and estimates.

Ethical Procedures

Ethical approval and written permission were obtained from Marmara University Institute of Educational Sciences Research and Publication Ethics Committee with the decision dated 19.11.2020 and numbered 2020/85. The research was carried out in accordance with ethical rules at every stage. Participation in the research took place on a voluntary basis.

Results

The "*complete*" dataset, including 686 cases, was used in the first step to conduct both the EFA and the CFA. The MDs were measured later, and 17 cases were identified as outliers at $p<.001$ significance level, and they were excluded from the dataset for further study. Following the removal of these cases, the EFA and CFA analyses were repeated with "*outlier case-free*" dataset composed of 669 cases. Finally, the Forward Search algorithm was used to detect the cases with the highest influence statistics and the first fifty cases were removed. This "*influential case-free*" dataset was used to repeat the EFA and CFA analyzes with the remaining 619 cases.

The Results of the Analysis for the Complete Dataset

The factorability of the complete dataset was firstly examined before the EFA was performed. Accordingly, KMO sample adequacy value of the scale was found to be .807. The Bartlett's Test of Sphericity result is statistically significant at $p<.001$ level.

Anti-image correlations were in the range of .860 to .731, and communalities were found to be varied between .506 to .688. All these results supported the factorability of the SRS. After the investigation of the factorability results, the EFA was performed and the results provided by the EFA suggested a two-factor solution. The two-factor solution was found to contribute to 58.49 percent of the total variance: the first factor with eigenvalue of 2.95 explains 42.17 percent of the total variance, while the second dimension with an eigenvalue of 1.14 explains 16.31 percent of variance. Based on the EFA results, the 4th, the Ross eel 5th, and the 6th items of the SRS were found to gather on a second dimension while the rest of the items were placed in the first dimension. Additionally, the CFA results showed that the single factor solution was not confirmed for the complete dataset [χ^2=155.88, df=14, χ^2/df=11.13, CFI=.87, TLI=.81, NFI=.86, GFI=.93, AGFI=.86, RMSEA=.12, SRMR=.07]. Subsequently, 17 cases were eliminated from the dataset based on the MDs and the second phase of analysis was conducted. In the rest of this manuscript, the information regarding the results provided by factor analyzes carried out at the second and third phases was presented together for the convenience of readers.

The Results of the Analysis for Outlier Case-free and Influential Case-free Datasets

Before presenting the EFA and CFA results, the inter-item correlations and item statistics that were calculated for both "outlier-free" and "influential case-free" datasets were presented in Table 1 below. The coefficients in the upper diagonal were calculated with the outlier the case-free dataset, while the coefficients in the lower diagonal were calculated with the influential case-free dataset. The findings revealed that small increases were observed for correlation values after removing influential cases from the dataset.

Table 1

Pearson Correlations of Items for Both the Outlier Case-Free and the Influential Case-Free Datasets

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7
Item 1	-	.44	.48	.46	.30	.30	.22
Item 2	.46	-	.57	.46	.27	.26	.15
Item 3	.50	.56	-	.53	.30	.32	.24
Item 4	.50	.51	.58	-	.47	.43	.18
Item 5	.36	.35	.36	.48	-	.46	.00
Item 6	.35	.34	.39	.46	.43	-	.07
Item 7	.24	.17	.28	.24	.09	.14	-

The statistics obtained for item statistics and internal consistency coefficients for both datasets were given in Table 2 below. As presented in the table, the corrected item-total correlations calculated for the influential case-free dataset are a little higher. Similarly, the value of the Cronbach α calculated for this dataset showed an increase as

compared to the outlier-free dataset. That is, influential cases have an impact on both item-total correlations and internal consistency of the SRS items. On the other hand, when the effect of inclusion of each item to the test on the reliability level was investigated, it was seen that the removal of each item has the same impact on test reliability for both datasets. For example, for both datasets, removing the 7th item increases the level of reliability.

Table 2

Item Statistics and Reliabilities of Datasets with and without Influential Cases

	Complete with Influential Cases		Data without Influential Cases	
Items	Corrected Item Total Cor.	Alpha if Item Deleted	Corrected Item Total Cor.	Alpha if Item Deleted
Item 1	.55	.72	.58	.76
Item 2	.53	.72	.57	.76
Item 3	.61	.70	.65	.74
Item 4	.65	.69	.69	.73
Item 5	.45	.73	.49	.77
Item 6	.46	.73	.51	.77
Item 7	.19	.80	.26	.82
Cronbach α		.76		.79

When the EFA results were investigated, it was seen that a two-factor solution was suggested as the first factor has the eigenvalue of 3.10 and explains 44.31% of the total variance. In comparison, the second dimension has the eigenvalue of 1.12 and explains 15.96% of the total variance for outlier case-free dataset. These two factors contributed to 60.27% of the total variance. Another result showed that data removal based on the MD did not affect the factor structure.

Then, with the removal of the fifty most influential cases, the analyzes were repeated. As a result, in line with the original structure of the SRS, one-dimensional structure was supported. This dimension had an eigenvalue of 3.33 and explained 47.54% of the total variance. As it can be inferred, removal of influential cases yields a factor structure compatible with the original factorial structure of the SRS.

Table 3

The EFA Results with Complete Data and the Data without İnfluential Cases

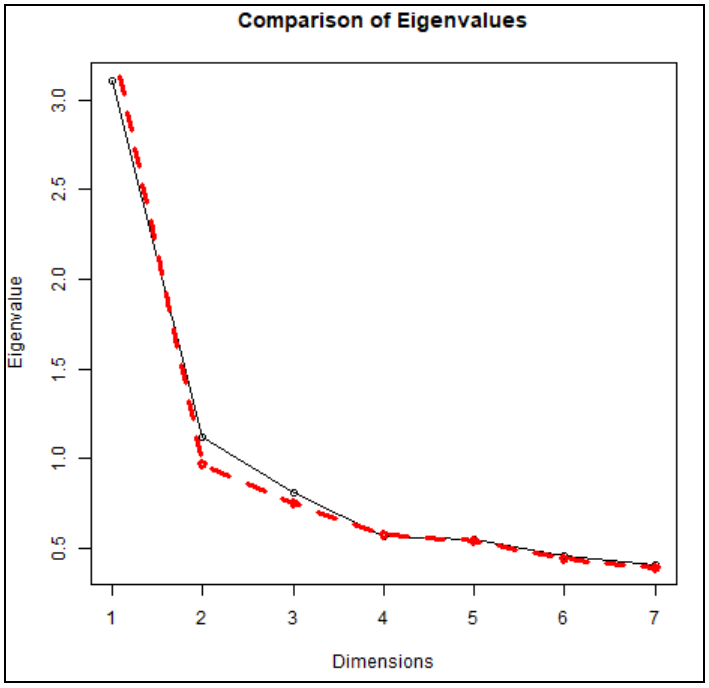
	Data with Influential Cases			Data without Influential Cases	
Items	Dim. 1	Dim. 2	Communality	Dim. 1	Communality
Item 1	.65		.54	.73	.53
Item 2	.66		.55	.73	.54
Item 3	.73		.65	.79	.62
Item 4	.53	.61	.65	.82	.67

Item 5		.81	.67	.64	.41
Item 6		.73	.57	.65	.43
Item 7	.71		.60	.37	.14
Eigenvalues	3.10	1.12		3.33	
Var. explained (%)	44.31	15.96		47.54	

Figure 2 shows how the eigenvalues of extracted factors are affected as a result of removing influential cases from the dataset. As can be shown, the scatter plot's slope became steeper as the influential cases were removed, and the unidimensional form became more interpretable based on the plot.

Figure 2

Effect of Influential Cases on the Eigenvalues. Red Line Pertains to the Data Without Influential Cases



Not: Red line pertains to the results obtained from the dataset without influential cases.

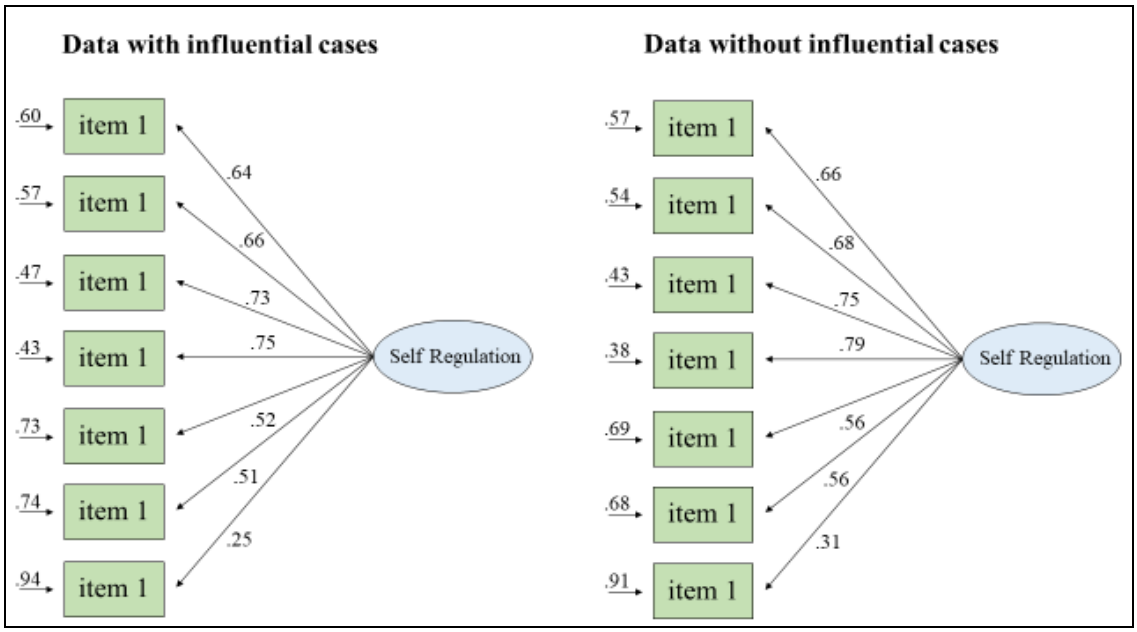
After removing the influential cases, the CFA findings also confirmed the SRS's unidimensionality. The CFA findings showed that unidimensional structure cannot be verified by using the outlier cases-free dataset [χ^2=137.94, df=14, χ^2/df 9.86, CFI=.90, TLI=.85, NFI=.85, GFI=.94, AGFI=.87, RMSEA=.12, SRMR=.06]. The unidimensional structure was largely supported when the study was repeated after removing the most influential fifty cases from the dataset [χ^2=58.03, df=14, χ^2/df=4.15, CFI=.96, TLI=.95, NFI=.95, GFI=.97, AGFI=.94, RMSEA=.07, SRMR=.04]. This finding demonstrates that existence of the influential cases may have an effect on the SRS's dimensionality, not only for the CFA but also for the EFA.

In addition, Figure 3 shows the estimated factor loadings based on CFA and the number of corresponding errors. As can be seen in the graph, removing the influential

cases from the dataset increased factor loadings and reduced the amount of error. For example, the factor loading increased from .25 to .31 for the seventh item, while the amount of error decreased from .94 to .91.

Figure 3

Effect of Influential Cases on Eigenvalues



Discussion and Conclusion

The aim of this analysis was to illustrate the impact of influential cases on the EFA and the CFA outcomes. Real polytomous data were collected for this purpose. There were 686 cases in the initial dataset. The following datasets were used for the EFA and the CFA: (a) complete dataset (b) the outlier case-free dataset that was consisted of 669 cases after the removal of 17 cases based on MDs, and (c) the influential case-free dataset, which composed of 619 cases after fifty of the most influential cases were removed. As suggested by Chalmers and Flora (2015), a forward search algorithm was used to evaluate influential cases. Correlation matrices for the SRS items, the factorability results, the number of dimensions extracted, the CFA-based fit indices, and the amount of factor loadings and errors were compared between these datasets after the analyses were completed.

As a result of removing the influential cases from the dataset, the inter-correlation values obtained for the SRS items and the internal consistency level of the scale both increased. This result implies that the existence of influential cases affects the homogeneity of the items. These findings are consistent with the existing literature (i.e., Liu & Zumbo, 2007).

According to the EFA results obtained for the entire dataset, the SRS has a two-dimensional structure, which contrasts with the SRS's original factorial structure. The number of factors extracted did not alter after removing the extreme cases based on MDs, but when the influential cases were removed further from the dataset, the factor analysis results for the SRS revealed a unidimensional structure, as originally proposed by Demiraslan et al. (2015). This finding showed that before starting the analysis, MDs and influential cases should be examined carefully because after removing the

influential cases, the fit statistics of CFA analysis mostly supported unidimensional structure. Otherwise, researchers can come to incorrect conclusions about the scale's factor structure because this study concretely showed that existence of influential cases in dataset adversely affected the factorability results, communality values, factor loadings and, percentage of variance explained by the first factor. These findings were in line with the existing literature (i.e., Liu et al., 2012). At the same time, it was found that the factor loadings had increased and that the amount of error for items had decreased. These results are consistent with Bollen and Arminger's findings (1991).

Implications

The impact of influential cases on regression analysis is well-documented. On the other hand, factor analytic approaches have only recently begun to be studied in terms of the effect of influential cases on them as a variant of regression-based modeling. All previous studies (Koran & Jaffari, 2020; Liu et al., 2012; Mavridis & Moustaki, 2008; Yuan & Zhong, 2008) used simulated datasets, compared different approaches, tested their efficiency across different regulated conditions and used highly technical terminology. Furthermore, except for Mavridis and Moustaki (2008), none of these studies used Forward Search. In this way, this research is unique. It uses a real dataset and shows how false conclusions can be drawn when influential cases are ignored using a factor analytic approach.

The findings obtained in this study should be interpreted with caution for some reasons. Firstly, in this study, the most effective 50 individuals were removed from the datasets without closer investigation on them. However, in a real study, the final decision to delete these cases will have to be made after a qualitative examination of these cases: investigation of particular response vectors and questionnaire forms (Bollen, 1987; Kleinbaum et al., 1988). None of the influential case detection methods, including the forward search algorithm, are adequate to explain a case's deletion from the dataset. This fact was not taken into account in this study. Second, in this study, the most influential fifty cases were all eliminated at the same time. The number of cases that were deleted was decided arbitrarily because there was no cut-off threshold value for deciding how many cases should be removed. It should be noted that this figure cannot be used as a guideline for future research.

Since this is a demonstration report, the results can only be considered in light of the current dataset. Analyses conducted with a different dataset could not yield similar results. The factor structure of the dataset was not monitored or manipulated in this research. Future research should examine whether the current study's findings are generalizable to other scales using datasets with a different number of variables and different psychometric characteristics.

Conflicts of Interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Akif Avcu is research assistant in Educational Sciences Department, Marmara University. His research interests include, test validation, item response theory, network psychometrics and behavioral addiction. He is actively supervising the academic studies conducted by Green Crescent Foundation. In addition, he teaches different courses like Introductory Statistics, Advanced Statistics, Measurement & Evaluation and Research Methodology.

References

Atkinson, A. C. (1994). Fast very robust methods for the detection of multiple outliers. *Journal of the American Statistical Association, 89*, 1329-1339. https://doi.org/10.1080/01621459.1994.10476872

Atkinson, A. C., Riani, M., & Cerioli, A. (2004). *Exploring multivariate data with the forward search*. Springer-Verlag.

Barnett, V., & Lewis, T. (1994). *Outliers in statistical data* (3rd ed.). Wiley.

Bendre, S. M., & Kale, B. K. (1987). Masking effect on tests for outliers in normal samples. *Biometrika, 74*(4), 891-896. https://doi.org/10.1093/biomet/74.4.891

Bollen, K. A. (1987). Outliers and improper solutions: a confirmatory factor analysis example. *Sociological Methods & Research, 15*(4), 375-384. https://doi.org/10.1177/0049124187015004002

Bollen, K. A., & Arminger, G. (1991). Observational residuals in factor analysis and structural equation models. In Mardsen, P. V. (Eds.), *Sociological methodology* (Vol. 21, pp. 235-262). Blackwell Publishing.

Chalmers, R. P., & Flora, D. B. (2015). Faoutlier: An R package for detecting influential cases in exploratory and confirmatory factor analysis. *Applied Psychological Measurement, 39*(7), 573-374. https://doi.org/10.1177/0146621615597894

Cook, R. D., & Weisberg, S. (1982). *Residuals and influence in regression*. Chapman & Hall.

Dan, E., & Ijeoma, O. A. (2013). Statistical analysis/methods of detecting outliers in a univariate data in a regression analysis model. *International journal of education and research, 1*(5), 1-24.

Demiraslan, Y. C., Haşlaman, T., Filiz, K., Mumcu, F., & Gökçearslan, Ş. (2015). Özdüzenlemenin dikkat kontrolü boyutu: bir ölçek uyarlama çalışması-Control dimension of self-regulation: a scale adaptation study. *Başkent University Journal of Education, 2*, 229-238.

Diehl, M., Semegon, A. B., & Schwarzer, R. (2006). Assessing attention control in goal pursuit: A component of dispositional self-regulation. *Journal of Personality Assessment, 86*(3), 306-317. https://doi.org/10.1207/s15327752jpa8603_06

Flora, D., LaBrish, C., & Chalmers, P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. https://doi.org/doi:10.3389/fpsyg.2012.00055

Fox, J. (2008). *Applied regression analysis and generalized linear models* (2nd ed.). Sage Publications, Inc.

Hadi, A. S., & Simonoff, J. S. (1993). Procedures for the identification of multiple outliers in linear models. *Journal of the American statistical association, 88*(424), 1264-1272. https://doi.org/10.1080/01621459.1993.10476407

Kleinbaum, D. G., Kupper, L. L., & Muller, K. E. (1988). *Variable reduction and factor analysis. Applied regression analysis and other multivariable methods*. PWS Kent Publishing Co.

Koran, J., & Jaffari, F. (2020). Deletion statistic accuracy in confirmatory factor models. *Methodological Innovations, 13*(2), 1-10. https://doi.org/10.1177/2059799120918349

Lee, S. Y., & Wang, S. J. (1996). Sensitivity analysis of structural equation models. *Psychometrika*, *61*, 93-108. https://doi.org/10.1007/BF02296960

Liu, H., Shah, S., & Jiang, W. (2004). On-line outlier detection and data cleaning. *Computers & Chemical Engineering, 28*(9), 1635-1647. https://doi.org/10.1016/j.compchemeng.2004.01.009

Liu, Y., & Zumbo, B. D. (2007). The impact of outliers on Cronbach's coefficient alpha estimate of reliability: Visual analogue scales. *Educational and Psychological Measurement, 67*, 620-634. https://doi.org/10.1177/0013164406296976

Liu, Y., Zumbo, B. D., & Wu, A. D. (2012). A Demonstration of the impact of outliers on the decisions about the number of factors in exploratory factor analysis. *Educational and Psychological Measurement*, *72*(2), 181-199. https://doi.org/10.1177/0013164411410878

Mavridis, D., & Moustaki, I. (2008). Detecting outliers in factor analysis using the forward search algorithm. *Multivariate Behavioral Research*, *43*(3), 453-475, https://doi.org/DOI: 10.1080/00273170802285909

Pek, J., & MacCallum, R. C. (2011). Sensitivity analysis in structural equation models: Cases and their influence. *Multivariate Behavioral Research*, *46*(2), 202-228. https://doi.org/10.1080/00273171.2011.561068

Poon, W.-Y., & Wong, Y.-K. (2004). A forward search procedure for identifying influential observations in the estimation of a covariance matrix. *Structural Equation Modeling: A Multidisciplinary Journal*, *11*(3), 357-374, https://doi.org/DOI: 10.1207/s15328007sem1103_4

Rasmussen, J. L. (1988). Evaluating outlier identification tests: Mahalanobis D squared and Comrey Dk. *Multivariate behavioral research, 23*(2), 189-202. https://doi.org/10.1207/s15327906mbr2302_4

R Core Team. (2020). R*: A language and environment for statistical computing. R Foundation for Statistical Computing*, Vienna, Austria. URL https://www.R-project.org/

Revelle, W. (2015). psych: Procedures for personality and psychological research [Computer software manual]. http://cran.r-project.org/web/packages/psych/ (R package version 1.9.12)

Riani, M., Cerioli, A., Atkinson, A. C., Perrotta, D., & Torti, F. (2008). Fitting mixtures of regression lines with the forward search. *Mining Massive Data Sets for Security: Advances in Data Mining, Search, Social Networks and Text Mining, and Their Applications to Security, 19*, 271.

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1-36. https://doi.org/10.18637/jss.v048.i02

Schwarzer, R., Diehl, M., & Schmitz, G. S. (1999). Self-Regulation scale. http://userpage.fu-berlin.de/~health/selfreg_e.htm

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed). Needham Heights, Allyn and Bacon.

Tanaka, Y., Watadani, S., & Ho Moon, S. (1991). Influence in covariance structure analysis: With an application to confirmatory factor analysis. *Communications in Statistics-Theory and Methods*, *20*(12), 3805-3821. https://doi.org/10.1080/03610929108830742

Yuan, K.-H., & Zhong, X. (2008). Outliers, leverage observations, and influential cases in factor analysis: using robust procedures to minimize their effect. *Sociological Methodology*, *38*(1), 329-368. https://doi.org/10.1111/j.1467-9531.2008.00198.x

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Need Analysis of a Web 2.0 Tool to be Developed for Measurement and Evaluation in Education*

Ölçme Değerlendirme Amaçlı Geliştirilecek Bir Web 2.0 Aracına Yönelik İhtiyaç Tespiti

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ABSTRACT: The aim of this research is to reveal the features of a Web 2.0 tool for measurement and evaluation that will be developed for primary education teachers, in line with the opinions of experts from the Department of Computer Education and Instructional Technology (CEIT) and Primary Education (PE). Case study is one of the qualitative research methods used in this research. Participants consisted of 20 (CEIT: 10, PE: 10) field experts, with professional experiences ranging from 1 to 27 years. The opinions of the field experts were received through semi-structured interviews. The findings obtained in the research were evaluated in general. It has been determined that the measurement and evaluation Web 2.0 tool to be developed for the use of primary education teachers, should not only have a question/answer design with multimedia support, but also include awards/competition and teamwork' interaction in order to be preferred by students. Additionally, it should provide ease of use and be supported by stakeholders in order to be preferred by teachers. It is recommended that the specified Web 2.0 tool should include outcome-based and graphical-based reporting features. Especially in the Covid-19 pandemic, in order for parents to support their child and follow the student's progress, it is recommended that a detailed statistical development report be included in the parent interface limited to their children only.

Keywords: Measurement and evaluation, needs analysis, Web 2.0 tool.

ÖZ: Araştırmanın amacı, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü (BÖTE) ve Temel Eğitim alan uzmanlarının görüşleri doğrultusunda sınıf öğretmenleri için geliştirilecek bir Web 2.0 ölçme ve değerlendirme aracının özelliklerini ortaya koymaktır. Bu araştırmada durum çalışması yöntemi kullanılmıştır. Katılımcılar, mesleki deneyimleri 1 ile 27 yıl arasında değişen 10 BÖTE ve 10 Temel Eğitim Bölümü olmak üzere 20 alan uzmanından oluşmaktadır. Alan uzmanlarının görüşleri yarı yapılandırılmış görüşmeler yoluyla alınmıştır. Araştırmada elde edilen bulgular genel olarak değerlendirildiğinde sınıf öğretmenlerinin kullanımına yönelik geliştirilecek olan ölçme ve değerlendirme Web 2.0 aracının öğrenciler tarafından tercih edilmesi için kullanımı kolay bir arayüze ve multimedya destekli soru/cevap tasarımına sahip olması, ödül/yarışma ve takım çalışması etkileşimini içermesi gerektiği belirlenmiştir. Öğretmenler tarafından tercih edilmesi için ise kullanım kolaylığı sağlanmalı, MEB ve paydaşlar tarafından desteklenmesi belirtilmiştir. Geliştirilecek olan ölçme ve değerlendirme Web 2.0 aracının sonuca dayalı ve grafik tabanlı raporlama özelliklerini içermesi önerilmiştir. Özellikle Covid-19 pandemi sürecinde velilerin öğrencilere destek olabilmeleri ve öğrencinin gelişimini takip edebilmeleri için veli arayüzüne yer verilmesi ve bu arayüzde sadece kendi çocukları ile sınırlı olarak detaylı istatistiksel gelişim raporunun yer alması önerilmektedir.

Anahtar kelimeler: Ölçme ve değerlendirme, ihtiyaç tespiti, Web 2.0 aracı.

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Serious changes have been experienced in all areas of life, especially in health and education, since the COVID-19 outbreak was declared as a "pandemic" by the World Health Organization on March 11, 2020 (WHO, 2020). Many countries have had to suspend face-to-face education. Globally, at least 1.5 billion students are affected by the COVID-19 pandemic (UNESCO, 2020a; UNICEF, 2020). Approximately 25 million students' training has been carried out in Turkey with distance education (UNESCO, 2020b). Primary and secondary level educational activities have been carried out through national television broadcasts and the Education Information Network (EIN) (Özer, 2020). This distance learning process is considered "emergency distance education" (Eken et al., 2020; Hodges et al., 2020; Tatlı et al., 2021).

Emergency distance education can be defined as an effort to continue education with available opportunities until the crisis disappears (Hodges et al., 2020). One of the most important problems in this process is how to conduct measurement and evaluation (ME) activities with distance learning (Bozkurt et al., 2020). Due to the continuing effects of the pandemic, the students passed the class without conducting ME activities, as in many countries (Karadağ, 2020). ME activities which provide feedback about the educational process are extremely important in determining the effectiveness. However, process-oriented feedback or ME approaches could not be used sufficiently in the pandemic (Bozkurt, 2020; Can, 2020). In this context, giving feedback to students, families and teachers is of great importance in evaluating its effectiveness during the emergency distance education process (Bozkurt, 2020; Keskin & Kaya, 2020). Teachers mostly use digital documents (slides, essays, books, etc.), z books, videos, etc., in the emergency distance education process. Although they use teaching materials (Bakioğlu & Çevik, 2020; Burke & Dempsey, 2020), it is stated that they do not have the necessary skills, especially for ME (Adıgüzel, 2020; Durak & Seferoğlu, 2017). The most fundamental reasons for teachers' technology usage inability are shown as deficiencies in technical support and their inadequacy in information and technology literacy (Elmahdi et al., 2018). Despite teachers' shortcomings, students who are 21st-century learners use technology more effectively (Karaoğlan-Yılmaz & Binay-Eyüboğlu, 2018; Pamuk et al., 2012; Prensky, 2010).

The gap in technology usage skills between teachers and students can be reduced with the Web 2.0 tools that allow computer users to design and develop their own interactive tools (Tatlı, 2019). Web 2.0 tools offer users the opportunity to access, process and share information in different formats. Also, Web 2.0 tools are easy to create interactive content and rapid feedback, especially in the distance education process (Almazon et al., 2011; İnal & Arslanbaş, 2021). While learning-teaching environments are transferred to the digital platform in the distance education process, ME activities are mostly carried out with paper and pencil (Brader et al., 2014; Chiheb et al., 2011; Süral & Girmen, 2019). However, by using Web 2.0 tools, students can answer questions online, receive instant feedback and perform activities by enjoying the process (Tatlı, 2019). Web 2.0 tools for ME activities support different question types, such as game-based, multiple-choice, true/false, open-ended, gap-filling, puzzles. Moreover, questions developed in these tools allow the use of multimedia elements, such as text, sound, picture and video (Bower, 2015; Tatlı, 2019). In the literature, it is recommended that Web 2.0 tools be used for the ME process to support teachers' and students' knowledge, experience and skills (Amoroso, 2005; Bakar & Avan, 2019;

Elmahdi et al., 2018; Harvey, 2019; Süral & Girmen, 2019; Taşlıçay-Arslan, 2019; Yurdugül & Bayrak, 2014). In the education process, formative evaluation is important in terms of determining the contribution of activities to the development of students and monitoring the long-term development of students (Ministry of National Education [MoNE], 2020). Therefore, Web 2.0 tools come to the forefront in terms of providing feedback in the formative evaluation process (Çelebi & Satırlı, 2021; Çelik, 2021; Kayacan & Ulker, 2020; Özpınar, 2020). The number of Web 2.0 tools that teachers and students use for ME is increasing day by day, but a different feature of each tool stands out (Albion, 2008; Kapuler, 2014; Orhan-Göksün et al., 2018; Tatlı, 2019).

There are many Web 2.0 tools that can be used for ME. However, a different feature comes to the fore in each of them when these tools are examined. While some of these tools have a structure that allows for the preparation of different types of questions and the archiving of the prepared questions, some of them do not have the feature of editing the developed content, Turkish language support, multimedia support for feedback, free use and class-based analysis. Also, the features of student, teacher and parent interfaces differ in these different Web 2.0 tools. Among these tools, such as LearningApp and Wordwall stand out as they contain gamification elements in different question types, while detailed analysis information about the results is provided to both students and teachers in the Kubbu tool (Tatlı, 2019). While some of the Web 2.0 tools with different features offer Turkish language support (Surveymonkey, LearningApps, Quizlet, Gradecam, Baambozle, Classflow, Microsoft Forms), most of them do not. There are different paid (Surveymonkey, Quizmaker) and free (LearningApp, Wordwall) versions of Web 2.0 tools. Most paid Web 2.0 tools offer limited time and fewer activities to their users as a free version. In addition, very few Web 2.0 tools have the ability to enrich the feedback with audio, visual and text (Quizizz). Apart from these, there are also Web 2.0 tools that only include visual feedback (Bamboozle, Clasflow, Classkick, Naiku, Quizalize). Considering the foreign language proficiency of primary school students, the limited number of Web 2.0 tools with a native language support appears as another limitation (Tatlı et al., 2019). Especially considering the characteristics of today's learners, providing written feedback to students who shorten the sentences, prefer symbols and emoji to be faster is a major limitation (Çakır & Topçu, 2005; Günther, 2007). Another striking limitation is that all Web 2.0 tools do not have the ability to create classes and archive student detailed data since the main purpose of online ME tools is to collect data from large groups (Evans & Mathur, 2005). Although Web 2.0 tools (Kubbu, Kahoot) inform the student and teacher about the outcome of the material, the parent is not included in this process. In most Web 2.0 tools developed for ME, materials are even sent to participants via links. Further, Web 2.0 tools (Quizizz, Socrative) that have the ability to create a class and assign students to the class within the application are quite limited.

Given the features mentioned above for ME purposes, there is a need for developing a new Web 2.0 tool for the primary school level, combining the advantages of existing Web 2.0 tools and excluding the negative features. It was considered appropriate to develop the Web 2.0 tool for this primary level, as it includes the fundamental cognitive objectives of different disciplines such as Science, Social Studies, Native Language, and Mathematics and it is also rich in developing materials for each discipline. The primary school level forms the basis of the future education life,

allows the use of different types of questions and basic lessons are shaped at this level, it is important to develop a Web 2.0 tool for ME for this level. Based on this need, it is aimed to reveal the features of the Web 2.0 tool that will be developed for primary education teachers, in line with the opinions of experts from the Department of Computer Education and Instructional Technology (CEIT) and Primary Education (PE). In this context, PE and CEIT field experts were consulted on the features that should be included in the design and feedback of the tool and their needs were required to increase the tool efficiency and interface design. Within the scope of primary education level, it was deemed appropriate to consult CEIT and PE field experts because of their knowledge and experience on the features of Web 2.0 tools. In the determination of the interviewed field experts, "the existence of a publication about Web 2.0 tools or the use of different Web 2.0 tools in teaching processes" was taken as a criterion. Thus, it is thought that this situation will contribute to obtaining more valid data by revealing the features of the Web 2.0 tool to be developed.

Based on all this, it is aimed to reveal the features of a Web 2.0 tool for ME that will be developed for PE teachers, in line with the opinions of CEIT and PE field experts in the research. Within the scope of this purpose, the sub-problems of the research are presented below.

In the Web 2.0 tool that will be developed for ME, according to field experts;

1. Which elements should be included in the design of the Web 2.0 tool?
2. How should the feedback be designed?
3. What should be considered in order to be preferred by students?
4. What should be considered in order to be preferred by teachers?
5. Which student information should be included in the student, teachers and parent interface?

Method

Research Design

Since it is aimed to reveal the features of a Web 2.0 tool for ME that will be developed for PE teachers, in line with the opinions of CEIT and PE field experts, case study was used in the research. Case study is a method in which one or more events, settings, programs, social groups or other interconnected systems are examined in depth (Yin, 2002). The most important advantage of this method is that it allows focusing on a specific situation of a problem. The use of case studies was deemed appropriate because it is a preferred method when asked what, how and why it differs from many research methods (Aytaçlı, 2012).

Participants

The opinions of CEIT field experts were taken regarding the basic features and design elements of the Web 2.0 tool for ME, which is planned to be used at the primary school level. The opinions of PE field experts were also consulted about the Web 2.0 tool' features for meeting the needs of PE teachers and its suitability for the characteristics of primary school students. Field experts were selected by criterion sampling. Criterion sampling is the inclusion of people, events, objects or situations with the qualifications determined in relation to the problem (Büyüköztürk et al., 2015).

Criterion sampling was found appropriate since "the existence of a publication about Web 2.0 tools or the use of different Web 2.0 tools in teaching processes" was taken as a criterion in determining the participants of the research. The distribution of the participants according to their gender and professional experiences is given in Table 1. As seen in Table 1, 10 CEIT (3 female, 7 male) and 10 PE (4 female, 6 male) field experts with professional experiences ranging from 1 to 27 years were included in the research.

Table 1

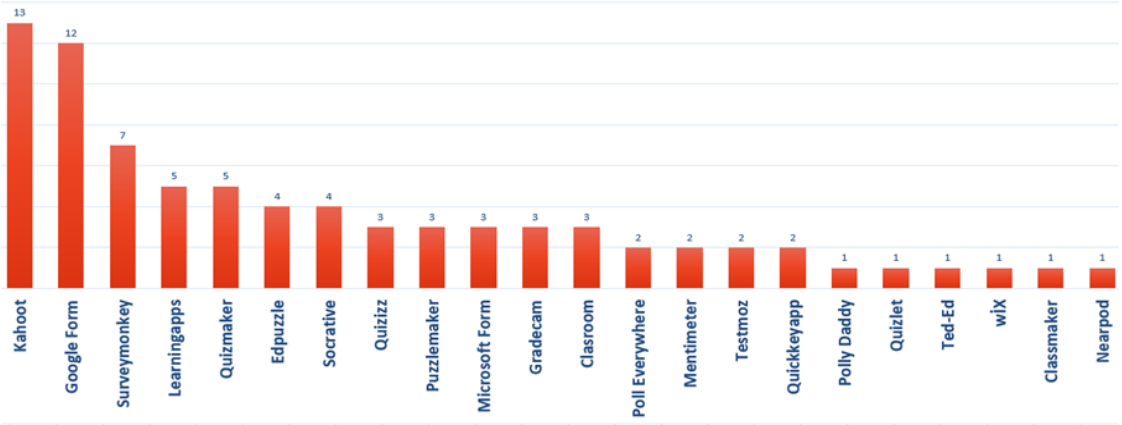
The Participants of the Research

Computer education and instructional technology field experts			Primary education field experts		
Code	Gender	Professional experience	Code	Gender	Professional experience
B1	Male	8	T1	Male	11
B2	Male	18	T2	Male	23
B3	Male	11	T3	Male	26
B4	Female	4	T4	Male	18
B5	Male	6	T5	Male	9
B6	Male	8	T6	Female	27
B7	Male	8	T7	Female	14
B8	Female	14	T8	Male	16
B9	Male	9	T9	Female	4
B10	Female	17	T10	Female	1

The data collection process of the research started with the determination of the tools used by the field experts and the reasons for preferring these tools. Accordingly, Web 2.0 tools used by field experts for ME are presented in Figure 1.

Figure 1

Web 2.0 Tools Used by Field Experts for ME

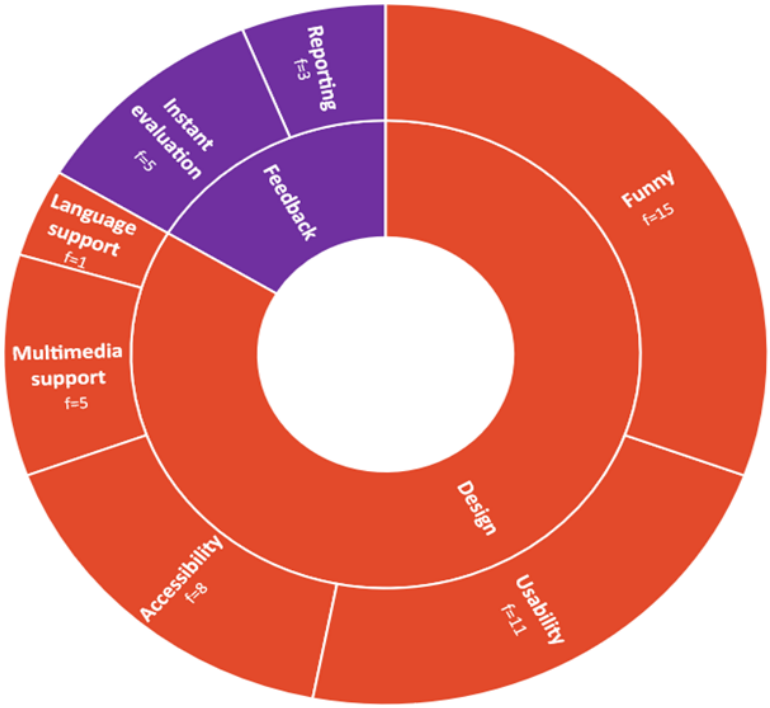


*Field experts were allowed to provide more than one opinion.

When Figure 1 is examined, it can be seen that field experts use a total of 22 different Web 2.0 tools for ME purposes. Among these tools, it is seen that they mostly prefer Kahoot (*f*=13), Google Form (*f*=12), Surveymonkey (*f*=7), Learningapps (*f*=5), Quizmaker (*f*=5). The factors affecting the preferences of the field experts in the Web 2.0 tools they use for ME are presented in Figure 2.

Figure 2

The Factors Affecting the Preferences of the Field Experts in the Web 2.0 Tools They Use for ME



*Field experts were allowed to provide more than one opinion.

When Figure 2 is examined, the factors affecting the preferences of the field experts in the Web 2.0 tools they use for ME purposes are categorized under two main categories: "Design" (*f*=40) and "Feedback" (*f*=8). When examined specifically in the design category, it is seen that the specified tool is mostly funny (*f*=15), usability (*f*=11) and accessibility (*f*=8). While B5 expresses the preference of the tool because of its fun as *"... because it creates a fun environment for all ages ...",* B6 explains its usefulness as *"... it is very easy to make changes and prepare on it".* Under the feedback category, field experts indicate that they prefer the Web 2.0 tool, as it allows for instant evaluation. B3 expressed this situation as *"It provides a quick and effective assessment in this process".*

Data Collection Tool

Within the scope of determining the features of the ME Web 2.0 tool to be developed for PE teachers in the research, the opinions of the field experts of the CEIT and the PE Teacher Department experts were received through semi-structured interviews. In the process of creating the form used in online interviews, a question pool was created by first examining the literature and a draft form was prepared. The developed draft interview questions were submitted to the opinions of eight field

experts (f_{CEIT}=3, $f_{primary\ education}$=3, $f_{mathematics\ education}$=1, $f_{science\ education}$=1) within the scope of the validity research. In order to examine the interview questions from a general framework, it was tried to ensure the diversity of the field experts. According to expert opinions, 3 questions were removed, 4 questions were combined, and probes were added to 2 questions. Two experts were consulted to check the suitability of the questions in terms of Turkish grammar and expression. The final form of the interview questions was given within the framework of expert opinions (Appendix 1).

After the final form of the interview questions was given, a pilot application was carried out with 3 field experts (not included in the participants). As a result of the pilot application, it was seen that field experts wanted an explanation about the concept of Web 2.0 for ME. For this reason, an information note about Web 2.0 tools has been added to the interview form.

Data Collection Process

Online interviews were conducted with field experts using Zoom and Google Meeting video conferencing platforms. While starting the interviews, the researcher introduced herself and explained the purpose of the research. The researcher gave information about the estimated duration (30-45 minutes) and content of the interview. Interviews were conducted after the approval of the field experts was obtained. Each interview lasted an average of 30-45 minutes. Only interview questions were asked to the participants. During the interview, the questions were respectively projected onto the screen via Zoom or Google Meeting platforms. Interviews were recorded. Later, the interview records were transcribed and subjected to analysis.

Data Analysis

The data obtained from the interviews were subjected to content analysis. With content analysis, it is aimed to reach the relationships and concepts that can explain the data collected (Yıldırım & Şimşek, 2011). In the content analysis, the data was coded. The data obtained within the scope of coding were divided into sections, and comparison and association were made between the data. The data were categorized by means of codes. As part of the content analysis, the data were coded and categorized, and themes were obtained. The data are organized by code and themes.

In qualitative research, the reliability of data analysis depends especially on the coding process. For the reliability of the analysis of the interview data, the data obtained were analyzed by two different coders. Analysis that was carried out independently of each other was brought together and examined by two different encoders. Codes and categories were clarified by comparing the codes and categories produced by two researchers. The frequencies of the clarified codes and categories are presented using figures. An equal number of field experts from departments of CEIT and PE were selected to support transferability. The interviews were recorded and transcribed within the knowledge of the participants, the transcribed contents were sent to the participants and then their approval was obtained. Thus, the data could be validated. In the findings, it was tried to ensure the trustworthiness of the data by quoting direct quotations from the statements of the participants. Coding reliability was checked to determine the consistency of the categories. The qualitative data of the study were subjected to content analysis by different researchers. As a result of the content analysis, the Kappa

coefficient was calculated as 0.79 with the codes created by two different researchers. Accordingly, it can be stated that the analysis is well-confirmed (Cohen, 1960; Landis & Koch, 1977). In the quantitative data of the research, reliability was supported by giving frequency values. It was presented to the reader by making direct quotations from the teachers' expressions to reflect the opinions of the field experts. In terms of research ethics, while CEIT field experts were coded as B1, B2, … B10, PE field experts were coded as T1, T2, … T10.

Findings

The data obtained from the semi-structured interviews conducted with field experts within the scope of the research are presented in this section.

The Elements Included in the Design of the Web 2.0 Tool

The elements included in the design of the Web 2.0 tool to be developed for ME are presented in Figure 3.

Figure 3

The Elements Included in the Design of the Web 2.0 Tool to Be Developed for ME

*Field experts were allowed to provide more than one opinion.

When Figure 3 is examined, the elements included in the design of the Web 2.0 tool for ME are "Feedback design" (*f*=27), "Question/answer design" (*f*=24), "Interface design" (*f*=19) and "Interaction design". It is seen that it is grouped under four categories as "design" (*f*=9). When examined in terms of categories, in the field of

feedback design being visual (*f*=8), T2 said, *"... even though the student is literate outside of the written language, the feedback should be given visually in my opinion"*. Under the Question / Answer design category, T5, one of the experts who received the need for multimedia support (*f*=11), stated that *"... there should be plenty of visuals, it should be multimedia, both sound and video..."*. Under the interface design category, field experts stated that the tool should be easy to use (*f*=10) and visual design (*f*=7). To explain the importance of ease-of-use, B2 said, *"... you should not put too much workload on the teacher. The easier it is, the easier it will be ..."*, B8 stated the importance of visual design as *"... a more visually based interface can be designed rather than a multi-text based interface that may contain more visual elements..."*.

The Features in the Feedback Design of the Web 2.0 Tool

The features in the feedback design of the Web 2.0 tool to be developed for ME are presented in Figure 4.

Figure 4

The Features in the Feedback Design of the Web 2.0 Tool to Be Developed For ME

*Field experts were allowed to provide more than one opinion.

When Figure 4 is examined, the features in the feedback design of the Web 2.0 tool to be developed for ME purposes are "Reporting" (*f*=42), "Feedback notice" (*f*=39), "Reporting on usage" (*f*=16) and "Feedback format" (*f*=9). Under the reporting category, B2 indicates the outcome based feedback (*f*=15) as *"... what are the topics that a student gives most wrong feedback can be given. It will also be very useful for teachers. Therefore, students can see more clearly in which subject they have*

deficiencies…". T8 states that it should be graphic based reporting (*f*=12) as *"… she needs to see graphically, visually… in order to have information about the class…"*. Finally, B2 explained that the number of correct/incorrect numbers (*f*=11) should be reported as *"… feedback should be shared with the teacher, how accurately the given questions are answered or where they are wrong …"*. Under the Feedback notice category, there should be System messages (*f*=17), and B3 states that *"… when a student teacher creates activities on the system, he/she can send a warning message…"*. B8 states that there should be links (*f*=12) as *"… such a homework was sent to your child, or such an activity was delivered to parents, maybe links can be sent to parents because it is difficult for young children to control over mobile phones …"*. Under the reporting on usage category, T9 says that answering time (*f*=11) should be reported as follows:

> *"… can be given in the time spent on each question. Because if the student spends too much time on that question and the whole class spends too much time on that question, it may mean that the question is difficult and selective, and it can be understood that it is distracting or not understood. The duration of the student's stay in that question can be given…"*.

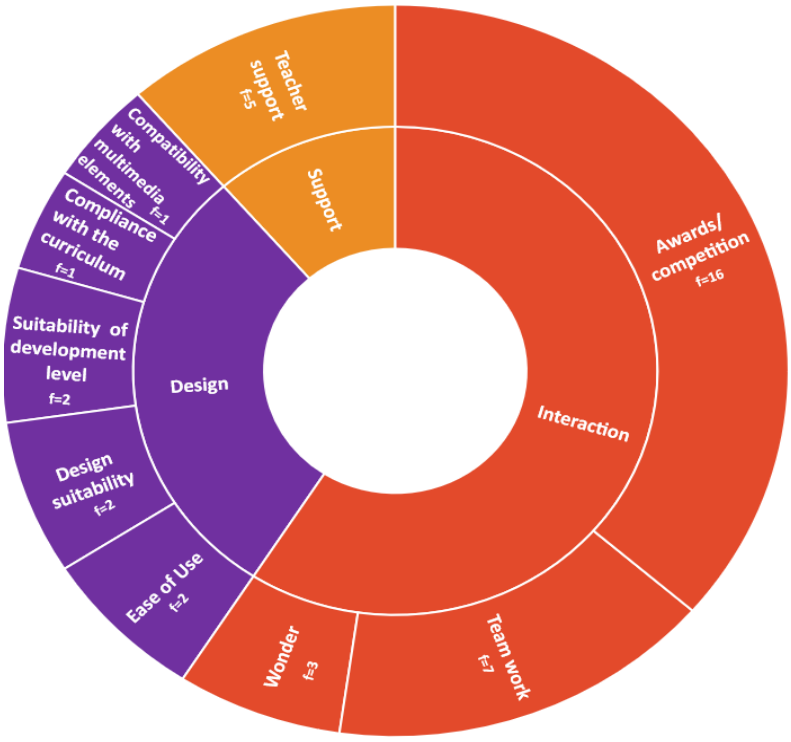
Finally, under the Feedback format category, it was stated by T8 that the feedback should be Instant (*f*=6): *"…she should definitely see what the correct answer is instantly… "*.

The Needs of Field Expert for Students' Preference of the Web 2.0 Tool

The needs of field experts for students' preference of the Web 2.0 tool to be developed for ME are presented in Figure 5.

Figure 5

The Needs of Field Expert for Students' Preference of the Web 2.0 Tool to Be Developed for ME



*Field experts were allowed to provide more than one opinion.

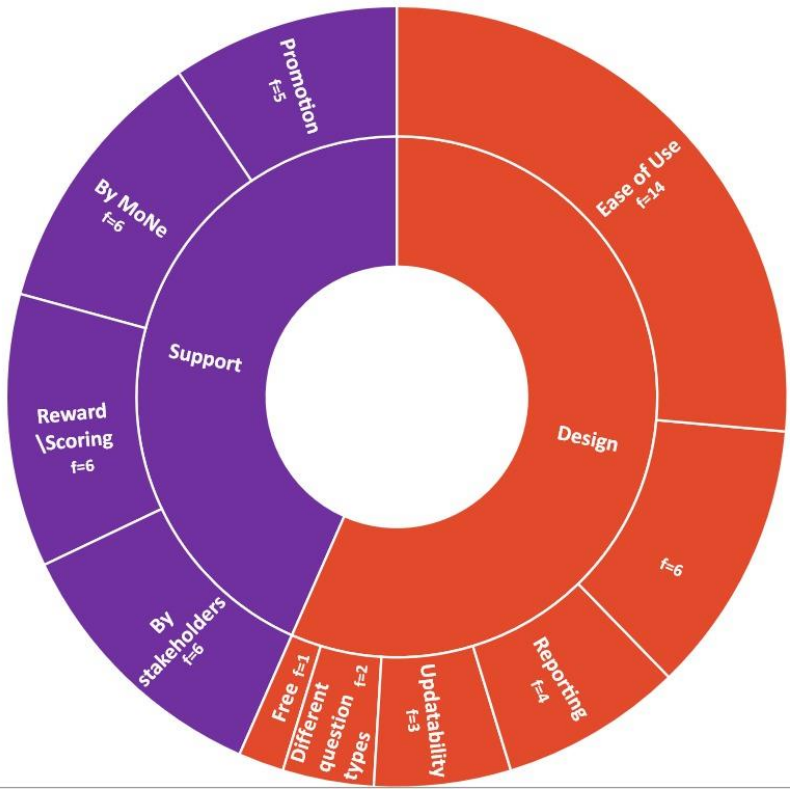
When Figure 5 is examined, the needs of the field experts for students' preference of the ME Web 2.0 tool are collected in three different categories as "Interaction" (*f*=26), "Design" (*f*=8) and "Support" (*f*=5). Under the "Interaction" category, B8 indicates that students should have Awards/competition (*f*=16) elements as *"... as the student progresses, there is a sapling for the student in the system"*. Under the Design category, field experts stated that it should be Suitability of development level (*f*=2), Design suitability (*f*=2) and Ease of use (*f*=2). While B3 expresses the importance of Suitability of development level as *"... we need to provide them with very simple, understandable, clear feedback..."*, T3 explains that there should be design conformity as *"...the use of colors, the use of text buttons, the characters created with lines are easier to read..."*. T8 expresses the importance of the ease of use of the tool in order to be preferred by the student as *"... it should be easy to use..."*. Finally, for teacher support (*f*=5), B1, who takes importance for the student, states that *"... if the teacher uses it actively, the child will be very happy if he/she texts with his / her teacher from there..."*.

The Needs of Field Expert for PE Teachers' Preference of the Web 2.0 Tool

The needs of field experts for PE teachers' preference of the Web 2.0 tool to be developed for ME are presented in Figure 6.

Figure 6

The Needs of Field Expert for PE Teachers' Preference of the Web 2.0 Tool to Be Developed for ME



*Field experts were allowed to provide more than one opinion.

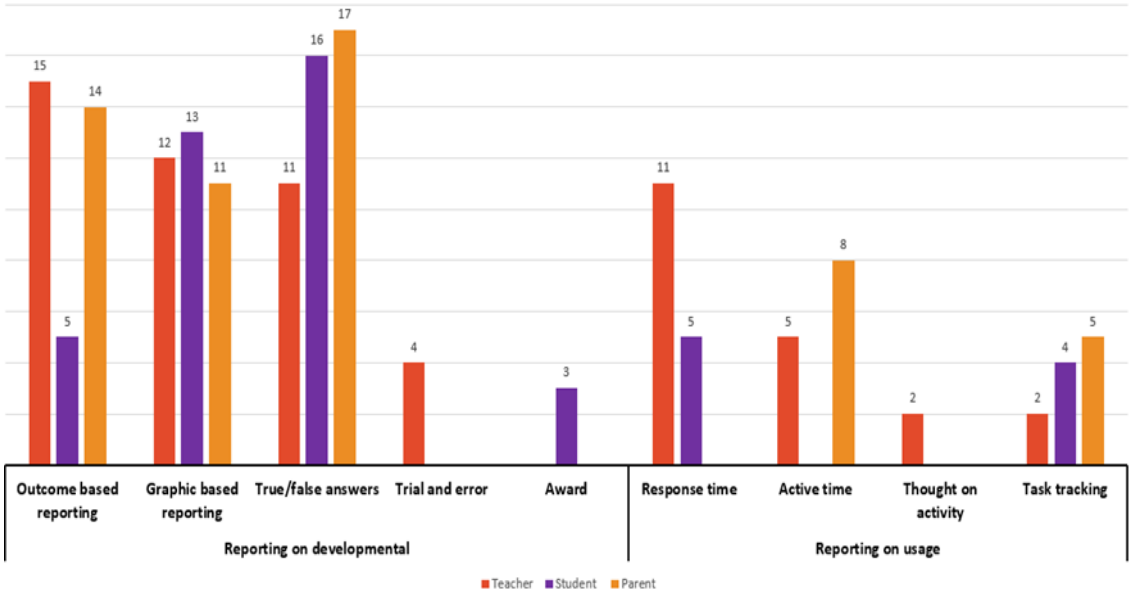
When Figure 6 is examined, the needs of the field experts for PE teachers' preference of the ME Web 2.0 tool are collected under two categories as "Design" (*f*=30) and "Support" (*f*=23). Under the design category, B5 states that the ease of use (*f*=14) affects the use of teachers by saying, *"… if he uses your platform in a simple way compared to the measurement methods he uses in the classroom, his motivation will increase…"*. Under the Support category, it is stated that it is important to support By MoNE (*f*=6), Reward/Scoring (*f*=6) and By stakeholders (*f*=6) for PE teachers to prefer the ME Web 2.0 tool. B5, who took the importance of supporting the Ministry of National Education (MoNE), says, *"… A plus can be given to the teachers from the MoNE wing. Awards may be given, but they may be in the form of the following course …"* while B1 attaches the importance of rewards/scoring by expressing *"For example, when the teacher adds a question or when others like it, the teacher's score may increase …"*. Finally, B1 who gave importance of the support provided by the stakeholders, states that *"… for the teacher who will congratulate, encourage or be honored by you, what he has done has worked or will receive positive feedback from parents…"*.

Student Information Stated by Field Experts to be Included in the Student, Teacher and Parent Interface

Student information stated by field experts to be included in the student, teacher and parent interface is presented in Figure 7.

Figure 7

Student Information Stated by Field Experts to Be Included in the Student, Teacher and Parent Interface



* Field experts are allowed to give more than one opinion.

When Figure 7 is examined, the student information stated by field experts to be included in the student, teacher and parent interface are collected in two different

categories as "Reporting on development" and "Reporting on usage". In terms of categories, field experts state that Outcome based reporting should be shared with teachers (*f*=15), true/ false answers with students (*f*=16), and true/false answers with parents. B2 expresses the importance of sharing outcome-based reporting with teacher by saying, *"... what are the topics that a student gives the most mistakes? It will also be very useful for teachers. Therefore, students can see more clearly in which subject they have deficiencies ..."*. While B3 explains the importance of sharing the true/false answers with the student as follows: *"... the information that the student answered correctly which questions should be available",* T3 states that true\false answers should be shared both with students and parents as *"... it is absolutely necessary to send an evaluation to the parents individually, which one did wrong..."*.

Discussion and Conclusion

The current research aims to reveal the features of the Web 2.0 tool that will be developed for PE teachers, in line with the opinions of experts from the department of CEIT and PE. It is seen that field experts use Google Forms and Kahoot applications more for ME purposes (Figure 1). Field experts also emphasize these tools' features as factors affecting their preferences. These detected Web 2.0 tools are preferred because they are fun, useful and easily accessible (Figure 2). Multimedia support and instant evaluation features of Web 2.0 tools used for ME are other dimensions that affect the preference. Rapid analysis is at the forefront of online ME tools since the main purpose of online ME tools is to collect data from large masses (Evans & Mathur, 2005). Thus, it can be asserted that field experts prefer such Web 2.0 tools that have an instant evaluation, multimedia support, usability, or accessibility features in order to facilitate communication with students in the process and to use time effectively. On the other hand, field experts may have chosen fun Web 2.0 tools to keep students active and motivated (Zarzycka-Piskorz, 2016).

The field experts state that the interface should be easy and have a visual design in the Web 2.0 tool to be developed for ME (Figure 3). It is thought that field experts emphasize ease of use in interface design in order to facilitate access to information and fulfill such requirements (Cho et al., 2009). Because it is known that intensive interface designs can distract users from using the application (Seo & Woo, 2010). In other words, too many links or content makes users uncertain about which link to choose and why, which may lead to giving up using the application. Multimedia support and entertainment/game support were emphasized in the question/answer design, while the visual and voice feature highlighted in the feedback design. It can be said that the field experts take into account the characteristics of today's learners and talk about a design that the student can respond to questions by recording his/her voice or drawing a picture and uploading it to the system. Considering that today's learners get bored quickly, prefer pictures and graphics instead of writing, and be reluctant to write although they know the answer (Hart, 2008), it is seen that field experts touch a necessary and very important point in both feedback and question/answer design. Because educational software is functional to the extent that it meets student needs and considers individual differences (Martínez-Villaseñor et al., 2014). As a matter of fact, providing different answer options to each student through multimedia support will undoubtedly increase

the quality of ME functionality and positively affect the academic success of students (Altınışık & Orhan, 2002; Buluş-Kırıkkaya et al., 2016).

Award/competition theme comes to the fore in students' preference of the specified Web 2.0 tool (Figure 5). It is thought that the field experts especially touch the award/competition theme in order to ensure the active participation of primary school students in the process. In web-based ME, there are serious problems in ensuring the intrinsic motivation of students and keeping them in practice, and these problems may result in cancellation of the students' use of the system (Tuluk & Yurdugül, 2020). For these reasons, referring the design element such as award/competition related to the performance situations of the students in the process or mentioning the teamwork that enables them to interact with the online practice can be interpreted as the experts offering solutions. The use of the specified Web 2.0 tool by students and teachers is one of the most important indicators of the tool's success. Field experts state that the Web 2.0 tool should be an easy-to-use design preferred by PE teachers (Figure 6). This consideration is important for PE teachers to both meet their needs and use the Web 2.0 tool efficiently. Because teachers' ability to prepare questions in a practical way affects their willingness to use the Web 2.0 tool (Acar, et al., 2020; Davis et al., 1989), shortens and facilitates the process of learning the application and enables them to be more effective in its use (Cesur & Yelken, 2015; Wang & Wang, 2009). The related literature indicates teachers' computer literacy is not sufficient (Akgül et al., 2015; Konan, 2010), they have problems in preparing computer-aided materials (Arslan & Şendurur, 2017; Drenoyianni & Selwood, 1998; Elmahdi et al., 2018; Pamuk et al., 2012) and they have low self-confidence in preparing computer-aided materials (Arslan & Şendurur, 2017; Ertmer et al., 1999; Handal, 2004; Sugar, 2002). For this reason, it is thought that the tool, which will be developed as a Web 2.0-supported and easy-to-use tool, can support teachers' competencies (Vitanova et al., 2015). Supporting the Web 2.0 tool with an award/scoring application made by MoNE and stakeholders' supports are among the needs for the use of teachers. These considerations support extrinsic motivation. Extrinsic motivation is necessary and important for teachers to develop positive attitudes towards technology (Guha, 2003). Therefore, it is thought that teachers will adopt this tool more with an application similar to the award/scoring of MoNE because a similar scoring is used for teachers in a similar online environment called as Interactive Information Network (IIN) under MoNE (Doğan & Koçak, 2020).

According to the student information to be directed in the student, teacher and parent interface, the directed information to students and parents is parallel (Figure 7). Field experts state that the number of true / false answers and graphic-based reporting regarding student information should be included. First of all, directing these two information to the students will support them to increase their awareness in order to know themselves better and overcome their learning deficiencies (Assessment Reform Group [ARG], 2002; Black & Wiliam, 1998). Similarly, sharing this information with parents enables parents to be a part of the teaching-learning process, to follow and learn about the student's progress (Lake & Olson, 2020; MoNE, 2020). On the other hand, sharing the graphical report of the student may cause a negative competitive environment among students as they see the names and the results of their friends. For this reason, it is important to share the student's own success orders rather than sharing the names and order of success of their peers. Otherwise, a negative competitive

environment may occur and this may cause a decrease in some students' motivations. In addition, it is stated that the graphical report is not sufficient to show the student individual development (MoNE, 2020). In this context, sharing the graphic-based report and the number of true/false answers together is a basic requirement for students to see their development.

The field experts state that the Web 2.0 tool, which will be developed for ME purposes in primary school, should include both the correct/wrong number and response time of the student in the teacher interface (Figure 7). They also repeat these features in the Web 2.0 tool's feedback design (Figure 4). The opinions of the field experts are that PE teachers will need this information to determine the students' learning level and follow their development because this mentioned information helps teachers obtain information and make decisions about the effectiveness of teaching. In this way, teachers can determine what kind of support they should offer, considering the student's difficulties (Black & Wiliam, 1998; Tuluk & Yurdugül, 2020). Field experts indicate that the outcome-based and graphic-based reporting feature should be included both in the teacher interface (Figure 7) and in the feedback of the Web 2.0 tool (Figure 4). In the ME process, various problems such as crowded class size, limited time, time-consuming assessment and reluctance of teachers are frequently encountered (Şimşek et al., 2017; Zhao, 2007). Thus, a Web 2.0 tool with the aforementioned features will be the solution to these problems. Including these considerations in the specified Web 2.0 tool will contribute to the correct determination of the outcome, the selection and application of the convenient ME tools for the outcomes, the determination of the students' reaching level of outcomes and the interpretation of these all information.

The findings obtained in the research are evaluated in general, the following main conclusions are reached. It is stated that the ME Web 2.0 tool to be developed for the use of PE teachers, should

- have an easy of use interface and a question/answer design with multimedia support.
- include awards/competition and teamwork' interaction in order to be preferred by students,
- ensure ease of use, be supported by MoNE and stakeholders in order to be preferred by teachers,
- share true/false answers and graphic-based reporting in the student interface and also present outcome-based reporting in the parent interface,
- provide true/false answers, response time, outcome-based and graphics-based reports both in the teacher interface and in the feedback design.

Implications

Given the results obtained in the current research, it is recommended to include an easy of use interface and multimedia support in the question/answer process within the scope of the needs determined from field experts for the Web 2.0 tool to be developed for ME in primary schools. In addition, it is recommended that the specified Web 2.0 tool include outcome-based and graphical-based reporting features. Especially in the Covid-19 pandemic, in order for parents to support their child and follow the student's progress, it is recommended that a detailed statistical development report be

included in the parent interface, restricting only to their children. Providing an environment where students view their success to focus on their development and prevent unwanted competition is also recommended. A statistical reporting system is proposed in the teacher interface, where the progress of all students can be examined in detail. It is also recommended to get the opinions of the PE teachers who will be the users of the Web 2.0 tool, which is planned to be developed for the PE level. Lastly, the Web 2.0 tool to be developed for the use of PE teachers can be integrated into the Interactive Information Network (IIN) portal supported by the MoNE.

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Statement of Responsibility

This study is one of the outputs of the TUBITAK 1001 project carried out by the first author Assoc. Prof. Dr. Zeynep TATLI. The authors took part in the team of the project and made significant contributions to the development of the process and the article. The 2nd and 3rd authors took part in the project as a scholarship student and the 4th author as a researcher. All authors were sufficiently involved in the work to take public responsibility for the design and implementation of the research, analysis of the data, writing or reviewing the manuscript.

Conflicts of Interest

The authors declare that there is no conflict of interest.

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References

Acar, S., Peker, B., & Küçükgençay, N. (2020). Opinions of secondary school teachers from various departments about online education platforms. *Journal Of Social, Humanities and Administrative Sciences*, *6*(27), 901-925. https://doi.org/10.31589/JOSHAS.347

Adıgüzel, A. (2020). Teachers' views on distance education and evaluation of student success in the pandemic process. *The Journal of National Education, 49*(1), 253-271. https://doi.org/10.37669/milliegitim.781998

Akgül, F., Küpeli, E., & Kır, İ. (2015). Identifying the computer literacy skill levels of primary school teachers: The case of Kahramanmaras. *Electronic Journal of Social Sciences, 14*(55), 207-219. https://doi.org/10.17755/esosder.44589

Albion, P. R. (2008). Web 2.0 in teacher education: Two imperatives for action. *Computers in the Schools, 25*(3-4), 181-198. https://doi.org/10.1080/07380560802368173

Almazon, R. S., Gil-García, J. R., Luna-Reyes, L. F., Luna, D. E., & Díaz-Murillo, G. (2011). The use of Web 2.0 on Mexican state websites: A three-year assessment. *Electronic Journal of e-Government, 9*(2), 107-121.

Altınışık, S., & Orhan, F. (2002). The effects of multimedia learning environment on the students' attitudes and achievement in social studies. *Hacettepe University Journal of Education, 23,* 41-49.

Amoroso, D. (2005). Use of online assessment tools to enhance student performance in large classes. *Information Systems Education Journal, 3*(4), 1-10.

Arslan, S., & Şendurur, P. (2017). Investigation of changes in factors affecting the technology integration in education. *Mehmet Akif Ersoy University Journal of Education Faculty, 4*(3), 25-50. https://doi.org/10.21764/efd.21927

Assessment Reform Group [ARG]. (2002). *Assessment for learning: 10 principles.* University of Cambridge School of Education.

Aytaçlı, B. (2012). A detailed analysis on case study. *Adnan Menderes University Faculty of Education Journal of Education Sciences, 3*(1), 1-9.

Bakar, F., & Avan, Ç. (2019). Use of technology in measurement and evaluation: Electronic portfolios. *Social Scientific Centered Issues, 1*(2), 37-42.

Bakioğlu, B., & Çevik, M. (2020). Science teachers' views on distance education in the COVID-19 pandemic process. *Turkish Studies, 15*(4),109-129. https://dx.doi.org/10.7827/TurkishStudies.43502

Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80,* 139-144.

Bozkurt, A. (2020). The coronavirus (Covid-19) pandemic process and evaluations on education in the post-pandemic world: New normal and new education paradigm. *AUAd, 6*(3), 112-142.

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., ... & Paskevicius, M. (2020). A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education, 15*(1), 1-126. https://doi.org/10.5281/zenodo.3878572

Bower, M. (2015). A typology of Web 2.0 learning technologies. *Educause, 8*(2), 2015.

Brader, A., Luke, A., Klenowski, V., Connolly, S., & Behzadpour, A. (2014). Designing online assessment tools for disengaged youth. *International Journal of Inclusive Education, 18*(7), 698-717. https://doi.org/10.1080/13603116.2013.817617

Buluş-Kırıkkaya, E., Dağ, F., Durdu, L., & Gerdan, S. (2016). CAI software for 8th grade natural processes unit and its effect on academic success. *Elementary Education Online, 15*(1) 234-250. : http://dx.doi.org/10.17051/io.2016.11845

Burke, J., & Dempsey, M. (2020). *COVID-19 practice in primary schools in Ireland report.* Maynooth University of Education. http://www.into.ie/app/uploads/2020/04/Covid-19-Practice-in-Primary-Schools-Report-1.pdf

Büyüköztürk, Ş., Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2015). *Bilimsel araştırma yöntemleri [Scientific research methods]*. Pegem Publications.

Çakır, H., & Topçu, H. (2005). Internet as a communication language. *Erciyes University Journal of Social Sciences Institute, 19*(2), 71-96.

Can, E. (2020). Coronavirus (Covid-19) pandemic and its pedagogical reflections: Open and distance education practices in Turkey. *AUAd, 6*(2), 11-53.

Çelebi, C., & Satırlı, H. (2021). Usage areas of Web 2.0 tools at primary school level. *Instructional Technology and Lifelong Learning, 2*(1), 75-110. https://doi.org/10.52911/itall.938122

Çelik, T. (2021). Examining formative evaluation experiences of prospective social studies teachers using Web 2.0 applications. *Milli Eğitim Dergisi*, *50*(231), 173-198. https://doi.org/10.37669/milliegitim.713075

Cesur, E., & Yelken, T. (2015). Teachers' opinions about intel teacher programme in-service training with face to face education and distance education. *Journal of International Social Research, 8*(38), 673-688. https://doi.org/10.17719/jisr.20153813677

Chiheb, R., Faizi, R., & Afia, A. E. (2011). Using objective online testing tools to assess students' learning: Potentials and limitations. *Journal of Theoretical and Applied Information Technology, 24*(1), 69-72.

Cho, V., Cheng, T. E., & Lai, W. J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers & Education, 53*(2), 216-227. https://doi.org/10.1016/j.compedu.2009.01.014

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*(1), 37-46.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology-A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

Doğan, S., & Koçak, E. (2020). A study on distance learning activities in the context of the EBA system. *Journal of Economics and Social Research, 7*(14), 111-124.

Drenoyianni, H., & Selwood, I. D. (1998). Conceptions or misconceptions? Primary teachers' perceptions and use of computers in the classroom. *Education and Information Technologies, 3*(2), 87-99.

Durak, H., & Seferoğlu, S. S. (2017). An examination of the factors that affect teachers' technology use proficiency. In H. F. Odabaşı, B. Akkoyunlu & A. İşman (Eds.),

Educational technology readings 2017 (pp. 537-556). TOJET-The Turkish Online Journal of Educational Technology.

Eken, Ö., Tosun, N., & Tuzcu-Eken, D. (2020). Urgent and Compulsory Move to Distance Education upon COVID-19: A General Evaluation. *Milli Eğitim Dergisi*, *49*(1), 113-128. https://doi.org/10.37669/milliegitim.780722

Elmahdi, I., Al-Hattami, A., & Fawzi, H. (2018). Using technology for formative assessment to improve students' learning. *Turkish Online Journal of Educational Technology-TOJET, 17*(2), 182-188.

Ertmer, P. A., Paul, A., Molly, L., Eva, R., & Denise, W. (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. *Journal of Research on Computing in Education, 32*(1), 54-72. https://doi.org/10.1080/08886504.1999.10782269

Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet Research, 15*, 195-219.

Guha, S. (2003). Are we all technically prepared? —Teachers' perspective on the causes of comfort or discomfort in using computers at elementary grade teaching. *Information Technology in Childhood Education Annual, 2003*(1), 317-349.

Günther, J. (2007). *Digital natives and digital immigrants.* Studienverlag.

Handal, B. (2004). Teachers' instructional beliefs about integrating educational technology. *e-Journal of Instructional Science and Technology, 17*(1), 1-10.

Hart, J. (2008). Understanding today's learner. *Learning Solutions Magazine, 22*,1-11.

Harvey, T. (2019). *Using ipads and seesaw for formative assessment in k2 classrooms*. [Conference presentation]. International Society for Technology in Education (ISTE) 2019, Philadelphia, United States. https://conference.iste.org/2019/program/search/detail_session.php?id=112113249

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review, 27*(3), 1-15.

İnal, E., & Arslanbaş, F. (2021). In teaching Turkish as a foreign language communication focused Web 2.0 tools and application examples. *Journal of Bayburt Education Faculty, 16*(Special Number), 228-249. https://doi.org/10.35675/befdergi.850781

Kapuler, D. (2014). Top 100 sites and apps of 2014. *Tech &Learning, 35*(6),14-16.

Karadağ, A. (2020, May 5). MEB kurumları yönetmeliğinde değişiklik resmî gazete'de. *Anadolu Agency*. https://www.aa.com.tr/tr/egitim/meb-kurumlari-yonetmeliginde-degisiklik-resmi- gazetede/1833220

Karaoğlan-Yılmaz, F. G., & Binay-Eyüboğlu, F. A. (2018). Investigation of the relationships between lifelong learning attitudes, digital native status and technology acceptance of teachers in terms of each other and various variables. *International Journal of Education Science and Technology, 4*(1), 1-17.

Kayacan, K., & Ulker, F. T. (2020). Technology for Education. In M. Zayyad & A. A. Unsal (Eds.), *Education research highlights in mathematics, science and technology 2020* (pp. 33-46). ISRES Publishing

Keskin, M., & Kaya, D. Ö. (2020). Evaluation of students' feedbacks on web-based distance education in the COVID-19 process. *İzmir Katip Çelebi University Faculty of Health Science Journal, 5*(2), 59-67.

Konan, N. (2010). Computer literacy levels of teachers. *Procedia-Social and Behavioral Sciences, 2*(2), 2567-2571. https://doi.org/10.1016/j.sbspro.2010.03.374

Lake, R., & Olson, L. (2020). *Learning as we go: Principles for effective assessment during the COVID-19 pandemic.* Center on Reinventing Public Education.

Landis, J. R., & Koch, G. G. (1977). An application of hierarchical kappa-type statistics in the assessment of majority agreement among multiple observers. *Biometrics*, *33*, 363-374.

Martínez-Villaseñor, M. D. L., González-Mendoza, M., & Danvila Del Valle, I. (2014). Enrichment of learner profile with ubiquitous user model interoperability. *Computación Sistemas, 18*(2), 359-374. https://doi.org/10.13053/CyS-18-2-2014-037

Ministy of National Education [MoNE]. (2020). *Sınıf eğitimi öğretmen rehber kitapçığı*. https://odsgm.meb.gov.tr/meb_iys_dosyalar/2020_08/26145857_Sinif.pdf

Orhan-Göksün, D., Filiz, O., & Kurt, A. A. (2018). Education bag: Development of a social website which presents Web 2.0 tools in a categorical way. *Ege Education Journal, 19*(2), 505-533. https://doi.org/10.12984/egeefd.437670

Özer, M. (2020). Educational policy actions by the ministry of national education in the times of covid-19 pandemic in Turkey. *Kastamonu Education Journal*, *28*(3), 1124-1129. https://doi.org/10.24106/kefdergi.722280

Özpınar, İ. (2020). Preservice teachers' use of Web 2.0 tools and perspectives on their use in real classroom environments. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *11*(3), 814-841. https://doi.org/10.16949/turkbilmat.736600

Pamuk, S., Ülken, A., & Dilek, N. (2012). The investigation of preservice teachers' technology integration competencies from technological pedagogical content knowledge framework. *Mustafa Kemal University Journal of Social Sciences Institute 9*(17), 415-438.

Prensky, M. (2010). *Teaching digital natives: Partnering for real learning.* Corwin A Sage Company.

Seo, Y. J., & Woo, H. (2010). The identification, implementation, and evaluation of critical user interface design features of computer-assisted instruction programs in mathematics for students with learning disabilities. *Computers & Education, 55*(1), 363-377. https://doi.org/10.1016/j.compedu.2010.02.002

Şimşek, Ö., Bars, M., & Zengin, Y. (2017). The use of information and communication technologies in the assessment and evaluation process in mathematics instruction. *International Journal of Curriculum and Instructional Studies (IJOCIS), 7*(13), 189-207.

Sugar, W. (2002). Applying human-centered design to technology integration: Three alternative technology perspectives. *Journal of Computing in Teacher Education, 19*(1), 12-17.

Süral, İ., & Girmen, P. (2019). Digital assessment in social studies course. *Eskişehir Osmangazi University Journal of Social Sciences, 20*(04), 289-304. https://doi.org/10.17494/ogusbd.548361

Taşlıçay-Arslan, Ş. (2019). New generation exam tool Flipquiz. *Abant İzzet Baysal University Journal of the Faculty of Education, 19*(4), 1538-1549. https://doi.org/10.17240/aibuefd.2019..-518445

Tatlı, Z. (2019). *Ölçme değerlendirmede Web 2.0* [*Web 2.0 in assessment]*. Pegem Publications.

Tatlı, Z., Er-Nas, S., Turan, Ş., & Yaman, H. (2021). Determination of the Classroom Teachers' Measurement and Assessment Needs in the Emergency Distance Education Processes. *Inonu University Journal of the Faculty of Education, 22*(2), 953-987. https://doi.org/10.17679/inuefd.901997

Tatlı, Z., İpek Akbulut, H., & Altınışık, D. (2019). Changing attitudes towards educational technology usage in classroom: Web 2.0 tools. *Malaysian Online Journal of Educational Technology, 7*(2), 1-19. https://doi.org/10.17220/mojet.2019.02.001

Tuluk, A., & Yurdugül, H. (2020). Design and development of a Web based dynamic assessment system to increase students' learning effectiveness. *International Journal of Assessment Tools in Education, 7*(4), 631-656. https://doi.org/10.21449/ijate.730454

UNESCO. (2020a). *School closures caused by Coronavirus (Covid-19).* UNESCO. https://en.unesco.org/covid19/educationresponse

UNESCO. (2020b). *Startling digital divides in distance learning emerge.* UNESCO. https://en.unesco.org/news/startling-digital-divides-distance-learning-emerge

UNICEF. (2020). *UNICEF and Microsoft launch global learning platform to help address COVID-19 education crisis.* UNICEF. https://www.unicef.org/press-releases/unicef-and-microsoft-launch-global-learning-platform-help-address-covid-19-education

Vitanova, V., Atanasova-Pachemska, T., Iliev, D., & Pachemska, S. (2015). Factors affecting the development of ICT competencies of teachers in primary schools. *Procedia-Social and Behavioral Sciences, 191*, 1087-1094. https://doi.org/10.1016/j.sbspro.2015.04.344

Wang, W.-T., & Wang, C.-C. (2009). An empirical study of instructor adoption of web-based learning systems. *Computers & Education, 53,* 761-774.

World Health Organization [WHO]. (2020, March). *WHO director-general's opening remarks at the media briefing on COVID-19*. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-COVID-19

Yıldırım, A., & Şimşek, H. (2011). *Qualitative research methods in the social sciences.* Seçkin Publisher.

Yin, R. K. (2002). *Case study research: Design and methods*. SAGE Publications.

Yurdugül, H., & Bayrak, F. (2014). The acceptance of Web based formative assessment system for primary school students. *Educational Sciences and Practice,13*(26), 167-186.

Zarzycka-Piskorz, E. (2016). Kahoot it or not? Can games be motivating in learning grammar?. *Teaching English with Technology, 16*(3), 17-36.

Zhao, Y. (2007). Social studies teachers' perspectives of technology integration. *Journal of Technology and Teacher Education, 15*(3), 311-333.

Appendix 1

Initial version of interview questions	Final version of interview questions after validity and reliability studies
Which of the Web 2.0 environments do you use for ME?	What Web 2.0 tools do you use for ME?
For what features do you prefer the ME Web 2.0 tools you have used?	For what features do you prefer the Web 2.0 tools you use for ME?
What features do you think a well-designed Web 2.0 tool should have?	Which features should be taken into account in the Web 2.0 tool that will be developed for ME?
	What information about student usage should be shared with the teacher?
Which of the Web 2.0 environments you use, do you like the feedback system? Why?	What information should be shared with students about their situation?
	What information should be shared with parents about their situation?
	What features should be included in the feedback system given to the student?
Added Interview Questions	Which motivational features should be included for students to prefer the Web 2.0 tool to be prepared for ME?
	Which motivational features should be included for PE teachers to prefer the Web 2.0 tool to be prepared for ME?

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The Mediating Role of Social Media Usage Habits in the Relationship Between FoMO and Nomophobia

FoMO ile Nomofobi Arasındaki İlişkide Sosyal Medya Kullanım Alışkanlıklarının Aracı Rolü

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ABSTRACT: This study examines the mediating role of social media usage habits in the relationship between FoMO and nomophobia. 457 people were recruited to participate in the study. While 177 of them were male, the remaining 280 participants were female, and the participants' age ranged between 18 and 70. The average age of the participants was calculated as 30.81. The research hypotheses were tested by hierarchical regression analysis. In addition, the significance of the mediator variable was examined via Bootstrapping analysis. First, Pearson product-moment correlation analysis was performed to determine the relationship between variables, and it was found that there was a positive significant relationship between variables. The subsequent hierarchical regression analysis determined that social media usage habits played a partial mediating role in the relationship between FoMO and nomophobia. All findings were discussed in the light of similar research studies in the existing literature, and several suggestions were provided in the end.

Keywords: FoMO, nomophobia, social media usage habits, mediation analysis.

ÖZ: Bu çalışmada, FoMO ile nomofobi arasındaki ilişkide sosyal medya kullanım alışkanlıklarının aracı rolünün incelenmesi amaçlanmıştır. Araştırmanın çalışma grubu, yaşları 18 ile 70 arasında değişen 177'si erkek ve 280'i kadın olmak üzere toplam 457 kişiden oluşmaktadır. Katılımcıların yaş ortalaması ise 30.81 olarak hesaplanmıştır. Araştırmanın hipotezleri hiyerarşik regresyon analizi ile test edilmiştir. Ayrıca aracı değişkenin anlamlılığı günümüzde daha çağdaş bir yaklaşım olarak kabul gören Bootstrapping yöntemi ile hesaplanmıştır. Veri analizinde ilk olarak değişkenler arasındaki ilişkiyi belirlemek amacıyla Pearson momentler çarpımı korelasyon analizi yapılmış ve değişkenler arasında pozitif yönde anlamlı ilişkiler olduğu ortaya konmuştur. Sonrasında yapılan hiyerarşik regresyon analizinde sosyal medya kullanım alışkanlıkları değişkeninin FoMO ile nomofobi arasındaki ilişkide kısmi aracı rol oynadığı belirlenmiştir. Alanyazında FoMO ile nomofobi arasındaki ilişkide sosyal medya kullanım alışkanlıkları değişkeninin aracı rolünün incelendiği herhangi bir çalışma olmaması, bu araştırmanın önemini ortaya koymaktadır. Elde edilen tüm bu bulgular benzer çalışmalar ve alanyazın ışığında tartışılmış, tüm okuyuculara bazı önerilerde bulunulmuştur.

Anahtar kelimeler: FoMO, nomofobi, sosyal medya kullanım alışkanlıkları, aracılık analizi.

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With the advancements in technology, people can now easily access information whenever and however they want. They can also communicate with their peers through video calls and share various posts on social networks. While fulfilling their daily routines through mobile devices, individuals may develop negative feelings such as nomophobia and FoMO when such devices are not accessible.

The term nomophobia (originated from NO Mobile PHOBIA) is defined as the experience of the involuntary fear of the individual in case of not being able to access and communicate with the mobile phone (Yıldırım & Correia, 2015). Nomophobia is evaluated both in the behavioral addiction group and in the phobia group. While it is in the sub-category of internet addiction in the behavioral addiction group, it is also in the specific phobia sub-category in the phobia group (Günlü & Uz-Baş, 2020). Using the phone regularly and spending time on the phone for a long time, carrying the phone charger constantly, having an angry mood when the smartphone needs to be turned off, and checking the notifications on the phone constantly are reported as the symptoms of nomophobia under the subtitle of specific phobias in the literature (Bragazzi & del Puente, 2014; Kaplan-Akıllı & Gezgin, 2016).

Nomophobia is seen as a digital age problem that vastly affects society. Nomophobia, which has a high incidence and degree in society, brings some problems along. (Büyükçolpan, 2019; Dixit et al., 2010; King et al., 2013; Sharma et al., 2015). The existing literature reports that staying away from the smartphone causes an increase in stress symptoms and temper in individuals (Polat, 2017); it also increases interpersonal sensitivity psychopathological symptoms such as obsessive-compulsive symptoms (Gonçalves et al., 2020). Besides, it is reported that nomophobia is related to social phobia (Apak & Yaman, 2019), loneliness (Karakuyu, 2019), depression (Büyükçolpan, 2019), happiness level (Güllüce et al., 2019), academic achievement (Erdem et al., 2016) and life satisfaction (Büyükalim, 2020).

Nomophobia, which is becoming even more common with the increase in smartphone usage (Polat, 2017), shows itself as a symptom of disturbance due to limited smartphone usage (Ma & Liu, 2018). Also, nomophobic individuals feel the need to have their phone next to them as they sleep, and the first thing they do in the mornings is to check their phones (Kaplan-Akıllı & Gezgin, 2016). Individuals' constant desire to check their phones eventually leads to the emergence of addictive behaviors at some point. Accordingly, it was stated that nomophobia is fueled by smartphone addiction and social media addiction (Gezgin, Şahin, & Yıldırım, 2017). Nomophobic individuals prefer to constantly stay online not to miss any updates on social media. While staying away from their smartphones prevents individuals from being aware of the updates in any social environment, this situation causes anxiety and leads to the emergence of FoMO.

FoMO, which is a condition that especially emerges among the younger generation partly because of the widespread smartphone usage, is one of the new types of internet addiction (Tomczyk & Selmanagic-Lizde, 2018). This concept is defined as the fear of being absent from the good, interesting, and exciting experiences that other people have had, not being able to keep up with the updates and missing what is happening (Przybylski et al., 2013). Individuals who fear missing out on things happening in the social environments constantly want to stay in touch with others and be informed about what others are doing. When evaluated in this context, FoMO is

generally accepted as a maladaptive psychological state (Wang et al., 2019). In the studies, while FoMO is positively associated with neuroticism, anxiety, depression, loneliness, and stress (Baker et al., 2016; Beyens et al., 2016; Dossey, 2014; Rozgonjuk et al., 2020a); it is negatively correlated with self-discipline (Rozgonjuk et al., 2020b), life satisfaction (Przybylski et al., 2013); self-esteem, well-being (Buglass et al., 2017) quality of life (Elhai et al., 2018).

FoMO plays an important role in addressing social media engagement (Przybylski et al., 2013) and increasing the use of social networks (Buglass et al., 2017) due to the widespread use of the Internet and smartphones. As individuals develop higher degrees of FoMO, their social media intensity (Roberts & David, 2019) and social media fatigue levels also increase (Bright & Logan, 2018). In the emergence of this situation, the desire of the individual to follow the social networks even more as a result of the anxiety about missing out on updates is effective. Individuals that do not want to miss out on updates in the social environments constantly use their smartphones and this condition plays an important role in shaping their social media habits.

Social media makes up a large part of the internet usage habits of individuals (Obee, 2012). Social media are social networks that enable users to communicate online, create and share content or make various comments (Kirtiş & Karahan, 2011). One of the most important factors that cause social media to be effective is individuals' feeling of dependency on it (Hetz et al., 2015). This feeling is fueled by the need for belonging at different levels in individuals of all ages (Beyens et al., 2016). It can be said that the use of social media, which is becoming widespread, varies among individuals and shapes the social media usage habits in line with each individual's own needs. Social media is frequently used for activities such as entertainment and relaxation (Küçükali, 2016), doing research (Başoğlu & Yanar, 2017), communication and professional cooperation (Biçer, 2014), getting information (Koçer, 2012), and looking at photos and sending messages (Başoğlu & Yanar, 2017). Although the use of social networks benefits individuals in many ways, their excessive use can negatively affect individuals' self-esteem (Buglass et al., 2017; Uzun et al., 2016) and life satisfaction (Balcı & Koçak, 2017), and it increases their addiction levels as well (Aydan, 2018; Güleryüz et al., 2020). Curiosity towards the lives of others is also effective in the addiction level of social media usage. Curiosity about what is happening in the lives of others and the desire to know what is happening can lead to the emergence of feelings of missing out, including feelings of anxiety and disturbance (Hetz et al., 2015). Individuals who want to follow every development exhibit the behavior of constantly checking their social media accounts via smartphones because they feel worried when they are deprived of following others.

In the light of this information, it can be argued that FoMO can affect nomophobia through individuals' social media usage habits. The fact that individuals use social media more may cause them to start following other individuals and comparing their own lives with those they follow. It is considered that this situation may cause individuals to be more nomophobic and thus, it fuels FoMO. The existing literature fails to provide no account of FoMO, nomophobia and social media usage habits together. This happens to be the core of the present study and the main starting point for the researchers. It is believed that this study can vastly contribute to the field of psychological counseling and guidance. In this model, which is tested based on this

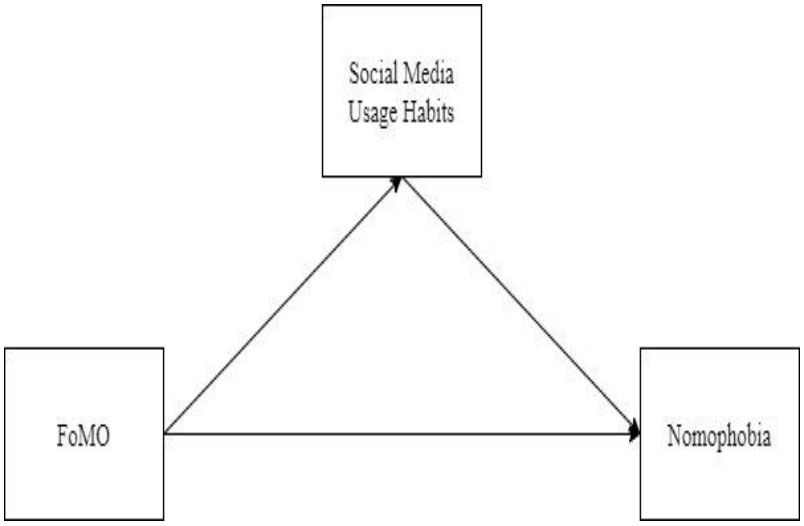
rationale, the mediating role of social media usage habits in the relationship between FoMO and nomophobia is examined, and the following hypotheses are developed to serve the purpose of the present research.

Hypotheses

The model tested in line with the purpose of the research is presented in Figure 1:

Figure 1

Proposed Conceptual Model Regarding the Mediating Role of Social Media Usage Habits in the Relationship between FoMO and Nomophobia



In order to test the model shown in Figure 1, the following hypotheses have been determined:

H1: There is a statistically significant relationship between the FoMO variable and both nomophobia and social media usage habits variable.

H2: FoMO significantly predicts the variable of nomophobia.

H3: FoMO significantly predicts social media usage habits and social media usage habits variable significantly predicts nomophobia.

H4: Social media usage habits variable has a mediating role in the relationship between FoMO and nomophobia.

Method

Research Model

This descriptive study is based on the relational screening model that examines the mediator role of social media usage habits in the relationship between FoMO and nomophobia. This model is used in order to determine the predictive values of the relationship between variables (Büyüköztürk, 2016). The independent variable of the study is FoMO, the dependent variable is nomophobia, and the mediator variable is social media usage habits.

Participants of the Research

The number of participants in this research was 457, 177 male (38.7%) and 280 female (61.3%). While the participants were aged between 18 and 70, the average age of the participants was calculated as 30.81. Regarding the perceived economic status of the participants, 44 (9.6%) stated that their financial situation was bad, 369 (80.8%) moderate, and the other 44 (9.6%) stated that their financial situation was good. The study was carried out with people of different vocational groups. The data of the study were collected in the first half of 2021 using the convenience sampling method. Convenience sampling is the most convenient method for the researcher in terms of time, economy, and workforce (Büyüköztürk, 2016). However, it should not be forgotten that it is difficult to represent the universe in this method. No fee was paid to the participants recruited for this study.

Data Collection Tools

Personal Information Form

The "Personal Information Form" developed by the researchers to determine the demographic features of the sample and describe the study group better contained information about the gender, age, and perceived socioeconomic status.

Fear of Missing Out Scale in Social Environments (FoMO)

The FoMO scale developed by Przybylski et al. (2013) was adapted to Turkish culture by Gökler et al. (2016). This 4-point Likert-type scale consisted of 10 items, and it was one-dimensional. High scores from the scale indicated that the fear of missing out on updates was high. Confirmatory factor analysis results showed that the scale was sufficient in fit indices. In terms of reliability, Cronbach alpha internal consistency value of the scale was reported as .81 (Gökler et al., 2016). In another study in the literature, the internal consistency coefficient of the scale was determined as .83 (Tanrıkulu, 2018), while this value was calculated as .84 in the present study.

Nomophobia Scale

The nomophobia scale was developed by Yıldırım and Correia (2015) to determine individuals' fear of staying away from their smartphones and was adapted to Turkish by Yıldırım et al. (2015). The scale, which had 20 items in total, included four sub-dimensions: "inability to access information", "giving up comfort", "inability to communicate" and "losing online connection". High scores in this 7-point Likert-type scale indicated that the level of nomophobia was high. As a result of the factor analysis of the scale, the construct validity was provided and the internal consistency coefficient in Yıldırım et al.'s (2015) study was reported to be .92. In the present study, the reliability coefficient was calculated as .95.

Scale of Social Media Usage Habits

This scale was developed by Avcı (2016) to determine the social media usage habits of individuals. The scale, which had 21 items in total, was scored as 4-point grading. After conducting the factor analysis, 63.1% of the total variance was explained and five sub-dimensions were revealed. These sub-dimensions were named respectively as "narcissism", "relationship", "trust and education", "sociality and political factors"

and "news, information and need" factors. After the construct validity of the scale was provided, the value that was reached in the Cronbach's alpha internal consistency analysis conducted for its reliability was .92. The internal consistency value calculated in this research was .91.

Data Collection Process

For the purpose of measuring the variables in the research, the owners of the scale were contacted, and the necessary permissions were obtained. The data of the study were collected via Google Form in the first half of 2021 using the appropriate sampling method. At the beginning of the form, the participants were informed about the study, volunteering, and confidentiality. After that, the research data were collected and transferred to the computer environment after receiving the participants' approval.

Data Analysis

In order to perform statistical analysis, the preliminary preparation of the data was carried out first. In this context, the data were evaluated on the frequency table, and it was checked whether there was any erroneous or incomplete coding. Any erroneous or incomplete coding was not encountered in this review. Afterward, the outliers were analyzed by calculating Mahalanobis distance values, and 39 measurements were extracted from the data set according to the .001 significance level (Büyüköztürk, 2016). A data set included the responses of 457 participants. The assumptions of normality and linearity of the variables and whether they had multiple connectivity problems were examined through the created data set. The values of Skewness and Kurtosis coefficients, which were examined over the total scores of the variables, were found to be in the range of ±1, except that the null hypothesis was rejected (Kolmogorov Smirnov $p \geq .05$). In the light of all these results, it could be argued that the data showed normal distribution (Çokluk et al., 2014). Lastly, VIF and tolerance values regarding multicollinearity were examined. In the literature, the fact that VIF value was greater than 3 or the tolerance value was lower than .30 indicated that there was a multiple connection problem (Büyüköztürk, 2016). In this context, it was determined that both the VIF value and the tolerance value did not pose any risk for the multicollinearity problem. After all the preliminary preparations were made, data analysis was conducted, and the significance value was accepted as $p < .05$.

In this study, hierarchical regression analysis, one of the multiple linear regression analysis methods, is used to examine the mediator role of social media usage habits in the relationship between FoMO and nomophobia. Regression analysis is an analysis method in which there is a relationship between two or more variables and one variable affects the other variable or variables (Can, 2014). Multiple regression analysis is a statistical analysis showing the effect of more than one independent variable on a dependent variable (Heppner et al., 2008). Finally, hierarchical regression analysis, which is the method to be used in this study, is explained as the sequential addition of independent variables to the analysis by the researcher while examining the effect on the dependent variable (Büyüköztürk, 2016). In this context, mediator variable analysis is carried out as Baron and Kenny (1986) suggested. Four hypotheses are expected to be met in this mediator variable analysis (Baron & Kenny, 1986). These are explained as (1) existence of a significant relationship and effect between the independent variable and the mediator variable, (2) existence of a significant relationship and effect between

the independent variable and the dependent variable, (3) existence of a significant relationship between the mediator variable and the dependent variable when the independent variable is controlled, and (4) existence of an insignificant relationship or a decreasing significance of the relationship between the independent variable and the dependent variable when the mediator variable is added to the model (partial mediation).

In this study, after the mediator variable analysis was conducted in line with the hypotheses of Baron and Kenny (1986), bootstrapping analysis was used to test the significance of the mediator variable. The reason for using this analysis was that it was considered a more contemporary approach in the literature than the Sobel test (Zhao et al., 2010) and was thought to give healthier results (Hayes & Preacher, 2014; Rucker et al., 2011). This analysis is reported to be an efficient statistical method that is used when testing the effect of mediating variables and determines the significance level of the indirect effect (Gürbüz, 2019). In this study, confidence intervals were calculated in 5000 sub-samples in the bootstrapping analysis performed to test the significance of the mediating variable. In this analysis, the lack of a zero value between the lower and upper limit of the confidence interval values indicates significance (Hayes & Preacher, 2014).

Ethical Procedures

Ethics committee approval of the study was obtained from Marmara University Scientific Research and Publication Ethics Committee on 26.02.2021 (Board Approval No: #2100081674/2021-2-8).

Results

In this study, initially, descriptive statistics of all variables were calculated and correlation coefficients of variables with each other were examined. The results obtained through statistical calculations were given in Table 1:

Table 1

Average, Standard Deviation and Correlation Values of the Research Variables

	Mean	*sd*	(1)	(2)
FoMO (1)	75.19	26.71		
Nomophobia (2)	19.21	5.15	.52*	
Social Media Usage Habits (3)	38.17	10.70	.50*	.39*

*$p \leq .01$

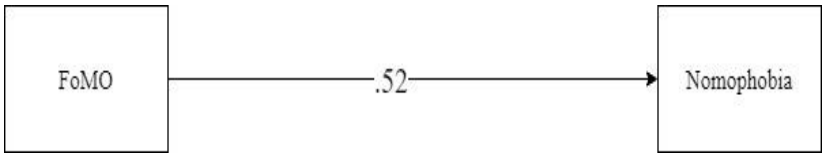
According to Table 1, the mean scale score of the FoMO variable was found to be 75.19 and its standard deviation as 26.71, while the mean scale score of the nomophobia variable was calculated as 19.21 and its standard deviation as 5.15. The average score of the social media usage habits variable was 38.17 and the standard deviation score was 10.70. Looking at the relationship between the variables, it was found that the FoMO variable had moderately significant relationships both with nomophobia (r=.52) and with social media usage habits (r=.50) in a positive direction

(p≤.01). These results were reported as high-level in the literature (Leech et al., 2008). It was also determined that there was a moderately significant positive correlation (r=.39) between nomophobia and social media usage habits (p≤.01). This finding was described as mid-level by Leech et al. (2008). Pearson product-moment correlation analysis results showed that the first hypothesis of the research was confirmed (*H1*).

In order to test the second hypothesis of the study, the extent to which the independent variable FoMO predicted the dependent variable nomophobia, was determined by simple regression analysis and the obtained predictive model was presented in Figure 2:

Figure 2

The Model Regarding the Prediction of the FoMO Variable on the Nomophobia Variable

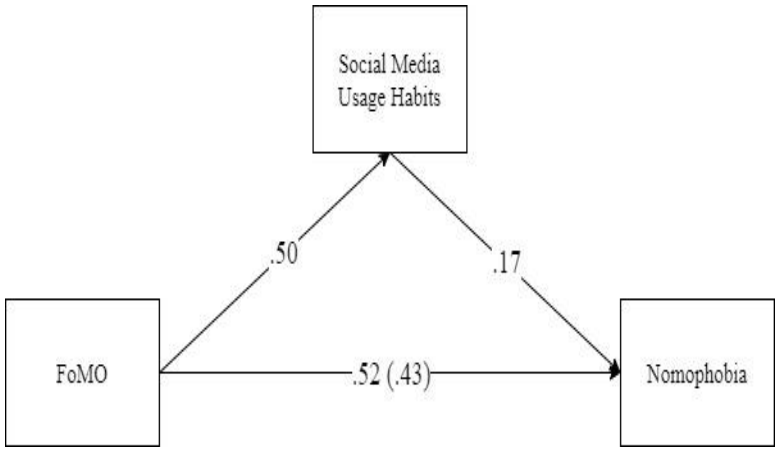


According to the obtained findings, the FoMO variable was a significant positive predictor of nomophobia. According to this regression model, FoMO predicted nomophobia variable at the level of 27% (r^2=.27; $F_{(1,455)}$=165.61; p≤.01). This result indicated that the second hypothesis of the research was also confirmed (*H2*).

Lastly, the third and fourth hypotheses of the study were analyzed. Initially, it was tested whether the FoMO variable predicted social media usage habits, then whether the social media usage habits variable predicted nomophobia, and through the established model, the mediating role of social media usage habits in the relationship between FoMO and nomophobia was examined. The predictive model that was generated after the mediation analysis for the third and fourth hypotheses of the research was given in Figure 3.

Figure 3

The Mediating Role of Social Media Usage Habits in the Relationship Between FoMO and Nomophobia



In line with the previous findings, it was seen that the FoMO variable significantly predicted social media usage habits (a=.50; p≤.000) and social media usage habits significantly predicted nomophobia (b=.17; p≤.000). This finding showed that the third hypothesis of the research was confirmed (*H3*). Apart from this, as seen in Figure 3, the coefficient of FoMO variable's predicting nomophobia was .52. When the social media usage habits variable was added to this model, the coefficient of the FoMO variable's predicting nomophobia decreased by .09 and became .43 (c'=.09; p<.01). This finding showed that social media usage habits played a partial mediating role in the relationship between FoMO and nomophobia in the model tested. With this result, fourth and the last hypothesis of the study was confirmed (*H4*), the hypotheses of Baron and Kenny (1986) were confirmed, and the model established in the study was statistically verified.

In the model established, the significance of the partial mediating role played by social media usage habits between FoMO and nomophobia was tested with bootstrapping analysis. In this analysis, confidence intervals were calculated over 5000 sub-samples, and it was decided by looking whether there is a zero (0) value between the lower and upper limits at 95% confidence interval. The results obtained in this context showed that social media usage habits had a significant partial mediating role between FoMO and nomophobia (95% CI [.04, .15]) The direct and indirect effect results reached within this analysis were given in Table 2:

Table 2

Bootstrapping Analysis Results Regarding Direct and Indirect Effects

Tested Path						%95 CI	
				ß	*SE*	Lower	Upper
Direct Effects							
FoMO	→	SMUH		.50*	.13	.77	1.30
SMUH	→	Nomophobia		.17*	.12	.04	.67
FoMO	→	Nomophobia		.52*	.26	.55	2.69
Indirect Effects							
FoMO	→	SMUH	→ Nomophobia	.09*	.03	.04	.15

* p≤ .01; *Note.* SMUH: Social media usage habits.

Discussion, Conclusion, and Suggestions

This study has been conducted to determine the mediating role of social media usage habits in the relationship between FoMO and nomophobia. In order to achieve this aim, a model has been established regarding the mediating role of the social media usage habits variable in the relationship between FoMO and nomophobia. In this model, it has been determined that FoMO directly affects the nomophobia levels of adult individuals, and social media usage habits have a partial mediator effect in this relationship. In addition, bilateral relationships between variables have been examined within the study, and it has been found that FoMO, nomophobia and social media usage habits are positively correlated with each other.

According to the findings obtained from the study, high-level significant positive relationships are found between FoMO and nomophobia. As individuals' fear of missing out on updates increases, the fear they feel when they are away from their smartphones also increases. This finding is parallel to the results of the previous studies in the literature (Yılmaz & Bekaroğlu, 2021). In a study conducted by Shiva et al. (2020), a high-level positive relationship is reported between FoMO and nomophobia. In a study conducted by Yaman and Kavuncu (2019) on university students, it is concluded that FoMO and nomophobia are positively associated and as individuals' FoMO levels increase, their nomophobia levels also increase. Similarly, Yıldız et al. (2020) report in their study on the relationships between netlessphobia, nomophobia, and fear of missing out on young athletes, that nomophobia is significantly associated with the fear of missing the updates. According to Gezgin et al. (2018), FoMO is a strong predictor of nomophobia. According to Yıldız-Durak (2018), adolescents may worry about the accessibility of their smartphones because they are afraid of missing social media updates and posts. It is argued that individuals who use their smartphones to stay connected to social media have higher levels of nomophobia (Sırakaya, 2018). Individuals see their smartphones as a part of themselves and use their smartphones not only for communication but, most importantly, to not stay behind social media (Polat, 2017). Based on all this information in the literature and the research results, it can be argued that individuals prefer to stay connected and need to constantly check their phones to not miss the developments in social media. Individuals who are unaware of what others on social media are doing whenever away from their phones may experience negative emotions. For this reason, being separated from their phones or losing the connection prevents them from being aware of updates in any social environment, which can cause concern and anxiety in the individual. This situation clearly reveals the connection between FoMO and nomophobia.

According to the findings obtained from the study, highly significant positive relationships have been found between FoMO and nomophobia. As the FoMO levels of individuals increase, their social media usage habits are affected and FoMO may fuel the social media usage of individuals. The use of social media is seen as an attractive option for individuals who fear missing out on updates in social environments (Przybylski et al., 2013). For those who maintain communication in daily life through social networks, losing the connection or missing out on updates can cause anxiety in individuals. This causes more intensive usage of social networking sites (Gezgin et al., 2018). People with high levels of FoMO may pay more attention to the moods of other people that they have positive social interactions with (Dou et al., 2021) and may show a higher need for approval. This leads to more use of social media among these people (Alt & Boniel-Nissim, 2018). Hamutoğlu et al. (2020) conclude that social media addiction is effective on FoMO in their research, where they examine the relationships between social media addiction, FoMO, and personality traits. Due to the intense use of the Internet and smartphones, FoMO also plays an important role in explaining social media engagement (Przybylski et al., 2013). In addition, it causes the use of social networks to increase (Buglass et al., 2017). As individuals' FoMO levels increase, social media intensity (Roberts & David, 2019) and social media fatigue levels increase (Bright & Logan, 2018). FoMO fortifies the dependency on social media. Individuals constantly feel lonely and constantly share something in order to complement the love

and affection they cannot get from their social environment (Dossey, 2014). In the emergence of these, the desire of the individual to follow the social networks even more as a result of the anxiety about missing out on updates is effective. Being out of these updates may cause concern and anxiety in the individual who wants to follow and check the news, posts, messages, or any situation in social environments that attracts one's attention. To get rid of this concern, individuals constantly want to be online on social media through smartphones. This situation explains the reason for one's existence on social media and plays an important role in shaping social media usage habits.

The findings reported in the present study also show a high level of correlation between nomophobia and social media usage habits. While individuals' social media usage habits are sometimes a cause, sometimes they can be a result. It can be said that these two variables that trigger each other are in mutual interaction. That is, they are in a cyclical relationship. The fear that individuals experience when they are away from their phones affects their social media usage habits, and social media usage habits cause individuals to be unable to stay away from their phones. This research finding is similar to the results of other studies in the literature. In a study conducted by Yaman and Kavuncu (2019), it is concluded that the use of social media by university students is effective on their nomophobia levels and predicts nomophobia. While Gezgin, Hamutoglu, et al. (2017) reports that the nomophobia levels of social network users are at average levels, they conclude that social network users frequently check their smartphones and the duration of mobile internet use is quite long. As a result, social media use and social media addiction also affect nomophobia and as individuals' use of social media increase, their levels of nomophobia also increase.

Because nomophobic individuals worry when they are away from their phones, they always try to keep their phones on and in their reach (Sırakaya, 2018). Also, nomophobic individuals feel the need to have their phone next to them as they sleep, and the first thing they do in the mornings is to check their phones (Kaplan-Akıllı & Gezgin, 2016). Individuals' desire to constantly check their phones eventually leads up to emergence of addictive behaviors at some point (Hetz et al., 2015). Nomophobia is fueled by smartphone addiction and social media addiction (Gezgin, Hamutoglu, et al., 2017). Accordingly, there are strong positive relationships between nomophobia and social media addiction (Kietzmann et al., 2011; Yıldız-Durak, 2018). There are various social media usage habits and each individual uses social media according to their needs. People can use social media to communicate with a large audience, introduce themselves and their lives, or follow others in their homes. Curiosity towards the lives of others is also effective in the addiction level of social media usage (Hetz et al., 2015). Any update happening in the social environment may become important for the individual. When the individual is stripped of following these updates, it is thought that one will begin feeling the lack of it. The individual who wants to get rid of this anxiety constantly check social media accounts through the smartphone.

The most significant finding of the present study is that the social media usage habits variable has a significant partial mediating role between FoMO and nomophobia. In the literature, no study reporting on the mediating role of social media usage habits in the relationship between FoMO and nomophobia is found. The results obtained from this study show that FoMO has a significant effect on nomophobia, while the effect on nomophobia is reduced when the social media usage habits variable is included in the

model. Although the findings show that FoMO levels are a variable that affects nomophobia, ignoring other variables that affect nomophobia may be a mistake. In this context, for example, social media usage habits can be considered as an important variable on nomophobia because social media use constitutes a large part of individuals' internet usage habits (Obee, 2012). One of the most important factors that cause social media to be effective is individuals' feeling of dependency on it (Hetz et al., 2015). This feeling is fueled by the need to belong at different levels in individuals of all ages (Beyens et al., 2016). In a generation characterized by a constant desire to stay connected, social media allows users to constantly monitor their social networks for any update (David et al., 2017; Roberts & Pirog, 2013; Roberts et al., 2014). Curiosity towards the lives of others is also effective in the addiction level of social media usage (Hetz et al., 2015). Individuals get to witness others' lives and constantly watch them. Curiosity about what is happening in the lives of others and the desire to know what is happening can lead to the emergence of feelings of missing out, including feelings of anxiety and disturbance (Hetz et al., 2015). Any update happening in the social environment may become important for the individual. When the individual is stripped of following these updates, one may feel the lack of it. The individual who wants to get rid of this anxiety feels the need to constantly check social media accounts through the smartphone. After a while, individuals who continuously monitor social networks will eventually reveal the behavior of following the developments in such platforms. Individual who is afraid of missing out on social media posts, conversations, or news will constantly control their smartphone. Therefore, while updates in social environments shape the social media usage habits of individuals who are afraid of missing out and cause an increase in nomophobia, these habits cause an increase in nomophobia in all cases, regardless of the habit of using social media. It can be said that the necessary precautions should be taken for individuals of all ages.

Some limitations should be taken into account when examining the findings of this study. First of all, during the data collection period, life was restricted in many areas due to the Covid-19 pandemic, which might have affected individuals' social media and smartphone usage habits. This situation can also be considered a limitation in terms of research results. Apart from this, gathering research data online can be considered another limitation. Lastly, since each scale measures different properties, the findings obtained from this study are limited to the qualities measured by the measurement tools.

Suggestions can be made in line with the results obtained from the research. Firstly, there may be an increase in the rate of mobile device usage of individuals in this period as stressful life events occur, and a large part of society is under lockdown at home. Since this change in the lifestyle will cause individuals to spend their time in environments such as social media and online platforms, at this point, individuals can improve their self-control and develop control mechanisms for themselves (Bright & Logan, 2018; Dossey, 2014) and they can apply social media detox or digital platform detox when necessary. As a result of the benefits of the digital age, these negative situations such as FoMO and nomophobia may lead to the emergence of different problems in individuals after a while (Buglass et al., 2017; Büyükalim, 2020; Karakuyu, 2019). In individuals who fear missing out on the news in social environments and being separated from their smartphones, different problems such as fast eating, skipping meals, and sleep problems may arise (Yılmaz et al., 2018). While individuals should

make the necessary effort and care for an orderly life, it may be suggested that individuals who fail to achieve this should receive the necessary mental health assistance despite the possibility of a mental health deterioration. Apart from this, considering the limited number of studies in the literature on FoMO and nomophobia, different studies can be conducted to examine the relationships between FoMO and nomophobia and such different variables. Considering that other variables may also play a role in the relationship between FoMO and nomophobia, new models can be tested based on the observations made. Apart from this, regulatory variables such as gender, age, and interpersonal relationships can be included in the model, and the effect of demographic variables on the relationship between FoMO and nomophobia can be discussed. For future research, it may be suggested to repeat the model in a different sample group, expand the research by adding new variables, re-do the research after the Covid-19 pandemic era, or reach various findings using other analyzes.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Availability of Data and Material

The datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author at the editor's request.

Code Availability

Not applicable.

Authors Contributions

All authors contributed to the study understanding and design. Material preparation, data collection and analysis were done by all authors. All authors have read and approved the final version of the article.

Ethics Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent top Participate

Informed consent was obtained from all the individual participants that were included in the study.

Consent for Publication

Three measures were used in this manuscript with the permission of measures' owners.

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References

Alt, D., & Boniel-Nissim, M. (2018). Parent-adolescent communication and problematic internet use: The mediating role of fear of missing out (FoMO). *Journal of Family Issues, 39*(13), 1-19. https://doi.org/10.1177/0192513X18783493

Apak, E., & Yaman, Ö. M. (2019). Üniversite öğrencilerinde nomofobi yaygınlığı ve nomofobi ile sosyal fobi arasındaki ilişki: Bingöl Üniversitesi örneklemi. *Addicta: The Turkish Journal on Addictions, 6*(3), 611-629. https://doi.org/10.15805/addicta.2019.6.3.0078

Avcı, K. (2016). Üniversite öğrencilerinin sosyal medya kullanım alışkanlıklarının sosyal ilişkilere etkisi. *Uluslararası Sosyal Araştırmalar Dergisi [The Journal of International Social Research], 9*(46), 641-655.

Aydan, H. (2018). Sosyal medya kullanımı ile sosyal medya bağımlılık düzeylerinin belirlenmesine yönelik bir araştırma: Ege Üniversitesi örneği. *Erciyes İletişim Dergisi [Journal of Erciyes Communication], 5*(4), 351-369. https://doi.org/10.17680/erciyesiletisim.420632

Baker, Z. G., Krieger, H., & LeRoy, A. S. (2016). Fear of missing out: Relationships with depression, mindfulness and physical symptoms. *Translational Issues in Psychological Science, 2*(3), 275-282. https://doi.org/10.1037/tps0000075

Balcı, Ş., & Koçak, M. C. (2017, 4-5 May). *The relations between social media usage and life satisfaction: A survey on university students*. The First International Conference on New Trends in Communication, Istanbul, Turkey.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182. https://doi.org/10.1037/0022-3514.51.6.1173

Başoğlu, U. D., & Yanar, Ş. (2017). Üniversite öğrencilerinin sosyal medya kullanım amaçları ve alışkanlıklarının belirlenmesi. *Kilis 7 Aralık Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 1*(2), 6-13.

Beyens, I., Frison, E., & Eggermont, S. (2016). I don't want to miss a thing: Adolescents' fear of missing out and its relationship to adolescents' social needs, Facebook use, and Facebook related stress. *Computers in Human Behavior, 64*, 1-8. https://doi.org/10.1016/j.chb.2016.05.083

Biçer, S. (2014). Akademisyenlerin sosyal ağlarda bulunma motivasyonları: Facebook örneği. *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi [Dumlupınar University Journal of Social Sciences], 40*, 59-80.

Bragazzi, N. L., & del Puente, G. D. (2014). A proposal nomophobia in the new DSM-IV. *Psychological Research Behavior Management, 7*, 155-160. https://doi.org/10.2147/PRBM.S41386

Bright, L. F., & Logan, K. (2018). Is my fear of missing out (FoMO) causing fatigue? Advertising, social media fatigue and the implications for consumers and brands. *Internet Research, 28*(5), 1213-1227. https://doi.org/10.1108/IntR-03-2017-0112

Buglass, S. L., Binder, J. F., Betts, L. R., & Underwood, D. M. J. (2017). Motivators of online vulnerability: The impact of social network site use and FoMO. *Computers in Human Behavior, 66,* 248-255. https://doi.org/10.1016/j.chb.2016.09.055

Büyükalim, M. (2020). *Üniversite öğrencilerinde genel aidiyet, nomofobi ve yaşam doyumu arasındaki yordayıcı ilişkiler* [Unpublished master's thesis]. Necmettin Erbakan University.

Büyükçolpan, H. (2019). *Üniversite öğrencilerinde nomofobi, bağlanma biçimleri, depresyon ve algılanan sosyal destek* [Unpublished master's thesis]. Hacettepe University.

Büyüköztürk, Ş. (2016). *Sosyal bilimler için veri analizi el kitabı istatistik, araştırma deseni SPSS uygulamaları ve yorum* (22nd ed.). Pegem Akademi.

Can, A. (2014). *SPSS ile bilimsel araştırma sürecinde nicel veri analizi* (2nd ed.). Pegem Akademi.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2014). *Sosyal bilimler için çok değişkenli istatistik SPSS ve LISREL uygulamaları* (3rd ed.). Pegem Akademi.

David, M. E., Roberts, J. A., & Christenson, B. (2017). Too much of a good thing: Investigating the association between actual smartphone use and individual well-being. *International Journal of Human Computer Interaction, 34*(3), 265-275. https://doi.org/10.1080/10447318.2017.1349250

Dixit, S., Shukla, H., Bhagwat, A. K., Bindal, A., Goyal, A., Zaidi, A. K., & Shrivastava, A. (2010). A study evaluate mobile phone dependence among students of a medical college and associated hospital of central India. *Indian Association of Preventive & Social Medicine, 35*(2), 339-341. https://doi.org/10.4103/0970-0218.66878

Dossey, L. (2014). FoMO, digital dementia, and our dangerous experiment. *Explore: The Journal of Science and Healing, 2*(10), 69-73. https://doi.org/10.1016/j.jbmt.2013.12.008

Dou, F., Li, Q., Li, X., Li, Q., & Wang, M. (2021). Impact of perceived social support on fear of missing of out (FoMO): A moderated mediation model. *Current Psychology,* 1-10. https://doi.org/10.1007/s12144-021-01404-4

Elhai, J. D., Levine, J. C., Alghraibeh, A. M., Alafnan, A. A., Aldraiweesh, A. A., & Hall, B. J. (2018). Fear of missing out: Testing relationships with negative affectivity, online social engagement, and problematic smartphone use. *Computers in Human Behavior, 89,* 289-298. https://doi.org/10.1016/j.chb.2018.08.020

Erdem, H., Kalkın, G., Türen, U., & Deniz, M. (2016). Üniversite öğrencilerinde mobil telefon yoksunluğu korkusunun (Nomofobi) akademik başarıya etkisi. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi [Süleyman Demirel University The Journal of Faculty of Economics Administrative Sciences], 21*(3), 923-936.

Gezgin, D. M., Hamutoğlu, N. B., Gemikonaklı, O., & Raman, I. (2017). Social networks users: Fear of missing out in preservice teachers. *Journal of Education and Practice, 8*(17), 156-168.

Gezgin, D. M., Hamutoğlu, N. B., Sezen-Gültekin, G., & Gemikonaklı, O. (2018). Relationship between nomophobia and fear of missing out among Turkish university students. *Cypriot Journal of Educational Science, 13*(4), 549-561. https://doi.org/10.18844/cjes.v13i4.3464

Gezgin, D. M., Şahin, Y. L., & Yıldırım, S. (2017). Sosyal ağ kullanıcıları arasında nomofobi yaygınlığının çeşitli faktörler açısından incelenmesi. *Eğitim Teknoloji Kuram ve Uygulama [Educational Technology Theory and Practice], 7*(1), 1-15. https://doi.org/10.17943/etku.288485

Gökler, M. E., Aydın, R., Ünal, E., & Metintaş, S. (2016). Sosyal Ortamlarda Gelişmeleri Kaçırma Korkusu Ölçeğinin Türkçe sürümünün geçerlilik ve güvenilirliğinin değerlendirilmesi. *Anadolu Psikiyatri Dergisi [Anatolian Journal of Psychiatry], 17*(Ek.1), 52-59. https://doi.org/10.5455/apd.195843

Gonçalves, S., Dias, P., & Correia, A. P. (2020). Nomophobia and lifestyle: Smartphone use and its relationship to psychopathologies. *Computers in Human Behavior Reports, 2*, 1-8. https://doi.org/10.1016/j.chbr.2020.100025

Güleryüz, S., Esentaş, M., Yıldız, K., & Güzel, P. (2020). Sosyal izolasyon sürecindeki bireylerin serbest zaman değerlendirme biçimleri: Sosyal medya kullanım amaçları ile sosyal medya bağımlılığı ilişkisinin incelenmesi. *FOCUSS Spor Yönetimi Araştırmaları Dergisi, [FOCUSS Journal of Sport Management Research], 1*(1), 31-45.

Güllüce, A. Ç., Kaygın, E., & Börekçi, N. E. (2019). Üniversite öğrencilerinin nomofobi düzeyi ile öznel iyi olma durumları arasındaki ilişkinin belirlenmesi: Ardahan örneği. *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi [Hacettepe University Journal of Economics and Administrative Sciences], 37*(4), 651-674. https://doi.org/10.17065/huniibf.482061

Günlü, A., & Uz-Baş, A. (2020). Genişletilmiş benlik kuramı bağlamında nomofobi. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi [Journal of the Human and Social Science Researches], 9*(5), 3853-3873. https://doi.org/10.15869/itobiad.778313

Gürbüz, S. (2019). *Sosyal bilimlerde aracı, düzenleyici ve durumsal etki analizleri.* Seçkin Yayıncılık.

Hamutoğlu, N. B., Topal, M., & Gezgin, D. M. (2020). Investigating direct and indirect effects of social media addiction, social media usage and personality traits on FoMO. *International Journal of Progressive Education, 16*(2), 248-261. https://doi.org/10.29329/ijpe.2020.241.17

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology, 67*, 451-470. https://doi.org/10.1111/bmsp.12028

Heppner, P. P., Wampold, B. E., & Kivlighan, D. M. (2008). *Psikolojik danışmada araştırma yöntemleri* (D. M. Siyez, Çev.). Metis Yayıncılık.

Hetz, P. R., Dawson, C. L., & Cullen, T. A. (2015). Social media use and the fear of missing out (FoMO) while studying abroad. *Journal of Research on Technology in Education, 47*(4), 259-272. https://doi.org/10.1080/15391523.2015.1080585

Kaplan-Akıllı, G. K., & Gezgin, D. M. (2016). Üniversite öğrencilerinin nomofobi düzeyleri ile farklı davranış örüntülerinin arasındaki ilişkilerin incelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi [Mehmet Akif Ersoy University Journal of Education Faculty], 1*(40), 51-69.

Karakuyu, A. (2019). Meslek yüksekokulu öğrencilerinin sosyal medyadaki gelişmeleri kaçırma korkuları ve yalnızlık durumlarının nomofobilerine katkısı. *Anadolu Bil Meslek Yüksekokulu Dergisi, 54,* 93-106.

Kietzmann, J. H., Hermkens, K., Mccarthy, I. P., & Silvestre, B. S. (2011). Social media? Get serious! Understanding the functional building blocks of social media. *Business Horizons, 54*, 241-251. https://doi.org/10.1016/j.bushor.2011.01.005

King, A. L. S., Valença, A. M., Silva, A. C. O., Baczynski, T., Carvalho, M. R., & Nardi, A. E. (2013). Nomophobia: Dependency on virtual environments or social phobia?. *Computers in Human Behavior, 29*(1), 140-144. https://doi.org/10.1016/j.chb.2012.07.025

Kirtiş, K. A., & Karahan, F. (2011). To be or not to be in social media arena as the most cost-efficient marketing strategy after the global recession. *Procedia Social and Behavioral Sciences, 24,* 260-268. https://doi.org/10.1016/j.sbspro.2011.09.083

Koçer, M. (2012). Erciyes Üniversitesi öğrencilerinin internet ve sosyal medya kullanım alışkanlıkları. *Akdeniz İletişim, 18*, 70-85.

Küçükali, A. (2016). Üniversite öğrencilerinin sosyal medya kullanımı: Atatürk Üniversitesi örneği. *Bartın Üniversitesi İ.İ.B.F. Dergisi, 7*(13), 538-543.

Leech, N. L., Barrett, K. C., & Morgan, G. A. (2008). *SPSS for intermediate statistics: Uses and interpretation.* Lawrence Erlbaum.

Ma, J., & Liu, C. (2018). Evaluation of the factor structure of the Chinese version of the nomophobia questionnaire. *Current Psychology, 40*, 1367-1373. https://doi.org/10.1007/s12144-018-0071-9

Obee, J. (2012). *The ultimate teen guide*. The Scarecrow Press.

Polat, R. (2017). Dijital hastalık olarak nomofobi. *Yeni Medya Elektronik Dergi [e-Journal of New Media], 1*(2), 164-172. https://doi.org/10.17932/IAU.EJNM.254802002017

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior, 29*(4), 1841-1848. https://doi.org/10.1016/j.chb.2013.02.014

Roberts, A. J., & David, M. E. (2019). The social media party: Fear of missing out (FoMO), social media ıntensity, connection, and well-being. *International Journal of Human-Computer Interaction, 36*(4), 386-392. https://doi.org/10.1080/10447318.2019.1646517

Roberts, J. A., Petnji YaYa, L. H., & Manolis, C. (2014). The invisible addiction: Cell-phone activities and addiction among male and female college students. *Journal of Behavioral Addictions, 3*(4), 254-265. https://doi.org/10.1556/JBA.3.2014.015

Roberts, J. A., & Pirog, S. F. III. (2013). A preliminary investigation of materialism and impulsiveness as predictors of technological addictions among young adults. *Journal of Behavioral Addictions, 2*(1), 56-62. https://doi.org/10.1556/jba.1.2012.011

Rozgonjuk, D., Sindermann, C., Elhai, J. D., & Montag, C. (2020a). Individual differences in Fear of Missing Out (FoMO): Age, gender, and the Big Five personality trait domains, facets, and items. *Personality and Individual Differences, 171*, 1-6. https://doi.org/10.1016/j.paid.2020.110546

Rozgonjuk, D., Sindermann, C., Elhai, J. D., & Montag, C. (2020b). Fear of missing out (FoMO) and social media's impact on daily-life and productivity at work: Do WhatsApp, Facebook, Instagram and Snapchat use disorders mediate that association?. *Addictive Behaviors, 110*, 106487. https://doi.org/10.1016/j.addbeh.2020.106487

Rucker, D. D., Preacher, K. J., Tormala, Z. L., & Petty, R. E. (2011). Mediation analysis in Social Psychology: Current practices and new recommendations. *Social and Personality Psychology Compass, 5*(6), 359-371. https://doi.org/10.1111/j.1751-9004.2011.00355.x

Sharma, N., Sharma, P., Sharma, N., & Wavare, R. R. (2015). Rising concern of nomophobia amongst Indian medical students. *International Journal of Research in Medical Sciences, 3*(3), 705-707. https://doi.org/10.5455/2320-6012.ijrms20150333

Shiva, A., Narula, S., & Shahi, S. K. (2020). What drives retail investors‟ investment decisions? Evidence from no mobile phone phobia (nomophobia) and investor fear of missing out (I – FoMO). *Journal of Content, Community & Communication, 11*, 2-19.

Sırakaya, M. (2018). Ön lisans öğrencilerinin nomofobi düzeylerinin akıllı telefon kullanım durumlarına göre incelenmesi. *Mersin Üniversitesi Eğitim Fakültesi Dergisi [Mersin University Journal of the Faculty of Education], 14*(2), 714-727. https://doi.org/10.17860/mersinefd.359458

Tanrıkulu, G. (2018). *"I need to be updated": Fear of missing out and its antecedents as predictors of adolescents' and emerging adults' aspects of social media addiction* [Unpublished master's thesis]. TED University.

Tomczyk, Ł., & Selmanagic-Lizde, E. S. (2018). Fear of Missing Out (FoMO) among youth in Bosnia and Herzegovina Scale and selected mechanisms. *Children and Youth Services Review, 88*, 541-549. https://doi.org/10.1016/j.childyouth.2018.03.048

Uzun, Ö., Yıldırım, V., & Uzun, E. (2016). Dikkat eksikliği hiperaktivite bozukluğu olan ergenlerde sosyal medya kullanım alışkanlıkları ve sosyal medya bağımlılığı, benlik saygısı ve algılanan sosyal destek ilişkisi. *Turkish Journal of Family Medicine and Primary Care, 10*(3), 142-147. https://doi.org/10.21763/tjfmpc.16425

Wang, P., Wang, X., Niea, J., Zeng, P., Liu, K., Wang, J., Guo, J., & Leia, L. (2019). Envy and problematic smartphone use: The mediating role of FoMO and the moderating role of student-student relationship. *Personality and Individual Differences, 146*, 136-142. https://doi.org/10.1016/j.paid.2019.04.013

Yaman, Z., & Kavuncu, B. (2019). Üniversite öğrencilerinin sosyal gelişmeleri kaçırma korkusunun ve sosyal ağ kullanım amacının nomofobi düzeyine etkisi. *Sosyal Bilimler Araştırmaları Dergisi, 14*(2), 555-570.

Yıldırım, C., & Correia, A. P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior, 49*, 130-137. https://doi.org/10.1016/j.chb.2015.02.059

Yıldırım, C., Sumuer, E., Adnan, M., & Yıldırım, S. (2015). A growing fear: Prevalence of nomophobia among Turkish college students. *Information Development, 32*(5), 1322-1331. https://doi.org/10.1177/0266666915599025

Yıldız, K., Kurnaz, D., & Kırık, A. M. (2020). Nomofobi, netlessfobi ve gelişmeleri kaçırma korkusu: sporcu genç yetişkinler üzerine bir araştırma. *Celal Bayar Üniversitesi Sosyal Bilimler Dergisi, 18*, 321-338. https://doi.org/10.18026/cbayarsos.669601

Yıldız-Durak, H. (2018). What would you do without your smartphone? Adolescents' social media usage, locus of control and loneliness as a predictor of nomophobia. *Addicta: The Turkish Journal on Addictions, 5*, 543-557. https://doi.org/10.15805/addicta.2018.5.2.0025

Yılmaz, M., Köse, A., & Doğru, Y. B. (2018). Akıllı telefondan yoksun kalmak: Nomofobi üzerine bir araştırma. *Online Academic Journal of Information Technology, 9*(35), 31-47.

Yılmaz, T., & Bekaroğlu, E. (2021). Does interpersonal sensitivity and paranoid ideation predict nomophobia: An analysis with a young adult sample. Current Psychology, 1-7. https://doi.org/10.1007/s12144-021-01501-4

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron ve Kenny: Myths and truths about mediation analysis. *Oxford University Press, 37*(2), 197-206. https://doi.org/10.1086/651257

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The Mediating Role of Psychological Resilience in the Relationship between Coping Humor and Psychological Well-being

Mizah Yoluyla Başa Çıkma ile Psikolojik İyi Oluş Arasındaki İlişkide Psikolojik Dayanıklılığın Aracı Rolü

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ABSTRACT: This study examines the mediating role of psychological resilience in the relationship between psychological counselors' use of coping humor and psychological well-being through structural equation modeling. Research participants comprise 228 psychological counselors between the ages of 23 and 52, among which 130 are female and 98 are male. A correlational research model is used in the research as one of the quantitative research methods. Data is collected through the scales of Coping Humor, Psychological Well-Being, and Psychological Resilience. Data is analyzed through *t*-test, Pearson product-moment correlation and structural equation modeling. Findings demonstrate that there is positively significant correlation between coping humor, psychological well-being, and psychological resilience. Moreover, coping humor significantly predicts psychological well-being positively whilst psychological resilience remains a partial mediating variable in this relationship. Findings show that the conceptual model developed for relationships between coping humor, psychological well-being, and psychological resilience is statistically supported.

Keywords: Coping humor, psychological well-being, psychological resilience, psychological counselor.

ÖZ: Bu araştırmada, psikolojik danışmanlarda mizah yoluyla başa çıkma ile psikolojik iyi oluş arasındaki ilişkide psikolojik dayanıklılığın aracı rolünün yapısal eşitlik modellemesi ile incelenmesi amaçlanmıştır. Araştırmada nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Araştırmanın katılımcıları yaşları 23 ile 52 arasında değişen 130 kadın ve 98 erkek olmak üzere toplam 228 psikolojik danışmandan oluşturmaktadır. Araştırma verilerinin toplanmasında, Mizah Yoluyla Başa Çıkma, Psikolojik İyi Oluş ve Psikolojik Dayanıklılık ölçekleri kullanılmıştır. Araştırmadan elde edilen veriler, *t*-testi, Pearson momentler çarpım korelasyonu ve yapısal eşitlik modellemesi ile analiz edilmiştir. Araştırmadan elde edilen bulgulara göre, mizah yoluyla başa çıkma, psikolojik iyi oluş ve psikolojik dayanıklılık arasında pozitif yönde anlamlı ilişkiler bulunmaktadır. Ayrıca, mizah yoluyla başa çıkmanın psikolojik iyi oluşu pozitif yönde ve anlamlı bir şekilde yordadığı, psikolojik dayanıklılığın ise bu ilişkide kısmi aracı değişken olarak yer aldığı görülmüştür. Araştırma sonuçları, mizah yoluyla başa çıkma, psikolojik iyi oluş ve psikolojik dayanıklılık arasındaki ilişkilere yönelik kurulan kavramsal modelin istatistiksel olarak desteklendiğini ortaya koymuştur.

Anahtar kelimeler: Mizah yoluyla başa çıkma, psikolojik iyi oluş, psikolojik dayanıklılık, psikolojik danışman.

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Detriments of centenary wars, massacres, and other traumatic incidents affecting human beings have urged scientists to study how psychological well-being and human dignity would improve. The discipline of psychology, in particular, has intensified its focus on curing mental illness that people have experienced after the Second World War (Ergün Başak, 2012). They have taken a more conventional approach and used the illness model, which has overlooked two important issues. First, every individual has a latent strength to re-adapt themselves following a bad experience. Second, their positive sides need to be focused on facilitating their re-adaptation (Seligman, 2002). Although the conventional approach was quite effective until the mid-twentieth century, it has also been considered that psychology as a scientific discipline could not be effective in enabling individuals to be more productive and effective by merely focusing on illness and mental illness (Seligman & Csikszentmihalyi, 2014). Instead, the focus of the discipline has shifted to the impact of psychological well-being on individuals' welfare and productivity (Gable & Haidt, 2005). Herewith, the emphasis has been placed on positive personality traits and life satisfaction has been of primary importance. All these efforts have resulted in a different approach to be embarked on in psychology that particularly focuses on positive human traits.

This approach, termed positive psychology (Seligman, 2002), preconceives that individuals are innately equipped with positive personality traits and aims to rehabilitate mental disorders and maintain psychological well-being by improving those traits (Bradburn, 1969). Seligman and Csikszentmihalyi (2014) argue that positive psychology is about well-being by focusing on emotions, sensual pleasures, and positive behaviors. On the other hand, Sheldon and King (2001) define positive psychology as a scientific discipline that studies strength and virtue. Moreover, along with positive psychology, not only well-being and resilience but also other concepts such as flow, happiness, creativity (Hefferon & Boniwell, 2014), welfare, virtue, optimism, forgiveness, hope, curiosity, and humor have gained particular importance and drawn attention for further scientific inquiry in terms of their impact on human beings (Gable & Haidt, 2005). Therefore, in this study, the effect of humor and psychological resilience on increasing psychological well-being, which is one of the concepts of positive psychology, was found worth investigating.

Literature Review

Humor has recently gained particular importance in positive psychology (Çiper Kaynar, 2019; Martin, 2001; Yerlikaya, 2009) as it helps cope with stress (Lefcourt, 2001) and is regarded as a tool to generate happiness and to increase positive emotions (Açıkgöz, 2016). The word humor (*mizah*) in Turkish has etymological roots within Arabic (Özdolap, 2015). The dictionary of the Turkish Language Association (TLA) defines humor as "*teasing someone without hurting their feelings, ridicule*" (TLA, 2020). In academic literature, the meaning of the term in use is similar to this definition, and it refers to the act of laughter resulting from ridicule that aims to respond to someone without hurting their feelings (Çiper Kaynar, 2019). Moreover, humor is used to make statements, as well as to make jokes and generate joy (Chauvet & Hofmeyer, 2007). In short, coping humor can be defined as individuals' reaction to stressful experiences through laughter during and after those experiences are lived, and their

tendency to ridicule those experiences with others and joke about them (Martin & Ford, 2007).

It is safe to say that the idea that humor improves resilience against stressful life events and enhances mental health traces far back. Freud (1905) argues that humor, which personality theorists widely refer to, is the healthiest of all coping mechanisms and helps individuals avoid any negative situation without losing the perception of reality. According to Maslow (1954) and Rogers (1961), humor is an important trait of self-realized individuals. Similarly, May (1953) argues that humor helps individuals distance themselves from their problems and re-evaluate them from a different perspective. Allport (1961) states that an advanced sense of humor is the key feature of a mature personality and argues that humor is a significant component of individuals' self-reflexive insights. Differently, Frankl (1984) argues that a sense of humor is an important weapon of the soul in the battle of self-defense and contends that one's ability to laugh at them is quite a significant personal trait. Likewise, Lefcourt and Martin (1986) regard humor as a coping mechanism or strategy, whilst Sherman (1988) considers humor a tool used to develop interpersonal relations and maintain them.

Humor has been an object of inquiry in such disciplines as philosophy, literature, and sociology (Özdolap, 2015). With the advent of positive psychology, it has been a field of interest for the discipline of psychology as well and a widely-studied object of inquiry within it (Yerlikaya, 2009). It is emphasized that humor contributes to psychological and physical well-being (Martin, 2001). It is also known to regulate stress, anxiety, and depression (Lefcourt, 2001; Martin, 1998). Hence, as humor positively affects well-being when used by individuals as a tool to cope with challenges (Alvord et al., 2011; Satıcı & Deniz, 2017), the impact of humor on coping in psychological counselors was considered of interest for research.

Well-being, another important concept for positive psychology, was first defined by Bradburn (1969) as the domination of positive emotions over negative ones. Later, two different models are proposed in regard to well-being. The first of these is "Subjective Well-being" developed by Diener in 1984 (Diener, 2009) and the other is "Psychological Well-being" devised by Ryff (1989). As it is undertaken in this study, psychological well-being is described as the enhanced life quality in a cohesive manner (Keyes & Annas, 2009). However, subjective well-being is a concept that draws from hedonism and is described as the experience of positive emotions with the satisfaction of desires to enable individuals to arrive at happiness and pleasure (Boniwell, 2012). After the 1980s, the concept of psychological well-being has started to be used within experimental studies and is known as the realization of one's self against difficult circumstances and of one's potential for a meaningful life (Ryff et al., 1999). In other words, psychological well-being means the management of existential challenges encountered in life, such as personal development, meaningful life pursuit, and good interpersonal skills (Keyes et al., 2002).

Having reviewed the literature, there are only a few studies examining the relationship between humor and psychological well-being (Celso et al., 2003; Kuiper & McHale, 2009). It is anticipated that humor has a positive impact on psychological well-being, given that humor positively affects the individual and their environment (Özbay et al., 2012; Satıcı & Deniz, 2017), that it contributes to cope with challenges (Celso et al., 2003), and that it enhances interpersonal relations (Houston et al., 1998). In fact,

humor is related to psychological well-being as it not only preserves welfare but also contributes to coping with challenges (Maiolino & Kuiper, 2016). Furthermore, humor is considered a unique method of interaction, which is used to keep communication active in everyday life, mitigate interpersonal tension, and improve resilience (Martin, 2001). Therefore, the relationship between psychological counselors' coping humor and their psychological well-being was considered worthy of investigation in this research study.

Another concept that positively affects psychological well-being alongside coping humor is psychological resilience. Psychological resilience refers to the power of resistance against challenging circumstances in life (Basım & Çetin, 2011; Terzi, 2005). With positive psychology, some individuals are psychologically regarded resilient as they preserve their mental balance through activating their positive traits as opposed to negative experiences (Rutter, 1999). Studies have begun to research individuals who have managed to overcome negative circumstances and transform into healthy individuals with self-respect, although they had been exposed to extremely stressful conditions during their upbringing (Stewart et al., 1997). The concept of resilience, etymologically coming from the Latin word of "resiliens", is used to describe this type of individual, referring to having qualities such as "pulling one's self together", flexibility, and being quick to 'bounce back' (Hoşoğlu et al., 2018). In the relevant literature, psychological resilience refers to the ability to resist against life-threatening factors, uncertainties, and poor life conditions (Ağırkan & Kağan, 2017), quick 'bouncing back' and robust 'coping with' (Luthans et al., 2006).

While individuals try to adapt themselves to the changing circumstances in the surrounding environment, they may be negatively affected by specific issues that cannot be tackled and their mental health may suffer. For instance, bereavement of a loved one, job loss, deteriorating economic conditions, epidemics and detriments of natural disasters may hamper individuals' coping strength. Particularly, individuals with insufficient coping strength may feel vulnerable and that vulnerability may increase stress and anxiety, reduce their psychological well-being, and cause certain adaptation problems and physical disorders (Moran & Hughes, 2006). However, some individuals continue to persevere and are observed to draw on their strength and stamina to 'bounce back', so to speak, from the detriments of extreme disaster (Ağırkan & Kağan, 2017). It is seen that these individuals bear certain traits, which are also known as life skills, such as interpersonal communication, problem-solving, decision-making, physical fitness, identity development, and sense-making of life (Terzi, 2005). Those individuals can be said to display resilience against challenges in life by practicing life skills and aim to build a meaningful life based on their objectives, and concurrently, to live a healthy life in all personal and social areas (Öz & Bahadır Yılmaz, 2009).

It is stated that individuals resort to humor to cope with challenges they encounter by imagining humorous situations and making jokes or displaying behavior that may be funny (Yerlikaya, 2009). It is known that coping humor, as an important mediator of resilience, contributes to the emergence of positive emotions, and subsequently, well-being (Açıkgöz, 2016). Studies have shown that humor and a sense of humor, improve physical and psychological health and contribute to the enhancement of an individual's welfare (İlhan, 2005). In fact, humor enables individuals to re-evaluate threatening and stressful life experiences with a positive outlook and helps

them to put challenges into perspective (Satıcı & Deniz, 2017). There are also a variety of findings in the relevant literature which conclude that coping humor increases resilience (Akgün & Uz Baş, 2020; Richardson, 2002). In light of such evidence, it is considered that psychological resilience may explain the relationship between coping humor and psychological well-being.

Schools' psychological counselors have an important role in mental health, service for pupil personality, and managerial duties (Şimşek & Tanaydın, 2002). In as much as they are responsible for pupils' well-being, they are responsible for teachers' and parents' mental issues, if any, and their impact on pupils and children. There are few studies suggesting that psychological counselors' job satisfaction and performance are negatively affected by both challenging work conditions at schools and busy and stressful work life (Balay, 2000). Henceforth, psychological counselors may feel under stress due to the working environment (Arslan, 2018; Çoban, 2005). Their well-being is of primary importance both for them and for the quality of their work.

Extended exposure to stress increases inner tension and psychical disorders and thus, reduces the productivity of individuals (Balaban, 2000). If stress is not dealt with accordingly, it results in the decline of productivity, dissatisfaction and causes damage to intimate relationships (Baltaş & Baltaş, 2000). Some studies have demonstrated that psychological resilience is effective in coping with stressful life events (Kosaka, 1996; Terzi, 2005), reducing the detrimental effects of stress, and preventing inner tension from causing illness (Kobasa, 1979). It is of particular importance that psychological counselors are equipped to develop appropriate strategies in order to find ways in which their well-being and resilience can be improved and stress can be coped with, given that they are more likely to experience burnout (Kesler, 1991) and become exposed to stress at a higher level (Arslan, 2018; Çoban, 2005).

In recent years, there has been an increasing tendency in the discipline to focus on such positive domains as well-being, humor, optimism, welfare, resilience, flexibility, and compassion instead of such negative ones as depression, anxiety, and fear (Karaırmak & Siviş Çetinkaya, 2011; Kuiper, 2012; Pidgeon & Keye, 2014). In the literature, there has been further interest in researching the positive domains and their relationships since the 2000s (Pidgeon & Keye, 2014; Souri & Hasanirad, 2011). Therefore, it can be argued that studies, which aim to identify and improve such personal traits that individuals can perform as strengths and feel better, have gained particular importance. However, when the literature is examined, there are few studies examining the relationships between psychological well-being, humor, and psychological resilience. Similarly, only a few studies are investigating such concepts as well-being, resilience and humor with a particular focus on psychological counselors working at schools (Arslan, 2018; Bulut & Erdoğan Akça, 2019). Therefore, this research aims to fill this identified gap in the literature with its findings and make an original contribution to psychological counseling.

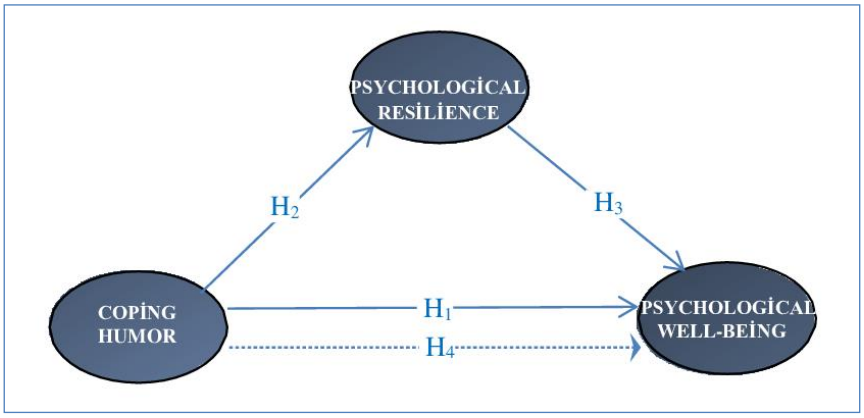
Present Study

This research aims to examine the relationship between psychological counselors' use of coping humor, psychological well-being, and psychological resilience and explore the mediating role of psychological resilience in the relationship

between humor as a coping mechanism and psychological well-being. The conceptual model that is used in this research is shown in Figure 1.

Figure 1

Conceptual Model of the Research



The below hypotheses are tested with the conceptual model presented in Figure 1.

H_1: There is a positively significant relationship between coping humor and psychological well-being.

H_2: There is a positively significant relationship between coping humor and psychological resilience.

H_3: There is a positively significant relationship between psychological resilience and psychological well-being.

H_4: The psychological resilience has a mediating role between coping humor and psychological well-being.

Method

The Research Model

This research is designed as quantitative research and uses the correlation research model (Karasar, 2005). The structural equation model (SEM) is used in the research to investigate the mediating role of psychological resilience in the relationship between psychological counselors' use of humor as a coping mechanism and their psychological well-being. The structural equation model is a statistical model used to identify directly-measurable and not-directly-measurable variables in causation and relationally (Wothke, 2010). It aims to explore whether the pre-determined relational patterns can be supported or not.

Research Participants

Research participants consisted of 228 psychological counselors who work in different schools and institutions across Turkey, affiliated with the Turkish Ministry of National Education. The research uses the convenience sampling method. While this method of sampling not only economizes on human resources, it is also a preferred method due to its cost-effectiveness and time-saving features (Büyüköztürk, 2019).

Although using the whole population as the universe of the research would be ideal, such an approach would not generally be preferred as it would be significantly time-consuming and costly. Thus, convenience sampling is preferred in this study (Leiner, 2014). In the convenience sampling method, the main assumption is that the sample is homogeneously distributed. It is assumed that the randomly selected sample is not different from the universe (Saunders et al., 2012). In the research, survey battery tests are prepared via "Google Form", sent to participants as digital texts, and then participants respond to these scales and return the relevant evidence to the researcher as digital texts. The scale forms are shared with psychological counselors through WhatsApp groups by Provincial and District Directorates of Turkish National Education. Information about the aim and the ethics of the research, based on the principles of consent and confidentiality of research participants, was provided in the messages sent via these groups.

The demographics of participants is composed of 57% (*n*=130) female, 43% (*n*=98) male, and 84.6% (*n*=193) people with undergraduate degrees and 15.4% (*n*=35) with postgraduate degrees. Considering professional seniority, the years of seniority lie at the 1-25 year-band and the mean of years of seniority is 5.9 with the standard deviation value of 4.42. The age band of participants is 23-50 and the average age is 29.7 with a standard deviation value of 4.96. Moreover, 3.9% (*n*=9) of participants work in pre-school education, 20.6% (*n*=47) in primary, 35% (*n*=80) in lower secondary, 30.3% (*n*=69) in upper secondary, and 8.8% (*n*=20) in counselling and research centers (CRC) and 1.3% (*n*=3) in other educational institutions such as (community colleges, vocational schools, and science and arts centers). Additionally, 76.3% (*n*=174) of participants work in city centers whilst 23.7% (*n*=54) in towns and villages.

Instruments

Coping Humor Scale (CHS): Yerlikaya (2003) has translated Martin and Lefcourt's (1983) CHS into Turkish. It is a self-report scale consisting of 7 items and a 4-point Likert scale (1=I strongly disagree, 4=I strongly agree). Scores in the one-dimensional scale are expected to be between 7 and 28. If one gets a high score on the scale, it means that they have a high level of coping humor. The coefficient of internal consistency of scale reliability test is .67 (Yerlikaya, 2009). Following the confirmatory factor analysis (CFA) conducted in the scope of this study to identify the construct validity of the CHS, this research has found that the scale is unifactorial and model fit values indicate a good fit (RMSEA=.07, GFI=.95, AGFI=.89, CFI=.93, SRMR=.07). In addition, the reliability test of the total scale for this study shows that Cronbach's Alpha coefficient is .79 and total item-correlations are between .36 and .62.

Psychological Well-being Scale (PWS): Telef (2013) has translated Diener et al. (2009) PWS into Turkish. It consists of 8 items and 7-pointLikert scale (1=I strongly disagree, 7=I strongly agree). The scale was initially entitled "Psychological Well-Being Scale" and then re-named "Psychological Flourishing Scale". As there is not a clear correspondence for the word "flourishing" in the Turkish language, Telef (2013) has called it "Psychological Well-Being". All of the items in the scale are positively reported and scores in the scale are expected to be between 8 and 56. If one gets a high score on the scale, it means that they simultaneously have multiple psychological strengths and resources. Validity tests of the scale show that the scale is unifactorial and

explains 42% of the total variance. Factor loadings of scale items are between .54 and .76. Reliability tests of the scale show that the coefficient of internal consistency is .80 (Telef, 2013). Even though the scale does not provide individual measures for psychological well-being, it gives an overview regarding the positive functions within important areas (Diener et al., 2010). Following the CFA to identify the construct validity of the PWS, this research has found that the scale is unifactorial and model fit values indicate a good fit(RMSEA=.08, GFI=.95, AGFI=.90, CFI=.93, SRMR=.06). In addition, the reliability test of the total scale for this study shows that Cronbach's Alpha coefficient is. 81 and total item-correlations are between .38 and .61.

Resilience Scale for Adults (RSA): Basım and Çetin (2011) have translated Friborg et al. (2005) RSA into Turkish. The scale consists of 33 items and a 5-point Likert scale. The scale provides research participants with positive and negative items on different sides in order for them to not be biased. There are boxes with five choices, which are put in between statements presented on each side. There are sixsub-dimensions in the RSA such as "perception of self, planned future, structured style, social competence, family cohesion, and social resources". Reliability tests of the scale show that Cronbach's Alpha coefficient of sub-dimensions is between .66 and .81. Factor loadings of scale items are between .41 and .70 and the explained total variance is measured as %54 (Basım & Çetin, 2011). Following the CFA of RSA, this research has found that the 6-dimensional construct of the scale is supported and model fit values indicate good fit (RMSEA=.07, GFI=.97, AGFI=.93, CFI=.97, SRMR=.03). In addition, the reliability test of the total scale for this study shows that the Cronbach's Alpha coefficient is .82 and total item-correlations are between .34 and .63.

Personal Information Sheet: It comprises personal information of research participants on the basis of gender, age, educational status, year of professional seniority, the year-level of education in schools that they work, and place of residence.

Data Collection Process

Prior to the data collection with the aforementioned scales, the ethical approval for this research is granted by Van Yüzüncü Yıl University's Ethics Committee for Social Sciences and Humanities. The approval is granted with the decision dated 30/12/2020 and numbered with 2020/15-54. The research has collected data from 228 of 233 psychological counselors upon their consent.

Data Analysis

The data is analyzed via SPSS 23 and AMOS 24 package program. Prior to the analysis, the data entered in the SPSS is checked in terms of deficiency and error. Then, the findings were checked for normality. Before the analyses were made, whether there were outliers in the data were checked using histograms and boxplots in the SPSS program. In addition, in the checks made with the Mahalanobis distance test, it was seen that 5 data were outliers and these data were removed from the data set. In the data analysis, first, the frequency values of the data set are checked. Then, values for skewness and kurtosis of all scales and their sub-dimensions are examined. Lastly, the minimum and maximum values of descriptive statistics, mean, and standard deviation are evaluated. Reliability values of all scales used in this research and inter-variable relationships to develop a model following the checks of linearity and co-variance

values are measured with Pearson Product-moment correlation coefficient.Also, it was checked whether there is a multi-collinearity problem in the data. After confirming measurement models of measurement tools with confirmatory factor analysis, the hypothetical model is also tested with a measurement model and has found that measurement values are acceptable. The model suggested at the end of this section is analyzed with structural equation modeling (SEM) and findings are discussed below.

The most important criteria in the evaluation of structural equation model studies are model fit values. Therefore, model fit values should be examined first in the measurement model. In order to evaluate the validity of the model, the model fit value specified by Karagöz (2016) and Meydan and Şeşen (2015) were taken as a reference. These values are given in Table 1.

Table 1

Model Fit Values

Model Fit Value	Good Fit	Acceptable Fit
χ^2	$.05<p\leq1$	$.01<p\leq.05$
χ^2/df	$\chi^2/df\leq3$	$\chi^2/df\leq5$
RMSEA	RMSEA≤.05	RMSEA≤.08
SRMR	0<SRMR≤.05	0<SRMR≤.08
GFI	.90≤GFI	.85≤GFI
AGFI	.90≤AGFI	.89≤AGFI≤.85
CFI	.90≤CFI	.85≤CFI
IFI	.95≤IFI	.94≤IFI≤.90

Karagöz, 2016; Meydan & Şeşen, 2015.

Results

Before testing the structural equation modeling, uni-variate normal distribution is assumed in the multivariate data analysis as one of the assumptions of the modeling (Kline, 2015; Şimşek, 2007). Table 2 below presents the descriptive statistics of the research scale and its sub-dimensions as well as values for skewness and kurtosis.

Table 2

Descriptive Statistics of the Research Scale and Its Sub-Dimensions, and Values for Skewness and Kurtosis

Variables	Number of Items	*N*	Max.	Min.	$\bar{X}$	*SS*	Skewness	Kurtosis
Psycho. Well-being	8	228	55	33	46.04	4.42	-.73	.37
Coping Humor	7	22	28	13	20.14	2.98	-.09	-.27
			٤					
Psycho. Resilience	33	228	158	94	129.5	13.86	-.35	-.46
Perception of Self	6	228	30	15	23.39	3.32	-.22	-.46

Planned Future	4	228	20	8	15.78	2.76	-.58	.06
Structured Style	4	228	20	6	15.19	2.73	-.33	-.12
Social Competence	6	228	30	13	23.43	3.36	-.41	.14
Family Cohesion	6	228	30	10	22.47	4.29	-.59	.02
Social Resources	7	228	35	17	29.03	3.43	-.59	.39

Two important factors of normality are skewness and kurtosis. It is expected to have a coefficient of skewness between -1 and +1, and the value of kurtosis close to null (Büyüköztürk, 2019). Similarly, Tabachnick and Fidell (2015) state that the data is in normal distribution if values for skewness and kurtosis are between +3 and -3. Similarly, Table 2 demonstrates that all scales and the values of skewness and kurtosis for sub-dimensions of those scales are between -1 and +1, and hence, the data is in normal distribution (Büyüköztürk, 2019).

Table 2 demonstrates that the mean of participants' scores for psychological well-being is 46.04±4.42, for coping humor 20.14±2.98, and for psychological resilience 129.05±13.86. In order to identify participants' levels of psychological well-being, coping humor, and psychological resilience, the comparison of each scale to their median values are made with one sample *t*-test analysis. Findings show that there is a highly significant difference between the counselors' scores for psychological well-being ($t_{(226)}$=47.88; sd: 227; p<.05), for coping humor ($t_{(226)}$ =13.38; sd: 227; p<.05), and for psychological resilience ($t_{(226)}$=33.25; sd: 227; p<.05) and the mean values of scales.

In order to use structural equation modeling, there must be significant relationships between dependent, independent and mediator variables (Baron & Kenny, 1986; Kline, 2015). For this reason, the Pearson Product-moment correlation coefficient was used to determine the relationships between the variables. Table 3 presents the correlation between participants' psychological well-being, coping humor, and psychological resilience.

Table 3

Correlational Relationship between Variables Used in the Conceptual Model

	PWB	CH	PR	PS	PF	SS	SC	FC	SR
PWB	1								
CH	.36**	1							
PR	.65**	.40**	1						
PS	.56**	.44**	.73**	1					
PF	.62**	.32**	.74**	.60**	1				
SS	.37**	.08**	.57**	.33**	.41**	1			
SC	.41**	.42**	.67**	.39**	.34**	.28**	1		
FC	.38**	.18**	.72**	.36**	.48**	.22**	.39**	1	
SR	.46**	.21**	.78**	.49**	.49**	.39**	.45**	.55**	1

N: 228; ***p<.01;* PWB: Psychological Well-being; CH: Coping Humor; PR: Psychological Resilience; PS: Perception of Self; PF: Perception of Future; SS: Structured Style; SC: Social Competence; FC: Family Cohesion; SR: Social Resources

If variables in the data set have a highly significant correlation, it hints at a multi-collinearity problem. Field (2009) suggests removing variables causing high-level correlation from the model. In order to identify whether or not there is multi-collinearity between variables, the Pearson Product-moment correlation coefficients are checked. Since the correlation values don't exceed the critical value of .90, it can be concluded that there isn't multi-collinearity problem in the data (Kline, 2015).

Having examined the correlation results in the findings in the Table 3 suggests that all variables have a positively significant correlation with each other. Therefore, it is evident that there is a positively significant relationship between psychological counselors' level of psychological well-being, and of coping humor ($r=.36$, $p<.01$) and psychological resilience ($r=.65$; $p<.01$). In addition, there is a positively significant correlation between participants' level of psychological resilience and coping humor ($r=.40$, $p<.01$). Thus, it is evident that the study supports the H_1, H_2 and H_3 hypotheses of the research.

Model Tests

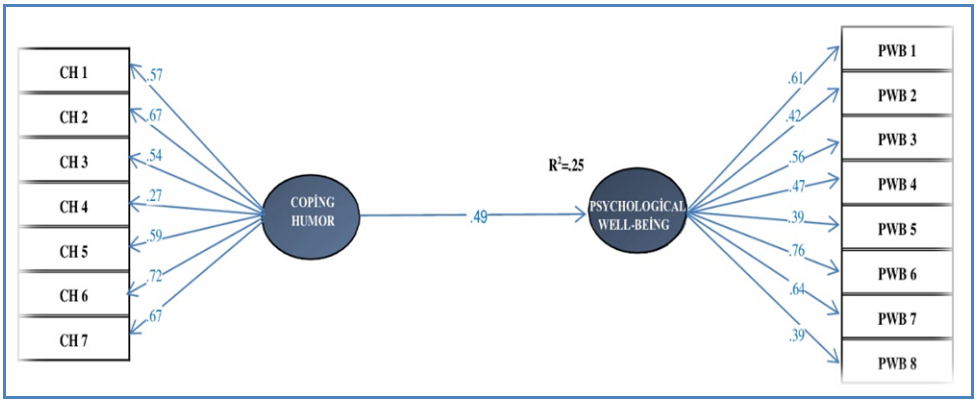
Model 1. Relationship between Coping Humor and Psychological Well-being

The first model of the research investigates the relationship between psychological counselors' level of coping humor and psychological well-being. Baron and Kenny (1986) suggest that there can be a relationship of mediation if there is a meaningful relationship between independent (coping humor) and dependent (psychological well-being) variables. Henceforth, this study investigates the predictive power of psychological counselors' level of coping humor over their psychological well-being.

Figure 2 presents the predictive power of psychological counselors' level of coping humor over their psychological well-being, analyzed through structural equation modeling.

Figure 2

Predictive Power of Coping Humor over Psychological Well-being



When the R^2 value given in Figure 2 is reviewed, it can be seen that 25% of the change in psychological well-being can be explained by coping humor. A review of the β value given in Figure 2 finds that coping humor has a significant predictor moderate level of predictive power over psychological well-being (Cohen, 2003).Thus, it is found

that the predictive power of coping humor over psychological well-being is at the level of .49.Table 4 demonstrates the model fit values presented in Figure 2.

Table 4

Model Fit Values presented in Figure 2

Good Fitting	Acceptable Fitting	Fit Value	Fitting
$\chi^2/df \leq 3$	$\chi^2/df \leq 5$	2.21	Good fitting
RMSEA≤.05	RMSEA≤.08	.07	Acceptable fitting
0<SRMR≤.05	0<SRMR≤.08	.06	Acceptable fitting
.90≤GFI	.85≤GFI	.90	Good fitting
.90≤AGFI	.89≤AGFI≤.85	.93	Good fitting
.90≤CFI	.85≤CFI	.97	Good fitting
.95≤IFI	.94≤IFI≤90	.93	Acceptable fitting

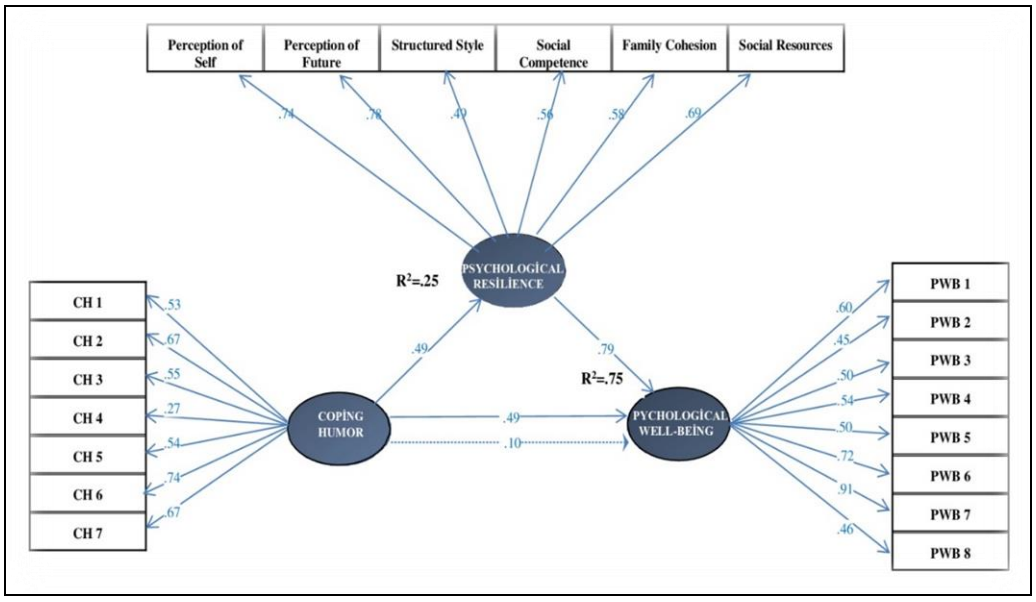
In Table 4, it can be seen that the model is significant with values of $\chi^2(190)$ and χ^2/df (2.21). Having examined the model fit values, it can be seen that the GFI=.90, AGFI=.90 and CFI=.90 values are of good fit (Kline, 2015; Tabachnick & Fidell, 2015) and the RMSEA=.07, SRMR=.06 and IFI=.93 values are within acceptable boundaries of fit (Karagöz, 2016; Meydan & Şeşen, 2015).

Model 2. The Mediating Role of Psychological Resilience in the Relationship between Coping Humor and Psychological Well-being

Figure 3 presents the model developed for the examination of the mediating role of psychological resilience in the relationship between coping humor and psychological well-being within the use of structural equation modeling.

Figure 3

The Mediating Role of Psychological Resilience in the Relationship between Coping Humor and Psychological Well-being



When the R^2 values given in Figure 3 are examined, it can be stated that 25% of the total change in resilience can be explained by coping humor and 71% of the total change in psychological well-being is explained by resilience and coping humor. A review of the β value given in Figure 3 shows that psychological resilience with coping humor (β=.49, p=.01) is moderate and psychological resilience has high predictive power on psychological well-being (β=.79, p=.01) (Cohen, 2003).

As Figure 3 shows, the predictive power of coping humor over psychological well-being drops from the level of .49 to the level of .10 as found in the structural equation modeling that has tested the mediating role of psychological resilience in the relationship between coping humor and psychological well-being. Table 5 below present's model fit values presented in Figure 3.

Table 5

Model Fit Values presented in Figure 3

Good Fitting	Acceptable Fitting	Fit Value	Fitting
$\chi^2/df \leq 3$	$\chi^2/df \leq 5$	2.21	Good fitting
RMSEA≤.05	RMSEA≤.08	.07	Acceptable fitting
0<SRMR≤.05	0<SRMR≤.08	.07	Acceptable fitting
.90≤GFI	.85≤GFI	.85	Acceptable fitting
.90≤AGFI	.89≤AGFI≤.85	.91	Good fitting
.90≤CFI	.85≤CFI	.96	Good fitting
.95≤IFI	.94≤IFI≤90	.95	Good fitting

Having examined the model fit values presented in Figure 3 shown in Table 5, it is found that the model is significant with values of χ^2(405) and χ^2/df(2.21). A review of model fit indices shows that the AGFI=.91, CFI=.96 and IFI=.95 values provide a good fit (Kline, 2015) and the RMSEA=.07, SRMR=.07 and GFI=.85 values are within acceptable boundaries of fit (Karagöz, 2016; Meydan & Şeşen, 2015).

The results of the bootstrapping analysis performed with a 5.000-resampling method on whether the indirect effects of partial mediation found in the model are significant or not are given in Table 6.

Table 6

Bootstrapping Results for the Mediating Role of Psychological Resilience in the Relationship between Coping Humor and Psychological Well-Being

Indirect Effects	Bootstrap Coefficient	SE	95% Confidence Interval		R^2	F
			Lower Limit	Upper Limit		
CH→PR→PWB	.463	.092	.304	.663	.75	70.09**

**p<.01, *p<.05, SE: Standard Errors, CH: Coping Humor, PR: Psychological Resilience, PWB: Psychological Well-Being

An examination of Table 6 shows a significant indirect relationship between psychological resilience and psychological well-being by means of coping humor (Bootstrap coefficient=.463, 95% confidence interval=.304 and .663). Bootstrapping results were found to be statistically significant as they did not include zero values for lower and upper limits in the 95% confidence interval. These results demonstrate that psychological resilience partially has a mediating role in the relationship between coping humor and psychological well-being.

Discussion and Conclusion

This study has investigated the mediating role of psychological resilience in the relationship between coping humor and psychological well-being. Findings show that there is a positively significant correlation in the relationships between coping humor, psychological resilience, and psychological well-being, and suggest that coping humor is an important descriptive variable for psychological resilience and psychological well-being. Moreover, the study finds that psychological resilience explains psychological well-being, and partially has a mediating role between coping humor and psychological well-being. Likewise, it is found that coping humor explains psychological well-being both directly and through psychological resilience. Research findings demonstrate that the conceptual model developed to holistically describe psychological well-being is supported and indicates good-fit values. This section discusses the research findings regarding the developed model and the tested hypotheses within the theoretical framework and makes suggestions.

This research concludes that the means of psychological counselors' scores for coping humor, psychological resilience, and psychological well-being are above the mean values. It can be argued that this result is related to psychological counselors' educational backgrounds and vocational fields. Psychological counselors' educational background enables them to cope with their psychological problems (Aladağ, 2014); hence their education may contribute to their well-being. As previously shown (Akça Erdoğan, 2018), psychological counselors have high levels of psychological well-being. As psychological counselors work in mental health and help individuals with a variety of personality traits and mental health issues (Gülbahçe & Özkurt, 2016), it is anticipated that they have a high level of psychological well-being and resilience. This requires them to continuously improve themselves professionally and update their area-specific knowledge (Karaırmak & Siviş, 2008). Thus, it can be noted that psychological counselors have a high level of psychological well-being and psychological resilience because it is a requirement of their job. Following the overall analysis of research findings, it can be inferred that psychological counselors quickly re-build themselves against obstacles and challenges, cope with difficult situations and experiences through having a sense of humor, and are more likely to view stressful and difficult experiences with a positive outlook.

Research findings show a positive correlation between coping humor and psychological well-being. Therefore, H_1 the first hypothesis of the research, was confirmed. Previous research findings support that coping humor directly and significantly relationship psychological well-being (Açıkgöz, 2016; Akça Erdoğan, 2018; Alvord et al., 2011; Kuiper & Martin, 2010; Kuiper & McHale, 2009; Satıcı & Deniz, 2017). Considering that psychological well-being increases individuals' potential

to pursue a meaningful life (Telef, 2013) and that humor positively contributes to individuals' lives at large (Martin, 2001), it is anticipated that there is a significant correlation between humor and psychological well-being. Similarly, there is a close relationship between psychological well-being and self-realization (Ryan & Deci, 2001). In general, psychological well-being is related to one's life goals, interpersonal skills, personal responsibilities in life (Ryff & Keyes, 1995) and positive moods (Kuyumcu, 2013) and hence, it also has significant relationships with the sense of humor.

Research findings demonstrate that there is a positively significant correlation between coping humor and psychological resilience. Therefore, this result confirms the second hypothesis of the research H_2. This particular relationship is consistent with many other studies in the existing literature (Açıkgöz, 2016; Akgün & Uz Baş, 2020; Olsson et al., 2003; Satıcı & Deniz, 2017). Individuals who use humor as a coping mechanism are able to detect and comprehend humor in their life events (Ruch, 1998). Therefore, it can be said that psychological counselors have the ability to re-evaluate situations and look at them from a positive perspective by using humor as a coping mechanism. In the existing literature, some studies support the findings of this research. For instance, it is evident that humor preserves individuals' mental health as used as a balancing factor against challenges and obstacles in life (Thorson et al., 1997). It is also found that the therapeutical use of humor supports individuals' physical, emotional, cognitive, and social development and hence, increases their psychological resilience (Çakmak, 2012).

Another finding of this research demonstrates that there is a significant correlation between psychological resilience and psychological well-being, which is the third hypothesis of the study. Studies in the existing literature support this finding (Fredrickson, 2001; Karacaoğlu & Köktaş, 2016; Malkoç & Yalçın, 2015; Pidgeon & Keye, 2014; Ryff & Singer, 2003). Psychologically resilient individuals successfully cope with the negative changes in their lives, and their successful coping also contributes to their well-being (Wagnild, 2009). Ryff et al. (1998) suggest that psychological resilience builds upon psychological well-being against challenges and also enhances it.

Research findings showed that there is a significant relationship between coping humor and psychological well-being through the mediator of psychological resilience. This finding confirms the fourth hypothesis of the research, H_4. There are no studies in the existing literature, which concurrently focus on the relationships of these three variables. Nevertheless, it is found that previous studies support this network of relations. Based on this finding, it can be suggested that coping humor enhances psychological well-being through psychological resilience. It is found that, with the use of humor, individuals look at life events from a different perspective by unraveling humorous, funny, and witty aspects of those events (Chauvet & Hofmeyer, 2007) and subsequently, by identifying poor aspects of the events (Lefcourt, 2001), which then facilitates coping process. Thus, it can be argued that humor increases individuals' psychological resilience and encourages them to focus on positive sides of events, or put differently, to be more optimistic. Moreover, these individuals may feel more satisfied with their lives, and more inclined to get social support and to establish more meaningful relationships (Ryff et al., 1999). Therefore, their psychological well-being

can improve. Similarly, studies show that coping humor helps individuals be more flexible (Kolburan et al., 2019) and be more resilient (Thorson et al., 1997), thus it successfully contributes to the maintenance of their mental health. Furthermore, because coping humor operates as a balancing factor amidst challenges (Akgün & Uz Baş, 2020), it can improve psychological resilience and hence, enhance psychological well-being.

Limitations

Of the limitations of the study, the first is the limitation related to the sampling method. As a result of convenience sampling, most of the selected participants in the sample were from the eastern provinces of Turkey and were new to the profession (mean working time=5.9±4.42); thus, constituting a significant limitation in terms of the generalizability of the study.

Another limitation of the study is that only humor and psychological resilience were under taken in explaining psychological well-being. Therefore, since a variety of factors are effective in explaining psychological well-being, it may be suggested that different conceptual models can be used to explain psychological well-being in future studies.

The fact that the participants of the study were psychological counselors constitutes another limitation in terms of the applicability of the study to other segments of society. Again, since the data was collected by means of self-reporting measurement tools, some scores in the data obtained from the scales may be high due to the social desirability factor.

One other limitation of the study may be attributed to the validity and credibility of the data as being limited to the data collection tools which were used. The insufficient number of participants (n=228) in this study is thought to be a significant limitation in terms of the generalizability of the research findings.

Finally, Covid-19 pandemic conditions in Turkey, and indeed globally, could be considered another limitation of the study. It may have been the case that the context of the scale items may have impacted the responses of those participating in the study.

Suggestions

In consideration of the importance and structure of the psychological counseling profession, it is suggested that the number of studies in the field of positive psychology for psychological counselors should increase. It is recommended that the importance should be placed on positive psychology concepts such as humor, resilience and psychological well-being. Information should be provided on the advantages of increasing the well-being of psychological counselors, not only in terms of their own well-being but also for the benefit of their clients. In addition, studies can be conducted on how psychological counselors can further use psychological well-being in their work settings. It may be recommended to provide in-service training or such activities as seminars on the importance of psychological well-being and giving expert advice on a variety of subjects.

As a result of the research, it was concluded that humor and psychological resilience are important factors in increasing the psychological well-being of psychological counselors. In light of these findings, psychological counselors can utilize

various techniques, including humor and psychological resilience in the therapeutic process to improve their clients' psychological well-being.

In regard to further research on this topic, it may be suggested that a more comprehensive study can be conducted by adding variables related to how the work environment affects psychological counselors. Future studies may also be suggested to use both qualitative and quantitative data to explain psychological well-being. Studies that cover a wider age range of psychological counselors and a wider scope in terms of regional coverage may also be recommended. In order to eliminate the limitations of a cross-sectional study, the generalizability of the findings can be increased with longitudinal studies to be conducted in different time frames.

This study was conducted by using the correlational research model. Thus, it may be suggested to conduct experimental studies to explain psychological well-being in future studies. Experimental studies can also be carried out with psycho-educational groups that include various factors that may be considered to increase psychological resilience and coping humor.

Finally, since this study was conducted during the Covid-19 pandemic process, the same study can be repeated after the pandemic to minimize the effects of the pandemic.

Statement of Responsibility

Ferdi Yağan; determination of problem situation, determination of sample group, selection and application of data collection tools, methodology, literature review, analysis, writing-original draft and resources. Zöhre Kaya; planning and implementation of activities, methodology, validation, writing-original draft, arrangement, writing-review, reviewing and inspection, editing, visualization and supervision.

Conflicts of Interest

There are no conflicts of interest in this study.

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References

Açıkgöz, M. (2016). *Examining the relationship among the psychological resilience, humor styles and happiness level of medicine school students* [Unpublished master's thesis]. Çağ University.

Ağırkan, M., & Kağan, M. (2017). The relationship between value orientations and psychological resilience levels of university students. *Journal of Erzincan University Faculty of Education, 19*(3), 225-245. https://doi.org/10.17556/erziefd.335063

Akça Erdoğan, B. (2018). *The investigation of emotion management skills and psychological well-beings of school psychological counselors with regard to humor styles, which they use* [Unpublished master's thesis]. Uludağ University.

Akgün, Ü., & Uz Baş, A. (2020). Assertiveness and humor styles as predictors of resilience in high school students. *PESA International Journal of Social Studies, 6*(3), 217-231.

Aladağ, M. (2014). Critical incidents in individual counseling practicum supervision across different levels of counselor education. *Journal of Education Ege, 15*(2), 428-475. https://doi.org/10.12984/eed.82217

Allport, G. W. (1961). *Pattern and growth in personality*. Holt.

Alvord, M. K., Zucker, B., & Grados, J. J. (2011). *Resilience builder program for children and adolescent-enhancing social competence and self-regulation*. Research Press.

Arslan, H. (2018). The relationship between happiness, resilience and addiction conditions of psychological consultants. *Journal of Education in Health Sciences*, *1*(1), 17-35.

Balaban, J. (2000). Stress sources and coping techniques of teachers in elementary education. *Journal of Education Pamukkale University Faculty, 7*, 188-195.

Balay, R. (2000). *Organizational commitment*. Nobel Publishing.

Baltaş, A., & Baltaş, Z. (2000). *Stress and ways to cope*. Remzi Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6),

Basım, H. N., & Çetin, F. (2011). Reliability and validity studies of resilience scale for adults. *Journal of Turkish Psychiatry*, *22*(2), 104-114.

Boniwell, I. (2012). *Positive psychology in a nutshell: The science of happiness*. (3th ed.). Open University Press.

Bradburn, N. M. (1969). *The structure of psychological well-being.* Aldine.

Bulut, S., & Erdoğan Akça, B. (2019). Examination of emotion management skills according to the humor styles used by school psychological counselors (guidance teachers). *3rd Eurasian Positive Psychology Congress,* 13-14 April 2019.

Büyüköztürk, Ş. (2019). *Data analysis handbook*. Pegem Publishing.

Çakmak, A. (2012). Humor and therapeutic usage of humor. *Presented at the II. International VI. National Psychiatric Nursing Congress.* 4-7 October, Erzurum.

Celso, B. C., Ebener, D. J., & Burkhead, H. (2003). Humor coping, health status, and life satisfaction among older adults residing in assisted living facilities. *Aging and Mental Health, 7*(6), 438-445. https://doi.org/10.1080/13607860310001594691

Chauvet, S., & Hofmeyer, A. (2007). Humor as a facilitative style in problem-based learning environments for nursing students. *Nurse Education Today, 27*, 286-292. https://doi:10.1016/j.nedt.2006.05.008

Çiper Kaynar, A. (2019). *Turkish adaptation of sense of humor questionnaire: Transliteral equivalence, reliability and validity study* [Unpublished master's thesis]. Üsküdar University.

Çoban, A. E. (2005). Peer supervision for school counselors. *Mersin University Journal of the Faculty of Education, 1*(1), 167-174. https://doi:10.17860/efd.52534

Cohen, J. (2003). A power primer. *Psychological Bulletin*, *112*(1), 155-159. https://doi: 10.1037//0033-2909.112.1.155

Diener, E. (2009). Subjective well-being. The science of well-being. *Social İndicators Research Series, USA, Springer*, *37*, 11-58. https://doi.org/10.1007/978-90-481-2350-6_2

Diener, E., Scollon, C. N., & Lucas, R. E. (2009). The evolving concept of subjective well-being: The multifaceted nature of happiness. *Advances in Cell Aging and Gerontology*, *15*, 187-219. https://doi.org/10.1007/978-90-481-2354-4_4

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social İndicators Research*, *97*(2), 143-156. https://doi.org/10.1007/s11205-009-9493-y

Ergün Başak, B. (2012). *The relationships between self-compassion, social connectedness, optimism and psychological resilience levels of low-income university students* [Unpublished doctoral thesis]. Anadolu University.

Field, A. (2009). *Discovering statistics using SPSS: Book plus code for E version of text* (3th ed.). Sage Publication.

Frankl, V. E. (1984). *Man's search for meaning*. Washington Square Press.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218-226. https://doi.org/10.1037/0003-066X.56.3.218

Freud, S. (1905). *Jokes and their relation to the unconscious*. Penguin Books (Reprint, 2002).

Friborg, O., Barlaug, D., Martinussen, M., Rosenvinge, J. H., & Hjemdal, O. (2005). Resilience in relation to personality and intelligence. *International Journal of Methods in Psychiatric Research, 14*(1), 29-42. https://doi.org/10.1002/cpp.488

Gable, S. L., & Haidt, J. (2005). What (and why) is positive psychology? *Review of General Psychology*, *9*(2), 103-110. https://doi.org/10.1037/1089-2680.9.2.103

Gülbahçe, A., & Özkurt, S. (2016). Analysis of empathic tendencies and empathic skills of prospective students of program of guidance and psychological counseling according to certain variables. *Adnan Menderes University Journal of the Faculty of Education*, *7*(1), 1-15.

Hefferon, H., & Boniwell, I. (2014). *Positive psychology theory, research and practice.* (T. Doğan, Trans. Ed.). Nobel Publishing.

Hoşoğlu, R., Kodaz, A. F., Bingöl, T. Y., & Batık, M. V. (2018). The resilient levels of preservice teachers. *International Journal of Society Researches*, *8*(14), 217-239. https://doi: 10.26466/opus.405751

Houston, D. M., Mckeee, K. L., Carroll, L., & Marsh, H. (1998). Using humor to promote psychological well-being in residential homes for older people. *Aging and Mental Health, 2*(4), 328-332. https://doi.org/10.1080/13607869856588

İlhan, T. (2005). *A model of humor styles based on subjective well-being* [Unpublished master's thesis]. Gazi University.

Karacaoğlu, K., & Köktaş, G. (2016). The mediating role of optimism on the relationship between psychological resilience and psychological well-being: A research on hospital employee. *The Journal of Human and Work, 3*(2), 119-127. https://doi.org/10.18394/iid.20391

Karagöz, Y. (2016). *SPSS 23 and AMOS 23 applied statistical analysis*. Nobel Academic Publishing.

Karaırmak, Ö., & Siviş, R. (2008). Transition from modernism to postmodernism and positive psychology. *Turkish Psychological Counseling and Guidance Journal, 3*(30), 102-115.

Karaırmak, Ö., & Siviş Çetinkaya, R. (2011). The effect of self-esteem and locus of control on resilience: The mediating role of affects. *Turkish Psychological Counseling and Guidance Journal*, *4*(35), 30-41.

Karasar, N. (2005). *Scientific research method: Concepts, principles and techniques.* Nobel Publishing.

Kesler, K. D. (1991). Burnout: A multimodal approach to assessment and resolution. *Elementary School Guidance & Counseling*, *24*(4), 303-311.

Keyes, C. L., & Annas, J. (2009). Feeling good and functioning well: Distinctive concepts in ancient philosophy and contemporary science. *The Journal of Positive Psychology*, *4*(3), 197-201. https://doi.org/10.1080/17439760902844228

Keyes, C. L., Shmotkin, D., & Ryff, C. D. (2002). Optimizing well-being: The empirical encounter of two traditions. *Journal of Personality and Social Psychology*, *82*(6), 1007-1022. https://doi.org/10.1037/0022-3514.82.6.1007

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Publications.

Kobasa, S. C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology*, *37*(1), 1-11. https://doi.org/10.1037/0022-3514.37.1.1

Kolburan, Ş. G., Eker, E., & Akdeniz, B. (2019). Evaluation of relationship between cognitive flexibility and humor styles. *The Turkish Adaptation Study of the Militant Extremist Mindset*, *16*(1), 1-13. https://doi.org/10.5336/forensic.2018-62253

Kosaka, M. (1996). Relationship between hardiness and psychological stressresponse. *Journal of Performance Studies*, *3*, 35-40.

Kuiper, N. A. (2012). Humor and resiliency: Towards a process model of coping and growth. *Europe's Journal of Psychology*, *8*(3), 475-491. http://doi.org/10.23668/psycharchives.1337

Kuiper, N. A., & Martin, H. (2010).ls sense of humor a positive personality characteristics? *The sense of humor: Explorations of a Personality Characteristic*, *3*, 159. https://doi.org/10.1515/9783110804607-009

Kuiper, N. A., & McHale, N. (2009). Humor styles as mediators between self-evaluative standards and psychological well-being. *The Journal of Psychology*, *143*(4), 359-376. https://doi.org/10.3200/JRLP.143.4.359-376

Kuyumcu, B. (2013). The predictive power of university students' positive-negative moods in their psychological wellbeing. *Journal of Theoretical Educational Science, 6*(1), 62-76.

Lefcourt, H. M. (2001). *Humor: The psychology of living buoyantly*. Kluwer Academic Publisher.

Lefcourt, H. M., & Martin, R. A. (1986). *Humor and life stress: antidote to adversity*. Springer.

Leiner, D. J. (2014). Convenience samples from online respondent pools: A case study of the SoSci Panel. *International Journal of Internet Science, 20*(5), 1-18. https://doi: 10.5771/2192-4007-2016-4-36769–134

Luthans, F., Avey, J. B., Avolio, B. J., Norman, S. M., & Combs, G. M. (2006). Psychological capital development: Toward a micro-intervention. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior, 27*(3), 387–393. https://doi.org/10.1002/job.373

Maiolino, N., & Kuiper, N. (2016). Examining the impact of a brief humor exercise on psychological well-being. *Translational Issues in Psychological Science, 2*(1), 4-13. https://doi.org/10.1037/tps0000065

Malkoç, A., & Yalçın, İ. (2015). Relationships among resilience, social support, coping, and psychological well-being among university students. *Turkish Psychological Counseling and Guidance Journal*, *5*(43), 35-43.

Martin, R. A. (1998). Approaches to the sense of humor: A historical view. W. Ruch, (Ed.) *The sense of humor*. Mouton de Gruyter.

Martin, R. A. (2001). Humor, laughter, and physical health: Methodological issues and research findings. *Psychological Bulletin, 127*(4), 504-519. https://doi.org/10.1037/0033-2909.127.4.504

Martin, R. A., & Ford, T. (2007). *The psychology of humor: An integrative approach* (2th ed.). Academic Press.

Martin, R. A., & Lefcourt, H. M. (1983). Sense of humor as a moderator of the relation between stressors and moods. *Journal of Personality and Social Psychology*, *45*(6), 1313-1324. https://doi.org/10.1037/0022-3514.45.6.1313

Maslow, A. (1954*). Motivation and personality*. Random House.

May, R. (1953). *Man's Search for Himself*. Random House.

Meydan, C., & Şeşen, H. (2015). *Structural Equation Model AMOS Applications* (2th ed.). Detay Publishing.

Moran, C. C., & Hughes, L. P. (2006). Coping with stress: Social work students and humor. *Social Work Education, 25*(5), 501-517. https://doi.org/10.1080/02615470600738890

Olsson, C. A., Bond, L., Burns, J. M., Vella-Brodrick, D. A., & Sawyer, S. M. (2003). Adolescent resilience: A concept analyses. *Journal of Adolescence, 26*(1), 1-11. https://doi.org/10.1016/S0140-1971(02)00118-5

Öz, F., & Bahadır Yılmaz, E. (2009). A significant concept in protecting mental health: resilience. *Hacettepe University Faculty of Health Sciences Nursing Journal*, *16*(3), 82-89.

Özbay, Y., Palancı, M., Kandemir, M., & Çakır, O. (2012). Predicting subjective well-being of university students by emotional regulation, humor, social self-efficacy and coping behaviors. *Turkish Journal of Educational Sciences*, *10*(2), 325-345.

Özdolap, M. (2015). *The relationship between humor styles and psychological symptoms* [Unpublished master's thesis]. Bilim University.

Pidgeon, A. M., & Keye, M. (2014). Relationship between resilience, mindfulness, and psychological well-being in university students. *International Journal of Liberal Arts and Social Science*, *2*(5), 27-32.

Richardson, G. E. (2002). The met theory of resilience and resiliency. *Journal of Clinical Psychology*, *58*(3), 307-321. https://doi.org/10.1002/jclp.10020

Rogers, C. R. (1961). *On becoming a person*. Houghton Mifflin.

Ruch, W. (1998). The sense of humor: A new look at an old concept. W. Ruch(Ed.), *The sense of humor.* Mouton de Gruyter.

Rutter, M. (1999). Resilience concepts and findings: Implications for family therapy. *Journal of Family Therapy*, *21*(2), 119-144. https://doi.org/10.1111/1467-6427.00108

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudemonic well-being. *Annual Review of Psychology*, *52*, 141-166. https://doi.org/10.1146/annurev.psych.52.1.141

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069-1081. https://doi:10.1037/0022-3514.857.6.1069

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, 69, 719-727. https://doi.org/10.1037/0022-3514.69.4.719

Ryff, C. D., Love, G. D., Essex, M. J., & Singer, B. (1998). Resilience in adulthood and later life. *Handbook of Aging and Mental Health*. Springer.

Ryff, C. D., Magee, W. J., Kling, K. C., & Wing, E. H. (1999). Forging macro-micro linkages in the study of psychological well-being. In C. D. Ryff & V. W. Marshall (Eds.) *The Self and Society in Aging Processes* (pp.247-274). Springer Publishing Company.

Ryff, C. D., & Singer, B. (2003). Flourishing under fire: Resilience as a prototype of challenged thriving. In C. Keyes & J. Haidt (Eds.), *Flourishing: Positive psychology and tile life well-lived*(pp.15-36). American Psychological Association.

Satıcı, S. A., & Deniz, M. E. (2017). Coping with humor and well-being: Examining the mediating role of resilience and optimism. *Elementary Education Online*, *16*(3), 1343-1356. https://doi.org/10.17051/ilkonline.2017.330262

Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research methods for business students*. Pearson Education.

Seligman, M. E. (2002). Positive psychology, positive prevention, and positive therapy. *Handbook of Positive Psychology*, *2*, 3-12.

Seligman, M. E., & Csikszentmihalyi, M. (2014). *Flow and the foundations of positive psychology*. Springer.

Sheldon, K. M., & King, L. (2001). Why positive psychology is necessary. *American psychologist*, *56*(3), 216-263. https://doi.org/10.1037/0003-066X.56.3.216

Sherman, L. W. (1988). Humor and social distance in elementary school children. Humor: *International Journal of Humor Research, 1*(4), 389-404. https://doi.org/10.1515/humr.1988.1.4.389

Şimşek, H., & Tanaydın, D. (2002). Parent involvement in primary education: teacher-parent-psychological counselor triangle. *Elementary Education Online*, *1*(1), 12-16.

Şimşek, Ö. F. (2007). *Introduction to structural equation modeling, basic principles and LISREL Applications.* Ekinoks Publishing.

Souri, H., & Hasanirad, T. (2011). Relationship between resilience, optimism and psychological well-being in students of medicine. *Procedia-Social and Behavioral Sciences*, *30*(2), 1541-1544. https://doi.org/10.1016/j.sbspro.2011.10.299

Stewart, M., Reid, G., & Mangham, C. (1997). Fostering children's resilience. *Journal of Pediatric Nursing*, *12*(1), 21-31. https://doi.org/10.1016/S0882-5963(97)80018-8

Tabachnick, B. G., & Fidell, L. S. (2015). Use of multivariate statistics. (M. Baloğlu, Trans., Ed.). Nobel Publishing.

Telef, B. B. (2013). The adaptation of psychological well-being into Turkish: A validity and reliability study. *Hacettepe University Journal of Education*, *28*(3), 374-384.

Terzi, Ş. (2005). *Psychological hardiness model relating to subjective well-being* [Unpublished doctoral dissertation]. Gazi University.

Thorson, J. A., Powell, F. C., Sarmany-Schuller, I., & Hampes, W. P. (1997). Psychological health and sense of humor. *Journal of Clinical Psychology*, *53*(6), 605-619. https://doi.org/10.1002/(SICI)1097

Turkish Language Association. (2020). *TLA current Turkish dictionary*, [http://tdk.org.tr]. Date of access: 21.11.2020.

Wagnild, G. (2009). A review of the Resilience Scale. *Journal of nursing measurement*, *17*(2), 105-113. https://doi: 10.1891/1061-3749.17.2.105

Wothke, W. (2010). Introduction to structural equation modeling course notes. *Carolina del Norte: SAS Institute Inc.*

Yerlikaya, E. E. (2003). *The adaptation of humor styles questionnaire into Turkish language* [Unpublished master's thesis]. Çukurova University.

Yerlikaya, E. E. (2009). *The relationship between humor styles and perceived stress, anxiety and depression of college students* [Unpublished doctoral thesis]. Çukurova University.

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Determining the Levels of How Families Shape Children's Engagement with Science: A Scale Development Study*

Ailelerin Çocuklarını Bilime Yönlendirme Düzeylerini Belirleme: Ölçek Geliştirme Çalışması

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ABSTRACT: This study aims to develop a scale that can be used to determine the levels of how families shape children's engagement with science. The study was conducted in the basic research design. The data collection was carried out in two stages. In the first stage, the data obtained from the scale applied to 324 people were subjected to exploratory factor analysis. In the second stage, data from 181 people were used for confirmatory factor analysis. As a result of the EFA, it was found that the factor loads ranged from .521 to .893, the Kaiser-Meyer-Olkin value was .866, the total variance explained was 62.254%, and the Cronbach's alpha value was .907. As a result of the CFA, however, it was found that the X^2/df value was 2, and the RMSEA value was .079. Thus, a 5-point, 3-factor Likert type scale, consisting of 18 items, was obtained with validity and reliability according to the analysis results. The factors involved in the scale were called "Practical Applications (Activities and Experiments)", "Introduction to Science" and "Building Scientific Foundations". With the developed scale, it is believed that researchers in the field can determine the level of orientation of children of families with different demographics and children of different age groups to science.

Keywords: Science, family orientation, engagement with science, family science.

ÖZ: Bu çalışmanın amacı, ailelerin çocuklarını bilime yönlendirme düzeylerini belirlemek için kullanılabilecek bir ölçek geliştirmektir. Çalışma temel araştırma niteliğinde yürütülmüştür. Amaç doğrultusunda ilk olarak ilgili alan yazın taranarak madde havuzu oluşturulmuştur. Oluşturulan madde havuzu uzman görüşüne sunulmuş ve daha sonra ölçeğin pilot uygulaması yapılmıştır. Uygulama kapsamında toplam 505 ebeveyn araştırmanın çalışma grubunu oluşturmuştur. Uygulama iki aşamada yürütülmüştür. Birinci aşamada 324 kişiye uygulanan ölçekten elde edilen veriler açımlayıcı faktör analizine tabi tutulmuştur. İkinci aşamada ise 181 kişiye uygulanan ölçekten elde edilen veriler doğrulayıcı faktör analizi için kullanılmıştır. Açımlayıcı faktör analizi sonucu faktör yüklerinin .521 ile .893 arasında değiştiği, Kaiser-Meyer-Olkin değerinin .866, açıklanan toplam varyansın %62.254 ve Cronbach's Alpha değerinin ise .907 olduğu bulunmuştur. Doğrulayıcı faktör analizi sonucu ise X^2/Sd değerinin 2 olduğu, RMSEA değerinin .079 olduğu bulunmuştur. Yapılan araştırma doğrultusunda elde edilen verilerin analiz sonuçlarına göre araştırmacılar tarafından geçerliği ve güvenirliği sağlanmış 18 maddeden oluşan 5'li likert tipinde 3 faktörlü bir ölçek elde edilmiştir. Ölçekte yer alan faktörler "Pratik Uygulamalar (Etkinlik ve Deney)", "Bilimle Tanıştırma" ve "Bilimsel Temel Oluşturma" olarak adlandırılmıştır. Geliştirilen ölçek ile alandaki araştırmacıların, farklı demografik özelliklere sahip ve farklı yaş gruplarında çocuğu olan ailelerin çocuklarını bilime yönlendirme düzeylerini belirleyebileceği düşünülmektedir.

Anahtar kelimeler: Bilim, aile yönlendirmesi, bilime teşvik, aile bilimi.

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Considering the past and present developments and practices, science is at the forefront and essential in every field and period. Science is one way of learning and acquiring knowledge and consists of beliefs and values in acquiring and developing scientific knowledge (Güler & Akman, 2006). There is a great need for science for new developments and implementations as it has been so far. Science is a trigger for further production and change in all areas. As with everything else, it is up to today's children to use science correctly and carry it into the future and continuously improve (Kunt, 2015).

In children, the perception of science and the formation of concepts related to science begins in preschool, as in all other areas (Ayvacı et al., 2016). The first interaction with science and the learning of scientific concepts first starts in infancy, in which children explore their surroundings by observations and learn to think (Akman et al., 2003). After infancy, young children learn about science by appealing in the investigation, inspection and wonder, characteristic of early childhood (National Research Council [NRC], 2007, 2012). Early childhood can be considered the best time for children to be introduced to science because their learning processes have also begun with their curiosity about the world (Kefi et al., 2013; NRC, 2007). Studies also show that children's involvement with science at an early age is a factor that positively increases science performances in later years of education (Morgan et al., 2016). For all these reasons, efforts to increase success in science and close the gaps in science achievement among children in the future should start in childhood and include their parents' education. Because one of the ways children learn science is to observe and imitate the scientific activities of adults (Raynal et al., 2021). Increasing the ability of parents to develop children's scientific dispositions helps children build actual experiences of science (NRC, 2007, 2012); these actual experiences potentially affect their academic choices and achievements in the following years (Leibham et al., 2013). Family support also helps them build up their economic future as adults improve their contributions (Raynal et al., 2021).

Several studies (e.g., Bell & St. Clair, 2015; Eisenberg et al., 2010; Kurt & Taş, 2019; Quiley et al., 2011) have found that providing an interest in science in early childhood strengthens children's learning of science content. For example, Fragkiadaki and Ravanis (2021) pointed out that a child's emotions in participating in, contributing to, or being in scientific activities or environments have a crucial role in examining and understanding children's early learning and development related to science. To achieve this situation, it is the duty of the family, the first social circle of the child, to support the child in science-related issues before starting school, where the learning of science content is carried out in a planned manner (Archer et al., 2012). If we hope to understand how children first learn to explore their surroundings, we need to investigate where they spend most of their time outside school (Keifert & Stevens, 2019). We should also consider these extracurricular areas as affluent places for learning (Giles, 2021; Vossoughi & Gutiérrez, 2014). That is why the family has a significant influence on children's development, interests and attitudes in all aspects. Many studies indicate a positive correlation between parents' attitudes children's attitudes on any issue (Fragkiadaki & Ravanis, 2021; Goldman et al., 2021; Raynal et al., 2021). Therefore, early parental involvement and encouraging parental participation in later education are

essential and should be encouraged for many reasons mentioned above (Kurt & Taş, 2019).

Parental Encouragement to Science Engagement

The socio-cultural approach based on Vygotsky (1978) related how children learn through the interaction with parents and the environment. The theory has also emphasized that adults have an essential role in developing higher mental functions of children. Besides that, the socio-cultural theory has noted that cultural influences have a dimension of the learning process. Vygotsky's theory provides a valuable framework for understanding teaching interactions between child and parent. Specifically, these interactions show how the transition process is going from collaborative problem-solving to the child's independent operation. Through collaborative problem solving, children learn to define tasks, construct their knowledge and manage the situation through engaging participation in organized activities under the guidance of elders (Sun & Moreno, 2020).

Parental education, family activities, and conversations between children and adults affect how children perceive and relate to science (Raynal et al., 2021). In addition, parents' attitudes, values, and practices towards science positively influence children's expectations and participation in science (Archer et al., 2012; DeWitt et al., 2013). However, supporting the children's interest in science and correctly guiding them can be complex. This complexity is not only related to the child and their interest but also involving the family. For instance, on the one hand, Appiah-Kubi and Amoako (2020) research are finding explained that the thought of parents to see their children's participation in their education as part of the education they are expected to give them motivates their participation. On the other hand, some parents see this participation as not enough. For example, Silander et al. (2018) research shows that parents often feel that their young children lack the confidence and knowledge they need to support science learning; however, almost half of US families do some science activity every day. While its role in providing the foundation for parents and children to engage in science has been noted in many studies, the power of parent-child involvement remains largely unexplored (Strickler-Eppard et al., 2019). Science education in families is quite different from science in school. The families' understanding of science may differ, depending on their motivations and the way they figure out the world. These differences may display how families discuss science and embody it on their terms (Goldman et al., 2021). Taking part in various home and community environments or collecting information about those environments can reveal children's science backgrounds, family cultures, and science perception of both children and families (González et al., 2005; Moll, 2014).

Science is a study that emphasizes critical and logical thinking, curiosity, and doubt (Ayvacı et al., 2016; McComas, 2014). In order to provide the child with the habit of scientific thinking in early childhood, which is based on lifelong learning, it is necessary to support scientific process skills (Aksüt, 2019; NRC, 1996). On the other hand, children are curious about everything; exploration, discovery, and analysis are natural motives. These skills, which are part of the scientific process, are expected to provide children with the foundation in science, provided that there is a suitable environment and family support (Archer et al., 2012). When a suitable environment is

presented to children at an early age, they become more interested in science, more open to research and discovery (Akman et al., 2003). According to Aktamış et al. (2008);

> Families should help their children in using skills such as observing, noticing a change, recognizing samples, making models, exploration, experimenting, predicting, measuring and sharing information, and should use these skills in their everyday life, this is because these skills are of importance for developing a scientific understanding (p. 40).

In that perspective, this science is called "family science" (Goldman et al., 2021). It has extraordinary features that can primarily establish science bases for young children by stimulating curiosity, exploration, experimentation, and interpretation (Crowley et al., 2001). For example, Solis and Callanan (2016) argue that families with less experience in formal school settings encourage more joint meaning-making in science tasks with their children; and family science also enables inquiry and play in ways that school science cannot.

Literature Review

Several studies have been conducted within the scope of early childhood and science. These studies focused on children's perceptions of science and scientists' concepts or science process skills. For example, preschool children's conceptions of the scientist (Ayvacı et al., 2016) and 6-year-olds' views on science (Güler & Akman, 2006) were investigated. As a result of these studies, it was determined that preschool children define a scientist with concepts such as men, laboratory, glasses, apron, and laboratory materials. In addition, studies were conducted on the scientific process skills of children aged 6 (Akman et al., 2003), the impact of activities with family participation on children's scientific process skills (Ulutaş & Kanak, 2018). As a result, it was concluded that the social environment impacts children's development of scientific skills.

As the closest social environment, the role of the family has been investigated in various studies related to children's learning in many senses. For example, several studies have investigated science conversations with children of foreign families residing in the United States (Tenenbaum & Callanan, 2008), parent-child conversations on science (Tenenbaum & Leaper, 2003), family behaviour in familiar science environments (Dierking & Falk, 1994) and how families shape their children's relationship with science and their identity related to science (Archer et al., 2012; DeWitt et al., 2013). As a result, there was a significant link between family attitudes and interests and the child's approaches. For example, according to a comprehensive survey conducted by DeWitt et al. (2013), family stances towards science, science experiences in school, the self-concept of the students in a science course, and the enthusiasm of students in science were found to be mainly correlated with positive parental attitudes (describing 50.5% of the variance in student eagerness). However, in Turkey, the relationship between activities and family participation is often in preschool (Ulutaş & Kanak, 2018). Besides, children's science process skills and the impact of families on students' attitudes towards science (Aktamış et al., 2008) were discussed. In common with other studies, it was determined that family approaches influence the child's approach to science and that family is a significant factor in the child's orientation.

Research conducted on science and children revealed that concepts related to science in children begin to form at an early age and are associated with family, teacher, and environmental conditions. The role of some variables in the role of families in directing children to science has been examined and discussed in studies. These are the gender of the child (Šimunović & Babarović, 2021), the economic status of the families (Goldman et al., 2021), the mother or father status of the parent who takes care of the child (Bucci Liddy et al., 2021), cultural perspectives (Sun & Moreno, 2020), and families perceived related their roles to encourage their children (Caspi et al., 2020). For example; Parents with lower incomes and fewer on-screen role notification reports were higher. Calabrese Barton et al. (2001) revealed that dealing with the life sciences was separate from their thoughts on motherhood and family life.

Although studies in the field of science in early childhood address the role of families in science process skills, and some variables in the role of parents in directing children to science, these studies are limited in terms of content and number. Although the quality of family interactions is critical in promoting children's stimulation and involvement (Eccles, 2007), no scale measured what families did to expose their children to science. In this context, it is believed that the development of a reliable and valid measurement tool that can be used to determine the impact of the orientation of children to science in early childhood by their families will contribute to the literature. In this direction, the current study aims to develop a scale to determine families' level of exposing their children to science.

Methodology

Research Design

This research is basic research as it aims to develop a valid and reliable scale to determine families' level of exposing their children to science. Basic research studies aim to add new ones to existing knowledge and increase knowledge in the field (Fraenkel et al., 2011). Therefore, researchers who conduct basic research studies are interested in gaining new knowledge rather than investigating the efficacy of specific educational practices. This study tries to increase awareness of how families shape children's engagement with science and reveals which activities can be related to the scientific understanding in line with the research type.

Participants

The criterion sampling method was drawn on to determine the study group of the research. Drawing on criterion sampling, the people who will participate in the study must have children aged 0-8 years. In this context, the pilot applications of the developed scale were conducted in 2020-2021 with 505 participants with children between the ages of 0-8 residing in various provinces of Turkey.

Table 1

EFA Study Group Demographic Characteristics

Characteristics of Participants		Frequency	Total
Gender	Female	286	324
	Male	38	
Age	18-25	2	324
	26-30	92	
	31-39	194	
	≥40	36	
Education Level	Primary school	22	324
	Secondary school	58	
	High School	70	
	Associate degree	30	
	Bachelor's degree and above	144	
Number of Children	1	84	324
	2	182	
	3 and above	58	

The study group consists of the first application group. The exploratory factor analysis (EFA) was performed with 324 people, and the second application group, in which confirmatory factor analysis (CFA), was performed with 181 people. The descriptive information of the participants is displayed in Tables 1 and 2. 20 individuals in the EFA group and 18 individuals in the CFA group were excluded from the study due to the end analysis.

Table 2

CFA Study Group Demographic Characteristics

Characteristics of Participants		Frequency	Total
Gender	Female	162	181
	Male	19	
Age	18-25	27	181
	26-30	61	
	31-39	76	
	≥40	18	
Level of Education	Primary school	5	181
	Secondary school	10	
	High School	36	
	Associate degree	37	
	Bachelor's degree and above	93	
Number of Children	1	97	181
	2	65	
	3 and above	24	

Data Collection

This study aimed to prepare a "Scale to Determine Families' Level of Orienting their Children to Science", and to this end, a literature review was carried out. In this field, all research, which was given in the introduction section, have been linked, which can be strong or weak, between parents' actions encouraging or orienting their children to science. Therefore, many items were written down, and possible correlations and similarities of them in line with these research findings or variables. The deduction method has used writing the scale items and choosing the items. During the decision to the items, when there were any indicators or items related to cultural background or specific family types, they were excluded to avoid a group-specific scale. According to the results obtained from the literature review theoretical framework, a scale of 25 items was developed, with a deductive method as explained above, considering what approaches can guide children to science. The items created were submitted to expert opinion. In the expert opinions, attention was paid to selecting experts, who have addressed science in their thesis or other studies, worked in the field of scale development and measurement evaluation, are interested in preschool education and continue to work on these issues actively. In addition, a language expert was consulted to review the items in the context of meaning and sentence order. Experts were asked to select one of the ratings of "Appropriate/Appropriate, but should be corrected/Not appropriate" for each item on the scale and write their recommendations on the item if they selected the "Appropriate, but should be corrected" option. In line with the expert opinions, the necessary modifications were made on the items, and the final version of the questionnaire was reduced to 20 items prior to application. Then, the questionnaire was applied to the first study group of 324 individuals. As a result of the EFA analysis, two items were removed from the scale, taking item loads and overlapping status into account.

Data Analysis

EFA was performed on the data using the SPSS 26.0 package programme. Then CFA was applied through the LISREL 8.8 package program by taking into account the factor structures determined. Following a detailed factor analysis to test whether the scale structure gives the same result in similar situations, the Cronbach's alpha coefficient was calculated for the scale internal consistency (Pallant, 2001). Finally, by calculating the item statistics, the situation of the items in the structure within the scale was tried to be revealed.

Ethical Procedures

Approval of the Ethics Committee was acquired from Kastamonu University Ethics Committee by Decision No:53 dated 25.12.2020.

Results

The findings gained within the study procedure are given under four headings: the findings for explanatory factor analysis, the findings for confirmatory factor analysis, scale reliability and item analysis.

Findings for Exploratory Factor Analysis (EFA)

This study aimed to "Determine Families' Level of Exposing their Children to Science", and a 5-point Likert type scale was developed for this purpose. First, the content validity was established for the scale developed. The content validity is based on expert opinions on the degree to which the items or questions in a test adequately represent the structure (Christensen et al., 2014; Yurdagül & Bayrak, 2012). In this context, opinions were collected from 6 experts, who have addressed science in their thesis or other studies, worked in scale development and measurement evaluation, are interested in preschool education and continue to work on these issues actively. In addition, an opinion was taken from a language expert to analyse the items in terms of meaning and sentence order. The expert opinions obtained were found to be inconsistent with each other. In line with the opinions, recommended modifications were made to the items considered necessary by the researchers. At the next stage, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's Sphericity test was performed to determine the suitability of the scale for factor analysis. A KMO value greater than .50 and a significant Bartlett's test result indicate that the sample size is adequate for factor analysis and the desired level of correlation between the scale items (Tabachnick & Fidell, 2007). Pallant (2001), on the other hand, proposed that the KMO value should be above .6. In this study, the Kaiser-Meyer-Olkin value was .866, and the Bartlett's Sphericity test was .000 (p<.05). The value ranges that obtained data were suitable for factor analysis. In addition, the correlation matrix has been put work on to determine the level of relationship between the scale items, and the correlation between the scale items was found to be at the desired level.

After deciding the fitness of the data set for factor analysis, eigenvalue scores and variance ratio tables were examined to determine the scale factor number. According to the Kaiser criterion, it is necessary to pay attention to factors with an eigenvalue 1 or higher (Pallant, 2001). Accordingly, looking at Table 3, only the first four factors received values above 1, and these factors account for a total of 69.290% of the variance.

Table 3

Eigenvalue and Variance Results

Factor	Eigenvalue	Variance (%)	Cumulative (%)
1	7.837	39.184	39.184
2	2.690	13.452	52.636
3	1.375	6.876	64.768
4	1.051	5.255	69.290

Other methods used in determining the number of factors include Cattell's scree plot, Bartlett's test, Velicer's MAP test, and Horn's Parallel Analysis tests (Yavuz & Doğan, 2015). Recent studies note that the number of dimensions should be determined according to MAP tests and Horn parallel analysis tests (Pallant, 2001; Yavuz & Doğan, 2015). For this reason, Horn parallel analysis was applied to choose the number of factors to keep. Eigenvalues greater than the criterion values obtained in the parallel

analysis are kept when deciding on the number of factors (Pallant, 2001). Table 4 shows a comparison of eigenvalue results and parallel analysis.

Table 4

Parallel Analysis and Comparison of Eigenvalue Results

Factor No	Eigenvalue	Criterion Value	Conclusion
1	7.837	1.4831	Keep
2	2.690	1.3918	Keep
3	1.375	1.3253	Keep
4	1.051	1.2644	Remove

According to Table 4, three factors whose eigenvalues are more significant than the criterion value were obtained. These findings support the idea that the scale should consist of 3 factors. In this context, the scale was limited to 3 factors and re-analysed. As a consequence of the analysis, it was found that the three-factor structure explains 59.512% of the variance. In order to see how much of the variance each item on the scale explains, the table of commonalities for each item presented in Table 5 was examined.

Table 5

Variance Explained for Each Item (Communalities)

Item No	Initial	Extraction
i7	1.000	.714
i3	1.000	.361
i8	1.000	.822
i9	1.000	.775
i10	1.000	.453
i16	1.000	.656
i17	1.000	.616
i19	1.000	.672
i20	1.000	.749
i24	1.000	.682
i25	1.000	.438
i6	1.000	.586
i11	1.000	.707
i12	1.000	.736
i13	1.000	.445
i14	1.000	.610
i15	1.000	.520

Considering the sample size and the studies in the literature (e.g., Kline, 2005; Pallant, 2001; Tabachnick & Fidell, 2007), the item load value in this study was determined to be at least .40. Therefore, when looking at Table 5, it seems that i3 has a low value (.361) according to this limit value. In addition, as shown in Table 6 obtained as a result of the rotation, this item did not load into any factors. For this reason, it was decided to remove i3 from the scale.

Considering the distribution of factor loads after rotation given in Table 6, the dimensions in which each item is grouped are seen. According to the factor structures, the 1st factor was called "Practical Applications (Activities and Experiments)", 2nd factor was called "Introduction to Science", and 3rd factor was called "Building Scientific Foundations". After determining the number of factors that make up the Scale for Determining the Levels of Families Orienting Their Children to Science, reasonable and inclusive factor names were determined for each factor in line with the literature. It was seen that the first factor did not include the activities and experiments that families did with their children. It is similar to "family science" activities (Goldman et al., 2021), which are the activities that family members do together. This dimension was named "Introduction to Science" because the items in the 2nd factor included the concepts underlying science and research. When examined in the relevant literature, it is similar to the nature of science (Akerson et al., 2011), which deals with children's scientists and their characteristics. The third dimension is named "Building Scientific Foundations" because it is a section where families directly interact with their children with science and science content. Giles (2021) emphasized that using scientific journals and trips to science centres lay an essential foundation for raising children as science literate. When the factors and context were considered, the i25 did not comply with the first factor, removing it from the scale. After the changes and item removals made on the scale, the total variance explained by the 3-factor structure was 62.254%. EFA results after rotation for each item are given in Table 6. The total variance explained by the 3-factor structure was 62.254% after the changes in the scale and item removal. The EFA results are provided in Table 6 after the rotation.

Table 6

EFA Results for the Scale of Determining the Families' Level of Directing Their Children to Science After Rotation

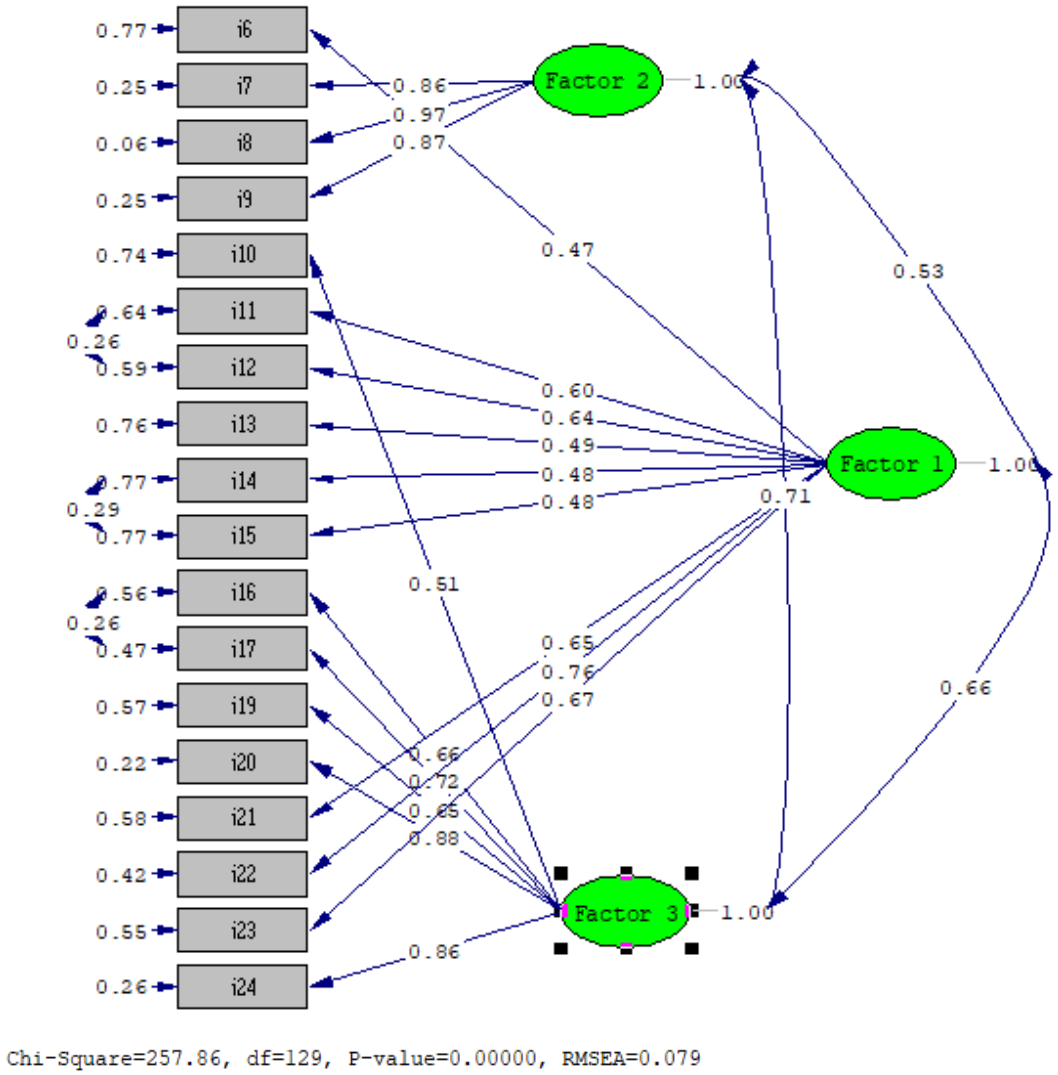
Item No	Items	Communality	Item-Scale Cor.	Factor Loadings 1	2	3
				Practical Applications	Introduction to Science	Building Scientific Foundations
i12	I take my child to scientific activity workshops.	.736	.615	.893		
i11	I take my child to science fairs.	.707	.577	.887		
i6	I ask my child questions that he/she can establish a cause-and-effect relationship.	.586	.604	.725		
i14	I give my child a chance to study nature.	.610	.488	.707		
i22	I observe the sky (Sun, moon, stars) with my child.	.567	.620	.702		
i13	I allow my child to study in detail the technological tools at home so that he/she can understand complex systems.	.445	.526	.621		
i23	I make daily forecasts about the weather/seasons with my child.	.445	.515	.601		
i21	I tell my child about the works of scientists.	.450	.452	.573		
i15	I encourage my child to produce new things.	.520	.552	.569		
i8	I do activities that enhance my child's sense of research.	.822	.533		.831	
i9	I do activities to develop my child's sense of discovery.	.775	.534		.808	
i7	I do simple experiments at home with my child.	.714	.458		.789	
i20	I tell my child about scientists.	.749	.698			-.830
i24	I do activities where my child can make comparisons.	.682	.662			-.786
i16	I buy my child science-themed magazines.	.656	.564			-.745

Findings for Confirmatory Factor Analysis

CFA results for the Scale to Determine Families' Level of Exposing their Children to Science are presented in Figure 1.

Figure 1

The CFA Model for the Scale



The graph in Figure 1 shows the relations of items with factor loads and factors and the modifications made. The comparison results according to compliance indexes of this three-dimensional 18-item scale are given in Table 7. According to the results of the CFA, it was found that the X^2/df value was 2, and the RMSEA value was .079. The decisions to accept the goodness of fits for CFA were made considering the criteria and limits listed by Schumacker and Lomax (2004). Besides, Kline (2005) stated that most preferred fit indices (CFI, AGFI, NFI, NNFI, IFI and GFI) should be ≥ .85 to define as an acceptance. In line with these references, it was found that the values of NFI, RFI, CFI, GFI, RMR and RMSEA were above the acceptable limit value, while the values of NNFI, IFI and X^2/df were above the perfect fit limit.

Table 7

*Scale Analysis Values with Ranges of Acceptance of the Goodness of Fit Indices for CFA**

Fitness Criterion	Acceptable limit (Good Fit)	Perfect fit limit	Orientation to Science Scale Limit	Evaluation
NFI	= .90 and above	= .95 and above	.93	Good fit
NNFI	= .90 and above	= .95 and above	.95	Perfect Fit
IFI	= .90 and above	= .95 and above	.96	Perfect Fit
RFI	= .90 and above	= .95 and above	.92	Good Fit
CFI	= .95 and above	= .97 and above	.96	Good Fit
GFI	= .85 and above	= .90 and above	.85	Good Fit
RMR	= .050 and = .080	= .000 and <.050	.070	Good Fit
RMSEA	= .050 and = .080	= .000 and <.050	.079	Good Fit
X^2/df	2 and =3	=0 and =2	2	Perfect Fit

* Schumacker and Lomax (2004)

When the scale results were examined in line with the data in Table 7, it was determined that the values obtained from the scale were in the desired value range, and therefore, content validity was ensured.

Scale Reliability

We drew on Cronbach's alpha reliability coefficients to decide whether the scale has internal consistency or not, and it was found that as to be .91 for the current scale. In addition, reliability coefficient values of the sub-factors of the scale were also calculated. The analysis results of the reliability coefficient of the total scale and its sub-factors were given in Table 8. This rate is considered quite good for a scale (Hinton et al., 2014).

Table 8

Reliability Coefficients of the Scale and its Sub-Factors

Factors	N	Items	Cronbach's Alpha
Practical Applications (Activities and Experiment)	9	6,11,12,13,14,15,21,22,23	.83
Introduction to Science	3	7,8,9	.92
Building Scientific Foundation	6	10,16,17,19,20,24	.88
Total	18		.91

Item Analysis

In the context of item analysis, the comparison of the 27% lower and upper groups formed in line with the item-total correlation and the total scores obtained from the scale was used in this study.

Item-total correlation is used to define the relationship between each scale item and the total score received from the scale. Besides, the average scores of groups formed in line with the total scores obtained from the scale from each item were compared with the independent sample t-test and are presented in Table 9.

Table 9

Item Analysis Results

Factors	Items	Corrected Item Total Correlation	Independent Group T-Test for the Comparison of Upper 27% and Lower 27%
Practical Applications (Activities and Experiments)	i6	.35	5.32
	i11	.56	9.50
	i12	.52	7.34
	i13	.49	6.90
	i14	.34	4.50
	i15	.43	6.55
	i21	.54	8.62
	i22	.58	8.17
	i23	.60	9.42
Introduction to Science	i7	.64	9.88
	i8	.72	12.99
	i9	.74	12.92
Building Scientific Foundations	i10	.52	7.61
	i16	.67	11.61
	i17	.73	12.62
	i19	.56	9.33
	i20	.71	14.71
	i24	.73	14.16

According to Table 9, it is understood that the corrected item-total correlation value for the items in the “Determining the Levels of How Families Shape Children’s Engagement with Science” scale is between .34 and 74. In addition, the lower and upper group independent sample t-test comparison of the scores obtained from each scale item was found to be significant (p<.01). Accordingly, in each item of the scale, it is

understood that the average score for each item of the upper 27% group is significantly higher than that of the lower 27% group. Therefore, since the item-total correlations are higher than .30 and the upper group subgroup t-test comparisons are significant (Tavşancıl, 2002), it can be said that each item in the scale is valid and has high discrimination.

Conclusion and Discussion

In the current study, a scale was developed to determine the families' level of directing children to science. In this context, a 5-point Likert-type scale of 3 factors and 18 items was developed. The factors involved in the scale were called "Practical Applications (Activities and Experiments)", "Introduction to Science" and "Building Scientific Foundations". Following the expert opinions, five items have removed the scale, which was prepared as a 25-item scale at first; the explanatory factor analysis was performed with 20 items, and two items were removed from the scale due to the analysis. The "Practical Applications (Activities and Experiments)" factor was loaded more by the participants, and nine items were grouped under this heading. In addition, there were three items under the heading "Introduction to Science", and six items under the heading "Building Scientific Foundations".

In line with the literature, there are many studies of parental encouragement and motivation to children in a good deal of different senses. For example, some studies (e.g., Raynal et al., 2021) are interested in everyday activities performed by parents and children and define the effect of these activities on different variables. The first factor of this scale, "Practical applications", can enlighten these everyday activities shared by children and parents. It also supports which activities can connect with supporting meaning, as the widespread perception that science is compelling poses a significant barrier to caregivers who would otherwise involve children in learning (Calabrese Barton & Yang, 2000). Goldman et al. (2021) has also defined these activities as a "family science". The second factor, "Introduction to Science", has also linked between nature of science (NOS) and families. Since the NOS studies are related to how science can be related to the production stage and fundamental values on the science (Kaya et al., 2016), it focused on how the families explain the meaning of the research, the sense of discovery, and the first simple experiments during early childhood. Akerson et al. (2011) also suggested that familiarity with the nature of science should be started early childhood. That is why the second factor can be defined as the first attempt of the families to introduce the nature of science. The third factor, "Building Scientific Foundations", has a particular version of family activities due to more like science aspect and containing science magazines and science centers. Many studies (e.g., Giles, 2021; Sawyer, 2005) explain that the crucial roles of science and technology centre on the potential for children's science literacy skills. For example, Sawyer (2005) stated that science literacy learning begins at birth, and the families knowing and unknowingly affect the quality of the happens across multiple settings. The importance of these roles orienting to the scientific perspective third factor has become more important to shape children' understanding of science.

Opinions were obtained from seven experts on the scale's content validity, linguistic validity, and meaning characteristics. Given the expert opinion, five items that do not serve the desired purpose were removed from the scale. In the study, the KMO

value of the scale was found to be .866. An increase in KMO value indicates that each variable on the scale has high predictability by other variables and is suitable for factor analysis (Keçe et al., 2020). EFA, Parallel Analysis and CFA were performed to determine the factors. Therefore, it can be stated that the scale is valid, considering the rates of variance explained, eigenvalues and factor loads of the items. Scale items need to explain at least 40% of the total variance in a scale development study, and factor loads need to be greater than .30 (Pallant, 2001).

CFA was performed to verify the data grouped under three factors, as found by EFA. It was determined that the construct validity of the scale was confirmed, and the factor structure was verified. Therefore, it can be stated that the items on the scale and the factors under which they are collected can measure the feature that needs to be measured within the scope of the scale (Keçe et al., 2020). We drew on Cronbach's alpha reliability coefficients to decide whether the scale has internal consistency or not, and it was found that as to be .91 for the current scale. It can be stated that this developed scale has an excellent internal consistency coefficient. This is because a reliability coefficient value of .70 and above for a scale indicates that the results obtained from the scale are reliable (Can, 2014). In line with the results, the scale will play an essential role in revealing the role of families, especially in increasing children's interest in science and science-related fields. According to studies conducted so far (e.g., Aydeniz, 2017), increasing students' interest in science and science-related fields has a vital role in STEM fields and gaining 21st-century skills. Similarly, the NRC (2011) report recommends that studies should be carried out to increase children's interest in science at an early age. In light of the points highlighted in this report, it is thought that the obtained scale can fill an essential gap in the field, especially in Turkey.

According to all analyses and reviews conducted on the scale, a scale was prepared that can be applied to each parent and determine the level of children's orientation to science. With the scale developed, researchers can collect information from parents of all ages and levels of education about their children's orientation to science and support their research with qualitative data. It is thought that this scale will be helpful, especially for researchers who want to investigate children's perception of young children's science, the roles of parents, and the effects of their actions on this perception. In addition, it is thought that educators and policymakers can use the data obtained from this scale to determine family roles to be encouraged towards science or to decide what families can do to improve children's understanding of science. In both cases, it can be said that it is a scale that will benefit both the field and practitioners with its essential contributions.

Limitations

This scale was developed to determine what families do to orient their children to science. The scale does not examine the reasons behind families taking these actions. There are studies in the literature that there may be sub-reasons such as academic success, career development, high income or career choice among these reasons. However, since these justifications cannot be obtained with this scale, it can be said that this is a limitation for this scale. It is thought that qualitative data other than quantitative data are needed to determine these reasons. Apart from this, items with cultural elements or specific family characteristics were not selected during item selection for

the scale. Because it was not preferred to limit the scale to a certain culture or family group. If desired, demographic characteristics can be collected together with the scale, and data can be compared, or inferences can be made for the mentioned items. Researchers or practitioners who will use the scale should consider these limitations.

Statement of Responsibility

Emine Bal; Planning and implementation of scale development study, methodology, literature review, formal arrangement, verification, reporting, writing - reviewing and inspection. Gökhan Kaya; Determination of problem situation, determination of sample group, planning and implementation of scale development study, analysis, verification, analysis.

Conflicts of Interest

This research has no financial, commercial, legal or professional relationship with other organizations or those working with them. There is no conflict of interest that would affect the research.

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References

Akerson, V. L., Buck, G. A., Donnelly, L. A., Nargund, V., & Weiland, I. S. (2011). The importance of teaching and learning nature of science in the early childhood years. *The Journal of Science Education and Technology*, *20*, 537-549. https://doi.org/10.1007/s10956-011-9312-5.

Akman, B., Üstün, E., & Güler, T. (2003). Using science process skills in 6 years old children. *Hacettepe University Journal of Education, 24*, 11-14.

Aksüt, P. (2019). Erken çocukluk döneminde fen eğitimi nedir? [What is science education in early childhood?] In Pelin A. (Ed.), *Erken çocukluk döneminde fen eğitimi* [Science education in early childhood] (pp. 1-22). Nobel Academic Publishing.

Aktamış, H., Ünal, G., & Ergin, Ö. (2008). Öğrencilerin fene yönelik tutumlarına ailelerin etkisi [Students' attitudes towards science influence of their families]. *Aile ve Toplum*, *14*(4), 39-48.

Appiah-Kubi, J., & Amoako, E. O. (2020). Parental participation in children's education: Experiences of parents and teachers in Ghana. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science]*, *13*(3), 456-473. http://dx.doi.org/10.30831/akukeg.634484

Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, B., & Wong, B. (2012). Science aspirations, capital, and family habitus: How families shape children's engagement and identification with science. *American Education Research Journal*, *49*(5), 881-908. https://doi.org/10.3102/0002831211433290

Aydeniz, M. (2017). *Eğitim sistemimiz ve 21. yüzyıl hayalimiz: 2045 hedeflerine ilerlerken, Türkiye için STEM odaklı ekonomik bir yol haritası [Our education system and our 21st-century dream: A STEM-focused economic roadmap for Turkey as we move towards 2045 goals]*. University of Tennessee.

Ayvacı, H. Ş., Atik, A., & Ürey, M. (2016). The perceptions of preschool children on the concept of scientist. *Bartin University Journal of Faculty of Education*, *5*(3), 669-689. https://doi.org/10.14686/buefad.v5i3.5000193186

Bell, R. L., & St. Clair, T. L. (2015). Too little too late: Addressing nature of science in early education. In M. C. Trundle & M. Sackes (Eds.), *Research in early childhood science education* (pp. 125-141). Springer.

Bucci Liddy, C. M., Brumariu, L. E., Diaconu-Gherasim, L. R., & Hunter, D. M. (2021). Maternal parenting and teaching strategies: relations with children's academic competence. *Educational Studies*, https://doi.org/10.1080/03055698.2021.1940870

Calabrese Barton, A., Hindin, T. J., Contento, I. R., Trudeau, M., Yang, K., Hagiwara, S., & Koch, P. D. (2001). Underprivileged urban mothers' perspectives on science. *Journal of Research in Science Teaching*, *38*(6), 688-711. https://doi.org/10.1002/tea.1026

Calabrese Barton, A., & Yang, K. (2000). The culture of power and science education: Learning from Miguel. *Journal of Research in Science Teaching*, *37*(8), 871-889. https://doi.org/10.1002/1098-2736(200010)37:8<871::AID-TEA7>3.0.CO;2-9

Can, A. (2014). *SPSS ile bilimsel araştırma sürecinde nicel veri analizi [Quantitative data analysis in the scientific research process with SPSS]*. Pegem A Publishing.

Caspi, A., Gorsky, P., Nitzani-Hendel, R., Zacharia, Z. C., Rosenfeld, S., & Shildhouse, B. (2020). Children's perceptions of the factors that led to their enrolment in advanced, middle-school science programmes. *International Journal of Science Education, 42*(11), 1915-1939. https://doi.org/10.1080/09500693.2020.1802083

Christensen, L., Johnson, R., & Turner, L. (2014). *Research methods, design, and analysis*. Pearson.

Crowley, K., Callanan, M. A., Jipson, J. L., Galco, J., Topping, K., & Shrager, J. (2001). Shared scientific thinking in everyday parent-child activity. *Science Education, 85*, 712-732. https://doi.org/10.1002/sce.1035

DeWitt, J., Osborne, J., Archer, L., Dillon, J., Willis, B., & Wong, B. (2013). Young children's aspirations in science: The unequivocal, the uncertain and the unthinkable. *International Journal of Science Education, 35*(6), 1037-1063. https://doi.org/10.1080/09500693.2011.608197

Dierking, L. D., & Falk, J. H. (1994). Family behavior and learning in informal science settings: A review of the research. *Science Education, 78*(1), 57-72.

Eccles, J. S. (2007). Families, schools, and developing achievement-related motivations and engagement. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization* (pp. 665–691). The Guilford Press.

Eisenberg, N., Vidmar, M., Spinrad, T. L., Eggum, N. D., Edwards, A., Gaertner, B., & Kupfer, A. (2010). Mothers' teaching strategies and children's effortful control: A longitudinal study. *Developmental Psychology, 46*(5), 1294-1308. https://doi.org/10.1037/a0020236

Fraenkel, J. R., Wallen, N. E., & Huyn, H. H. (2011). *How to design and evaluate research in education*. MacGraw-Hill.

Fragkiadaki, G., & Ravanis, K. (2021). The unity between intellect, affect, and action in a child's learning and development in science. *Learning, Culture and Social Interaction, 29*. https://doi.org/10.1016/j.lcsi.2021.100495

Giles, R. M. (2021). Science, technology, and literacy? Assessing the potential for children's reading and writing in four science centres, *International Journal of Early Years Education, 29*(1), 88-95. https://doi.org/10.1080/09669760.2020.1759400

Goldman, S., Luce, M. R., & Vea, T. (2021). Opportunities and tensions in family science: challenging dominant paradigms of science education. *Cultural Studies of Science Education, 16*, 621-641. https://doi.org/10.1007/s11422-020-09998-0

González, N., Moll, L. C., & Amanti, C. (2005). *Funds of knowledge: Theorizing practices in households, communities, and classrooms*. Routledge.

Güler, T., & Akman, B. (2006). 6 year old children's views on science and scientists. *Hacettepe University Journal of Education, 31*, 55-66.

Hinton, P. R., McMurray, I., & Brownlow, C. (2014). *SPSS explained*. Routledge.

Kaya, G., Şardağ, M., Cakmakci, G. Doğan, N., İrez, S., & Yalaki, Y. (2016). Discourse patterns and communicative approaches for teaching nature of science. *Education and Science, 41*(185), 83-99. https://doi.org/10.15390/EB.2016.4852

Keçe, B., Saraçoğlu, S., & Bektaş, O. (2020). Developing a scientific attitude scale: Validity and reliability study. *MM-International Journal of Educational Sciences*, *4*(2), 32-56. https://doi.org/10.46762/mamulebd.774267

Kefi, S., Çeliköz, N., & Erişen, Y. (2013). Preschool teachers' levels of using the basic science process skills. *Journal of Research in Education and Teaching*, *2*(2), 300-319.

Keifert, D., & Stevens, R. (2019). Inquiry as a members' phenomenon: Young children as competent inquirers. *Journal of the Learning Sciences*, *28*(2), 240-278. https://doi.org/10.1080/10508406.2018.1528448.

Kline, R. B. (2005). *Principles and practice of structural equation modeling (2nd ed.)*. Guilford.

Kunt, B. (2015). *The Preschool student's determination of science process skills (60 - 72 months)* [Unpublished master's thesis] Dumlupınar University, Institute of Education Sciences.

Kurt, U., & Taş, Y. (2019). Prediction of students' strategies for doing science homework by parental support and students' goal orientation. *Pegem Eğitim ve Öğretim Dergisi*, *9*(2), 585-604, http://dx.doi.org/10.14527/pegegog.2019.019.

Leibham, M. B., Alexander, J. M., & Johnson, K. E. (2013). Science interests in preschool boys and girls. *Science Education*, *97*(4), 574–593. https://doi.org/10.1002/sce.21066.

McComas, W. F. (2014). Science process skills. In McComas W.F. (Ed.), *The language of science education*. Sense Publishers

Moll, L. C. (2014). *L. S. Vygotsky and education*. Routledge.

Morgan, P. L., Farkas, G., Hillemeier, M. M., & Maczuga, S. (2016). Science achievement gaps begin very early, persist, and are largely explained by modifiable factors. *Educational Researcher*, *45*(1), 18–35. https://doi.org/10.3102/0013189X16 633182.

National Research Council [NRC]. (1996). *National science education standards.* National Academy of Sciences.

National Research Council [NRC]. (2007). *Taking science to school: Learning and teaching science in grades k-8*. National Academies Press. https://doi.org/10.17226/11625.

National Research Council [NRC]. (2011). *Successful K-12 science education: identifying effective approaches in science, technology, engineering and mathematics*. The National Academic Press.

National Research Council [NRC]. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas*. National Academies Press. https://doi.org/10.17226/13165.

Pallant, J. (2001). *SPSS survival manual*. Open University Press.

Quiley, C., Buck, G., & Akerson, V. (2011). The NOS challenge. *Science and Children*, *49*, 57-61.

Raynal, A., Lavigne, H., Goldstein, M., & Gutierrez, J. (2021). Starting with parents: Investigating a multi-generational, media-enhanced approach to support informal

science learning for young children. *Early Childhood Education Journal*. https://doi.org/10.1007/s10643-021-01209-x

Sawyer, R. K. (2005). *The Cambridge handbook of the learning sciences*. Cambridge University Press.

Silander, M., Grindal, T., Hupert, N., Garcia, E., Anderson, K., Vahey, P., & Pasnik, S. (2018). *What parents talk about when they talk about learning: a national survey about young children and science.* Education Development Center.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. Lawrence Erlbaum Associates.

Šimunović, M., & Babarović, T. (2021). The role of parental socializing behaviors in two domains of student STEM career interest. *Research in Science Education, 51*, 1055-1071. https://doi.org/10.1007/s11165-020-09938-6

Solis, G., & Callanan, M. (2016). Evidence against deficit accounts: Conversations about science in Mexican heritage families living in the United States. *Mind, Culture, and Activity, 23*(3), 212-224. https://doi.org/10.1080/10749039.2016.1196493

Strickler-Eppard, L., Czerniak, C. M., & Kaderavek, J. (2019). Families' capacity to engage in science inquiry at home through structured activities. *Early Childhood Education Journal, 47*(6), 653-664. https://doi.org/10.1007/s10643-019-00958-0

Sun, K., & Moreno, R. P. (2020). Chinese Mother-Child Interactions in Everyday Math Activities: Engaging Young Children in Mathematics at Home. *Early Childhood Education Journal*, 49, 1061-1072. https://doi.org/10.1007/s10643-020-01118-5

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics (5th ed.).* Allyn & Bacon.

Tavşancıl, E. (2002). *Tutumların ölçülmesi ve SPSS ile veri analizi*. Nobel Yayıncılık.

Tenenbaum, H. R., & Callanan, M. A. (2008). Parents' science talk to their children in Mexican-descent families residing in the USA. *International Journal of Behavioral Development, 32*(1), 1-12. https://doi.org/10.1177/0165025407084046

Tenenbaum, H. R., & Leaper, C. (2003). Parent-child conversations about science: Socialization of gender inequities. *Developmental Psychology*, *39*(1), 34-47. https://doi.org/10.1037//0012-1649.39.1.34

Ulutaş, A., & Kanak, M. (2018). Effect of the cooperative learning with family involvement based science education on the scientific process skills of 5-6-year-old children. *NeuroQuantology, 16*(11), 20-29. https://doi.org/10.14704/nq.2018.16.11.1263

Vossoughi, S., & Gutiérrez, K. D. (2014). Studying movement, hybridity, and change: Toward a multi-sited sensibility for research on learning across contexts and borders. *Teachers College Record, 116*(14), 603-632. https://doi.org/10.1177/016146811411601413

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.

Yavuz, G., & Doğan, N. (2015). Using velicer's map test and horn's parallel analysis for determining component number. *Hacettepe University Journal of Education, 30*(3), 176-188.

Yurdagül, H., & Bayrak, F. (2012). Content validity measures in scale development studies: Comparison of content validity index and kappa statics. *Hacettepe University Journal of Education, Special Issue 2*, 264-271.

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Bilingual Students, Language Conflict, Language - Culture Shock: Situations Faced by Teachers Assigned to Eastern Regions of Turkey

İki Dilli Öğrenciler, Dil Çatışması, Dil - Kültür Şoku: Türkiye'nin Doğu Bölgelerine Atanan Öğretmenlerin Yüzleştikleri Durumlar

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ABSTRACT: Many bilingual students studying at schools in rural areas of Eastern and Southeastern Turkey experience language conflict in the process of acquiring Turkish. Likewise, teachers appointed to schools where bilingual students are educated, especially from the western regions of Turkey, have problems adapting to the region's culture and language. The problems experienced and seen cause language and culture shock for teachers. At the same time, these problems lead to various negativities on students and teachers in the education process. In this study, language conflict experienced by bilingual students was evaluated according to teacher opinions. Likewise, it is aimed to question the dimensions and consequences of language and culture shock in teachers. Teachers from different branches (n=120) working in the district villages of Van province were included in the study group. Research data were collected via an online questionnaire in the spring semester of the 2020-2021 academic year. The collected data were analyzed with the MaxQDA 2020 program. It was concluded that the students experienced intense language conflict at school. Similarly, it was concluded that the teachers also experienced language and culture shocks in the eastern regions where they were assigned.

Keywords: Bilingual students, language conflict, language shock, culture shock, teachers.

ÖZ: Türkiye'nin Doğu ve Güneydoğusunun kırsal bölgelerinde bulunan okullarda eğitim alan birçok iki dilli öğrenciler Türkçeyi edinme sürecinde dil çatışması yaşamaktadırlar. Aynı şekilde iki dilli öğrencilerin eğitim gördüğü okullara Türkiye'nin özellikle batı bölgelerinden atanan öğretmenler de bölgenin kültürüne ve diline uyum sağlamada sorun yaşamaktadırlar. Yaşanan ve görülen sorunlar öğretmenler için dil ve kültür şokuna neden olmaktadır. Aynı zamanda bu sorunlar, eğitim sürecinde öğrenci ve öğretmenler üzerinde çeşitli olumsuzluklara yol açmaktadır. Bu çalışmada iki dilli öğrencilerde yaşanan dil çatışması öğretmen görüşlerine göre değerlendirilmiştir. Aynı şekilde, öğretmenlerde de dil ve kültür şokunun boyutlarını, sonuçlarını sorgulamak amaçlanmıştır. Van ilçe köylerinde görev yapan farklı branşlardan öğretmenler (n=120) çalışma grubuna dâhil edilmiştir. Araştırma verileri 2020-2021 eğitim-öğretim yılı bahar döneminde çevrimiçi anket yoluyla toplanmıştır. Toplanan veriler MaxQDA 2020 programı ile analiz edilmiştir. Öğrencilerin okulda yoğun dil çatışması yaşadıkları sonucu ortaya çıkmıştır. Benzer şekilde öğretmenlerin de atandıkları doğu bölgelerinde dil ve kültür şokları yaşadıkları sonucuna varılmıştır.

Anahtar kelimeler: İki dilli öğrenciler, dil çatışması, dil şoku, kültür şoku, öğretmenler.

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The concept of bilingualism, which is considered to speak two languages at the same proficiency level (Ramírez-Esparza & García-Sierra, 2014), is now accepted as an essential and inevitable reality. The factors that make it inevitable that almost one in three people (Wei, 2000) or even half of the world's population (Grosjean, 2010) are bilingual are sometimes the desire to access information from different sources and societies (Mohamed, 2018), sometimes intense human mobility and the multicultural nature of societies (Trisnawati, 2017). Among many factors that cause individuals to be bilingual (Antoniou, 2019), especially the society inhabited and the multicultural structure of the society take a special place. In multicultural and multilingual societies, the obligation of individuals to learn and use the official or dominant language (target language) of the society to which they belong, other than their first language (Citrin et al., 1990), is quite striking. The process of acquiring a second language after their mother tongue can ultimately lead individuals to become bilingual (Ramírez-Esparza & García-Sierra, 2014). However, although the efforts of individuals to become bilingual by learning the dominant language of the society other than their first language is sometimes an advantage, this process may not always take place at the desired level (Danbolt, 2011; Trisnawati, 2017). Due to the occasional and insurmountable difficulties of the second language acquisition process, this process can lead to various negative consequences for bilingual students and other individuals in the long run (Danbolt, 2011). Due to the inability to reach the desired level of proficiency in the second language (Genesee, 2008), it becomes inevitable that bilingualism often turns into a problematic dimension. It can be said that one of the biggest causes of the problems that arise is language conflict.

Language Conflict, Language and Culture Shock

It is known that bilingual students and many individuals experience some problems acquiring a second language (Muarich, 1999). The language conflict (Van Heuven et al., 2008) and the language shock (Schumann, 1986), primarily due to the mixing of the first language with the second language (Guiberson, 2013), are of particular importance among these. As a result of the encounter of two different languages, it is highly likely that the words enter into competition and create confusion in the brain. This problem can often be explained by language conflict (Van Heuven et al., 2008). Likewise, Benyelles (2011) draws attention to the fact that more than one language in the same region can trigger language conflict.

Another problem experienced by many individuals with bilingual students when they enter the environments where the second language is spoken can be expressed as language and culture shock (Schumann, 1978). Schumann; combines language and culture shock under the heading of affective factors in the 'acculturation model'. However, language shock should be considered separately from language conflict. Because if there is language shock, you may not have been exposed to the second language intensively before. There may also be a possibility of no exposure to the second language. According to Fan (2010), language shock; is considered one of the main factors of culture shock. There are adverse effects of the discomfort and foreignness of the individual who enters a different environment on the language. Because culture and language are concepts that affect each other. Therefore, it is a strong possibility that both concepts affect each other. The culture shock was first used

by cultural anthropologist Kalervo Oberg (Luo, 2014) and may be caused by linguistic differences. Therefore, the prerequisite for a good understanding of language shock is to understand culture shock. According to Schumann (1986), culture shock is experienced more in adults. In humans, sadness, stress, anxiety, depression in culture shock manifested by symptoms (Saylag, 2014), individuals enter an unfamiliar environment (Rese, 2018) that they have not previously experienced. Communication also decreases during this process.

Language Conflict in Bilingual Students in Rural Regions of Turkey

Turkey's Eastern and Southeastern Anatolia regions are considered more rural and disadvantaged (EGR, 2020; Erol & Özdemir, 2020) compared to the other five geographical regions. Compared to other regions, these regions have differences in terms of both the languages used in the region, culture, and climate (Derince & Eyüboğlu, 2012). There are other students from different languages whose first language is Arabic, Zaza (Asrağ, 2009; Yılmaz & Şekerci, 2016). Although there are many bilingual students in rural areas, it is known that the first language of these students is mainly Kurdish (Koşan, 2015; Yılmaz & Şekerci, 2016). There are other students from different languages whose first language is Arabic, Zaza (Asrağ, 2009; Yılmaz & Şekerci, 2016). In other words, it is possible to say that there is a multilingual and cultured environment in Turkey (Derince & Eyüboğlu, 2012; Koşan, 2015; Kotluk & Kocakaya, 2018). According to Wei (2008), other multicultural countries in different countries have an official language and different languages spoken. However, it should be noted that bilingual students in rural areas (Eastern and Southeastern Anatolia regions) of Turkey are official citizens of the Republic of Turkey; that is, they are not a minority (Yakışır, 2009). In this context, it is known that students whose first language is Kurdish have some problems (reading, communication, academic failure, discipline) throughout their education (Derince & Eyüboğlu, 2012; Susar Kırmızı et al., 2016; Tulu, 2009; Uğur, 2017).

Bilingual students start school by learning Turkish, the official language of the country, at a certain level (Ceyhan & Koçbaş, 2011) before starting school. Since these students are not foreign to Turkish, they can overcome the effect of language shock over time. On the other hand, in more rural areas and even in villages, the level of Turkish learning of many bilingual students may remain at a lower level (Derince & Eyüboğlu, 2012; Tulu, 2009). This disadvantage causes bilingual students to experience language conflict at school and in the classroom (Susar Kırmızı et al., 2016; Yılmaz & Şekerci, 2016). Language conflict (Kızıltaş & Kozikoğlu, 2020) is inevitable as bilingual children enter a systematic Turkish environment for the first time (Koşan, 2015; Tulu, 2009) and they are prohibited from using their first language (Kurdish).

Language and Culture Shock in Teachers Assigned to Rural Regions of Turkey

The problems experienced in rural areas where bilingual students continue their education are not limited to language shock and conflict. Among the teachers assigned to schools in these regions where bilingual students are educated, teachers from western or other regions of Turkey and foreign to the region (Kozikoğlu & Senemoğlu, 2018) also constitute a significant proportion. Moreover, most teachers do not know bilingual students' first language (Uğur, 2017). As a result, many teachers come across someone

who speaks the Kurdish language for the first time. It is expected that this will create language shock (Kozikoğlu & Senemoğlu, 2018). Likewise, the culture of the cities where teachers were born and raised and the life, culture and even the climate of the regions where the schools they work in bear some differences (Aygül & Korkmaz, 2018; Derince & Eyüboğlu, 2012; Kotluk & Kocakaya, 2018; Kozikoğlu & Senemoğlu, 2018).

The unity of many elements (common religion, shared history, a single nation) brings people in Turkey's eastern and western regions together on a common ground (Özcan, 2016; Yakışır, 2009) plays an essential role in breaking the impact of cultural conflict. In other words, teachers assigned to the eastern regions of Turkey are more likely to experience an inevitable shock process in cultural terms. Cultural conflict is experienced more when people go to environments and countries where different religions (Chaudhary & Yadav, 2018) and traditions prevail (Banaszkiewicz & Buczkowska, 2015). On the other hand, this is not the case in culture shock. Therefore, it can be said that the problems experienced in teachers assigned to the eastern regions of Turkey are centered around language and culture shock.

The language and culture shock experienced in teachers, along with the language conflict experienced in students, cause various problems in the individual and social context (Ceyhan & Koçbaş, 2011; Susar Kırmızı et al., 2016) on bilingual students. The rural areas are the country's provinces with the lowest academic success in national and international exams in Turkey (Derince & Eyüboğlu, 2012; EGR, 2020; Koşan, 2015) is just one of the examples that confirm this adverse event situation. Therefore, it is crucial to discuss these problems.

Language conflict, language and culture shock experienced in rural areas of Turkey in the context of students/teachers are fundamental problems. However, the lack of studies directly addressing this problem in rural areas of Turkey is another problem. There are a limited number of studies, albeit far from these problems in disadvantaged regions (Aygül & Korkmaz, 2018; Kotluk & Kocakaya, 2018; Saylag, 2014). It is understood that the studies conducted are far from the concepts of language conflict, language and culture shock experienced in the context of bilingual students and teachers. On the other hand, it can be said that there are studies in this field in countries other than Turkey (Benyelles, 2011; Rese, 2018). However, the lack of similar studies on this problem specific to Turkey is also seen in foreign literature.

Current Study

This research; focuses on the language conflict experienced by bilingual students in rural Turkey and the language-culture shock seen in teachers working in these regions. This study aims to reveal the source and results of these conflicts, in short, all dimensions. The purpose of filling the gap created by the studies in this scope in the literature and creating awareness on this issue makes the research important, meaningful and original. In this context, some questions were sought for answers. In the context of bilingual students in schools in rural regions of eastern and southeastern Turkey and teachers assigned to schools in these regions, the following questions were tried to be answered:

- What are the dimensions of language conflict experienced by bilingual students?

- What are the consequences of language conflict in bilingual students?
- What are the solutions to eliminate the consequences of language conflict experienced by bilingual students?
- How is the extent of the language and culture shock experienced by teachers?

Method

Research Design

Phenomenology design, one of the qualitative research methods, was used in the study. Phenomenology focuses on phenomena that we are aware of in daily life but do not have an in-depth and detailed understanding (Büyüköztürk et al., 2016). For example, language conflict in bilingual students who acquire Turkish as a second language and the language and culture shock experienced by teachers assigned to schools in these regions are known but need detailed examination. Therefore, the phenomenology design was used to obtain detailed information about the testimonies, experiences, and perceptions of teachers in different branches, who were thought to have information about these phenomena.

Participants

The study's working group consists of teachers (female=85, male=35) working in different branches in Van province in the 2020-2021 academic year (Table 1). Criteria sampling from purpose-made sampling methods were used to determine the working group. In criteria sampling, specific criteria are determined to fit the purpose of the research. Then, individuals, events or situations that meet the specified criteria/criteria are included in the workgroup (Büyüköztürk et al., 2016).

Table 1

Descriptive Information of the Teachers

Branch	Gender	Professional Seniority	*n*	Total
Primary School Teacher (*n*=73)	Male	0-5 year	25	29
		6-10 year	1	
		11-15 year	3	
	Female	0-5 year	39	44
		6-10 year	4	
		11-15 year	1	
Preschool Teacher (*n*=47)	Male	0-5 year	5	6
		6-10 year	1	
		11-15 year	-	
	Female	0-5 year	35	41
		6-10 year	4	
		11-15 year	2	

Looking at Table 1, most of the teachers participating in the research are female teachers (*n*=85). It is noteworthy that the number of primary school teachers participating in the research is also in the majority (*n*=73). In this study, the fact that teachers work in disadvantaged areas (district village schools) and that their branches are classroom teachers/preschool teachers are considered criteria. Furthermore, two branches are selected as criteria because bilingual students' first meeting with the school is preschool (*n*=47) or primary school (*n*=73). In other words, it is the occurrence of the first and intense periods of language conflict at the said education levels.

Data Collection Tool and Process

In this study, the data were collected through an online questionnaire. Google Forms is one of the techniques included in this scope. It can be said that web-based online surveys such as Google Forms are valuable and effective in reaching many people quickly (Kumar & Naik, 2016; Raju & Harinarayana, 2016). In such a period when the Covid-19 pandemic made it difficult to come face to face, the advantages of collecting data with an online survey were utilized. Depending on the purpose of the research, five open-ended questions were asked to the teachers. These questions are: "Can you share your experiences about language conflict in students during the process of acquiring Turkish as a second language", "What do you think about creating psychological and social distance in bilingual students", "When you were assigned to a school/region with bilingual students, did you experience language and culture conflicts, could you share your thoughts?", "What are the consequences of language conflict experienced by bilingual students in the process of acquiring Turkish", "What are your suggestions for solutions in order to overcome the language conflict experienced by students in the process of acquiring Turkish as a second language?". In the personal information form included in the data collection tool, the gender and branches of the participants were tried to be determined. Participants were encouraged to participate in the research voluntarily. Second language acquisition, language-culture relationship the opinions of academicians working on their subjects have been utilized. After the opinions of four experts, one of the questions prepared was removed, and it was decided to collect data over five questions. Likewise, the questions in the online questionnaire were evaluated in the context of language and content by field experts. After that, the questions and the research were piloted on 15 teachers. After all the procedures, online survey questions were finalized.

Data Analysis

The data collected from teachers via online questionnaires were analyzed using content analysis. Content analysis is to gather similar data within the framework of specific concepts and themes and to interpret them by organizing them in an understandable way (Yıldırım & Şimşek, 2013). Themes in questions, categories and codes were created according to these themes. In order to ensure the external reliability of the research, detailed explanations regarding the stages such as the purpose of the research, study group, data collection tool, data collection and data analysis are included. The collected data was transcribed. The data shared with an expert was provided to be coded independently. Then, the coding made by the researcher and the expert were compared. According to the formula of Miles and Huberman (1994)

(Reliability=Consensus/(agreement+disagreement)), the percentage of agreement between two different coders was calculated, and 95% agreement was found. Therefore, it was decided that the codes made were reliable (Miles & Huberman, 1994). In coding the data, MaxQDA 2020 qualitative data analysis was used.

Ethical Procedures

Ethical committee approval for this study was obtained from the Ethics Committee of Van Yuzuncu Yil University (Num: 2021/06-14; Date: 30.04.2021).

Findings

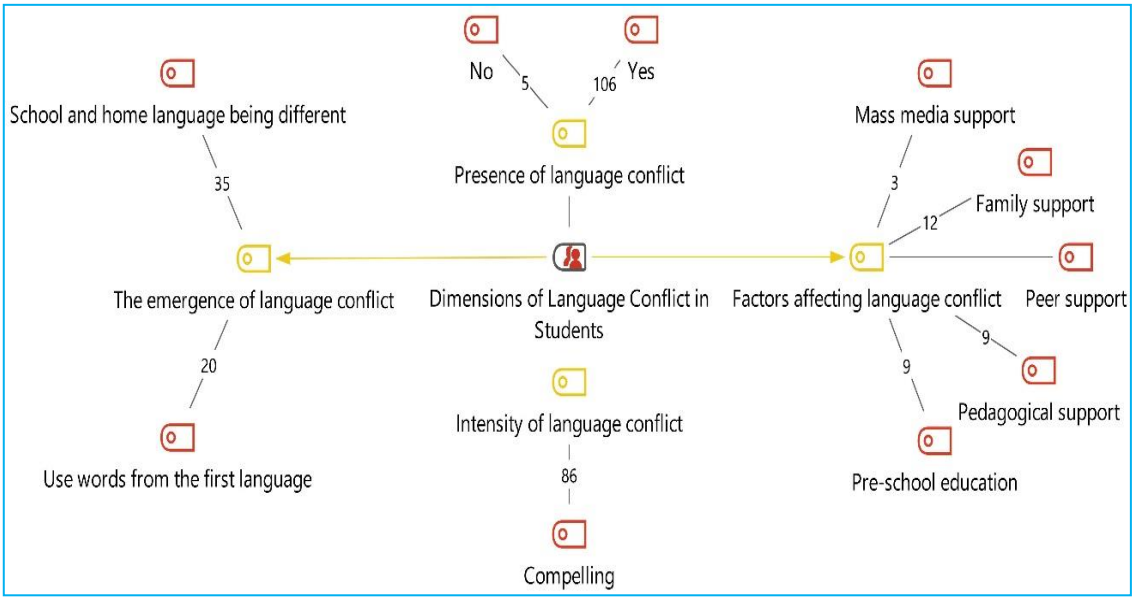
Data obtained from interviews with teachers; "dimensions of language conflict", "psychological distance in bilingual students", "social distance in bilingual students", "language shock in teachers", "culture shock in teachers", "consequences of language conflict in bilingual students", and "solutions for resolving language conflict in bilingual students" are grouped under seven themes. The research data were presented by describing them according to the determined themes.

Dimensions of Language Conflict

The teachers' opinions were gathered under "dimensions of language conflict" (Figure 1).

Figure 1

MAX Maps Code Theory Model Regarding Dimensions of Language Conflict



According to the opinions of the teachers, in the classroom and school, it is understood that from time to time, bilingual students (Turkish-Kurdish) offer support to their peers who have not yet reached a certain level of proficiency in Turkish (*n*=16). Emphasis is placed on the importance of family support (*n*=12) and peers in supporting the Turkish language learned in the classroom and school. Lack of family support triggers language conflict. Especially outside of school, in the family, the use of televisions, computers, smartphones, tablets in the environment provides more intertwining with Turkish by using mass media (*n*=3). This situation may positively

affect the development of Turkish according to the results of the participants' opinions. In addition, in-service and pedagogical support (*n*=9) to be provided to teachers is essential in contributing to students who cannot overcome the language barrier and do not have the required proficiency in Turkish. Another great point in teachers' views is that language conflict in bilingual students who have received preschool education (*n*=9) has a short course. Participant views on these situations are as follows:

> As bilingual students communicate with other children in the classroom, they use Turkish effectively (T23).
>
> The child does not understand me, and I do not understand him. If he cries, you cannot comfort the child. Sometimes I even wanted to cry. Later, we communicated through my children, who knew Turkish (T86).
>
> In addition, not speaking Turkish in the family environment makes it more difficult for children to learn (T58).
>
> Problems experienced in children who receive preschool education are much less (T68).

Considering the teachers' opinions, it is understood that teachers have difficulties in terms of language conflict experienced in bilingual students. It can be said that preschool education also plays an essential role in this process. Families' contribution in overcoming the language conflict process is precious. So much so that the continuation of the use of the first language in the family negatively affects the reinforcement of Turkish learned at school. This habit sometimes causes the use of words from the first language (*n*=20) in the classroom environment from time to time. Ultimately, the difference between the language used at home and school (*n*=35) constitutes the starting point of the conflict. After a particular stage, the intensity of language conflict becomes challenging (*n*=86) for students in many ways. Participant views on these situations are as follows:

> In my students whose mother tongue is Kurdish, Turkish concepts, objects, shapes first make sense in Kurdish to understand the events. Then it translates it into Turkish. This causes difficulties and time in the learning process. He tries to think in Kurdish and answer the Turkish question I ask. He answers with sentences in Turkish, a little in Kurdish, due to his insufficient Turkish vocabulary (T121).
>
> Since Kurdish is spoken in the students' homes, they know it as a mother tongue and live this way. This is why Turkish is a second language. Kurdish is naturally spoken because the parents do not speak Turkish (T35).

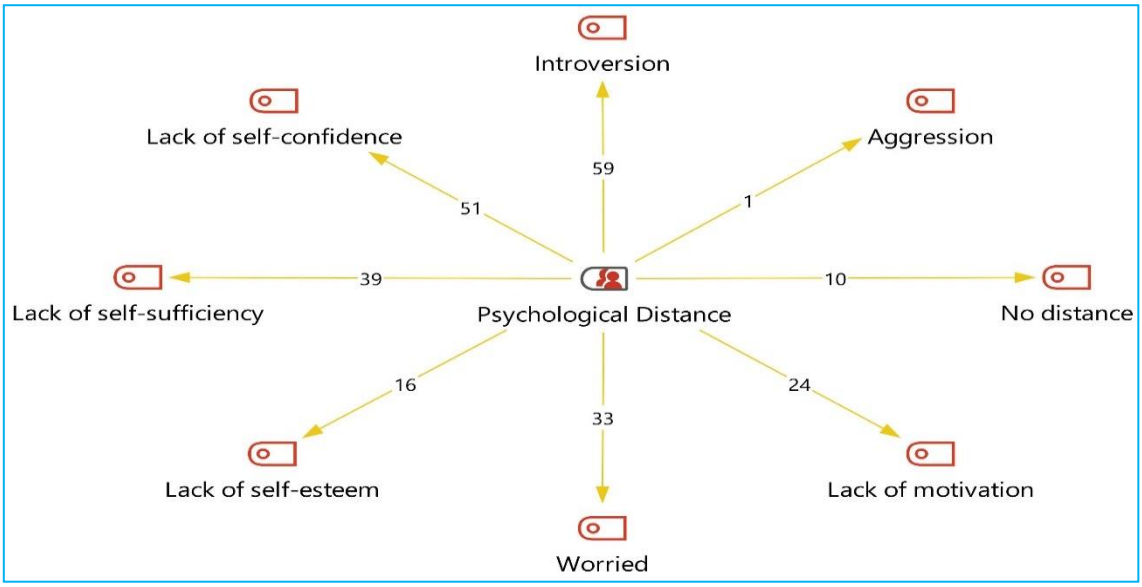
As understood in teachers' opinions, language conflict in bilingual students who acquire Turkish as a second language is undeniable (*n*=106). On the other hand, the number of teachers who stated that there was no language conflict (*n*=5) and the number of teachers who did not express their opinion is deficient (*n*=9).

Psychological Distance in Bilingual Students

The teachers' opinions were gathered under "psychological distance in bilingual students" (Figure 2).

Figure 2

MAX Maps Code Theory Model regarding Psychological Distance



Students lack motivation towards a second language that they do not command (*n*=24). This deficiency is accompanied by the inability of the students to consider themselves competent and the low self-efficacy (*n*=39) perceptions. Teachers stated a lack of self-confidence (*n*=51) below this. These disadvantages in bilingual students can negatively affect their self-esteem (*n*=16). Their positive views and thoughts towards themselves are affected by this situation. All the negativities experienced make students more worried (*n*=33) and introverted (*n*=59) individuals. Participant views on these situations are as follows:

> They get along better with students whose mother tongue is Kurdish like them, and more difficultly with other students. I think this is because they had trouble expressing themselves in Turkish (T37).
>
> They are very dull and cowards. The worried caused by the inability to speak Turkish inevitably prevented them from expressing themselves. Even when expressing their indispensable needs, they talked tightly and hard. Nevertheless, even though they spoke Kurdish, they started to relax a little when they saw that I understood them (T101).
>
> Students who cannot express themselves well are introverted and lack self-confidence. Furthermore, in the following periods, they become afraid to ask questions despite speaking Turkish, cannot defend themselves against an injustice and experience a feeling of inadequacy (T112).

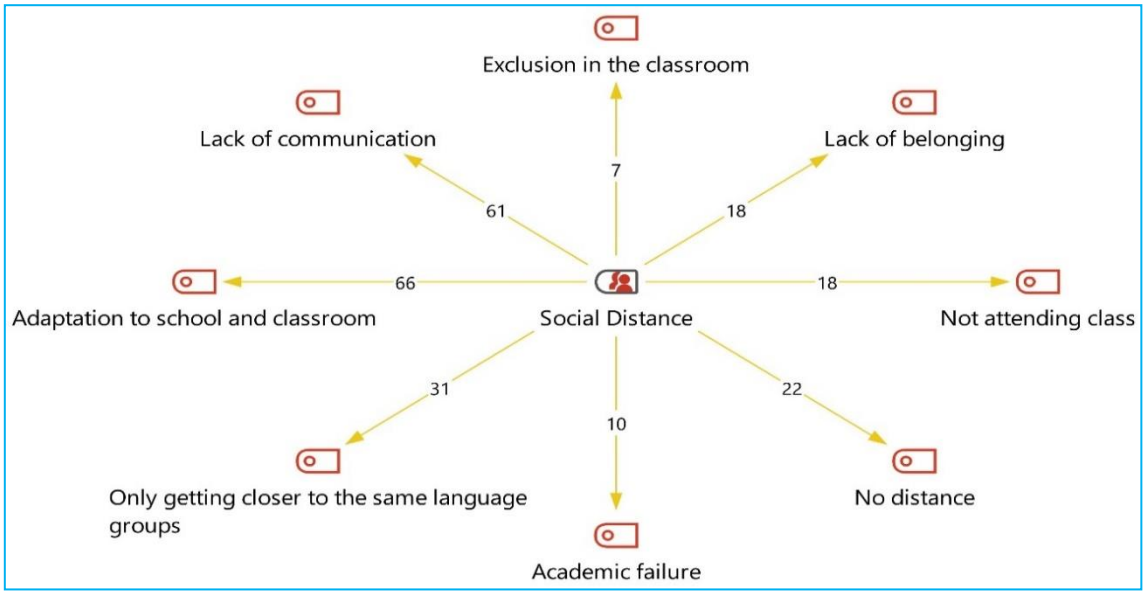
Considering the teachers' views, it can be said that students create a psychological distance from themselves and isolate themselves from the classroom. It is also reported that they show aggression (*n*=1), albeit rarely. On the other hand, it should be noted that there are teachers' opinions that bilingual students do not enter a psychological distance (*n*=10).

Social Distance in Bilingual Students

The teachers' opinions were gathered under "social distance in bilingual students" (Figure 3).

Figure 3

MAX Maps Code Theory Model regarding Social Distance



Lack of communication with students and teachers (*n*=61) due to the problem of not having enough command of the second language causes them to hesitate to participate in the lesson (*n*=18). Students in a different and intensely spoken second language environment; experience some tides at the point of seeing themselves belonging to the class, to the school (*n*=18). Although students try to participate in the lesson, they also consider the possibility of being mocked in the classroom (*n*=7). In such cases, they try to overcome their loneliness by showing closeness to students in a similar situation (*n*=31). These problems negatively affect the adaptation process of bilingual students to both the classroom and the school (*n*=66). Ultimately, academic failure (*n*=10) also becomes inevitable. Participant views on these situations are as follows:

> Such students are very comfortable with their friends; on the contrary, they are very on their toes in the classroom environment. Therefore, he prefers not to talk with his teachers unless he is obliged to or promised by the teacher (T8).
>
> I think it is adversely affected in every way. They also have Turkish-speaking friends in the classroom. It is challenging to comply with them. He is trying to set up a game alone. Friendships are troubled. Since he cannot establish a dialogue with the teacher, in the same way, he cannot gain the necessary confidence and has emotional difficulties within himself (T111).

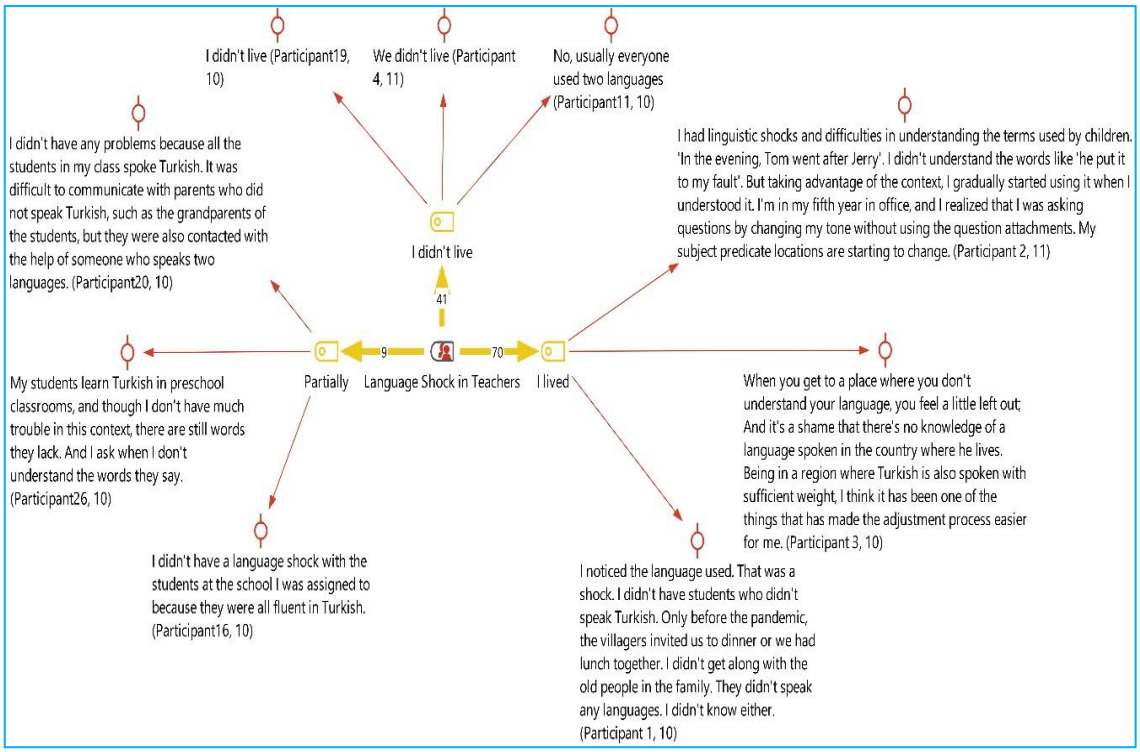
Considering the teachers' opinions, it should be noted that there are teachers' opinions that bilingual students do not maintain social distance (*n*=22).

Language Shock in Teachers

The teachers' opinions were gathered under "language shock in teachers" (Figure 4).

Figure 4

MAX Maps Code Sub Code Model regarding Language Shock in Teachers



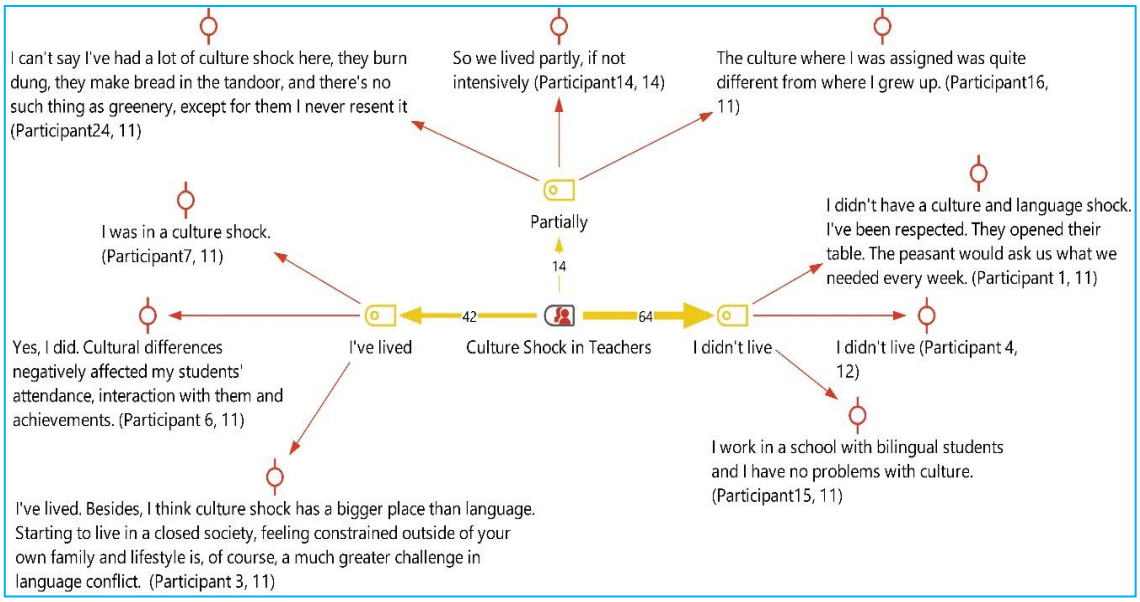
As seen in Figure 4, it is understood that most of the teachers experienced language shock (*n*=70). However, there are also opinions stating that teachers partially experienced language shock and overcame this shock over time (*n*=9). On the other hand, the number of teachers who did not experience language shock is also significant (*n*=41).

Culture Shock in Teachers

The teachers' opinions were gathered under culture shock in teachers (Figure 5).

Figure 5

MAX Maps Code Sub Code Model regarding Culture Shock in Teachers



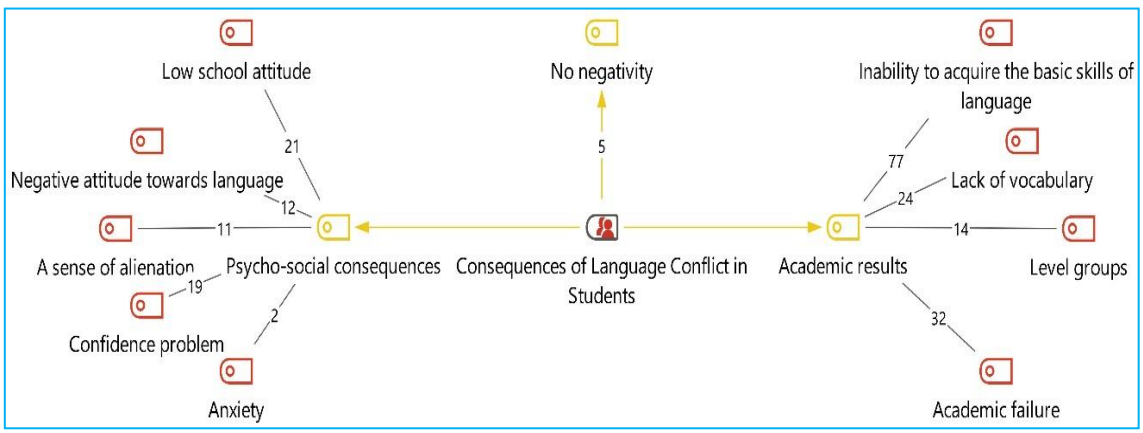
As seen in Figure 6, it is understood that most of the teachers do not experience culture shock (*n*=64). In addition, opinions state that teachers partially experience culture shock (*n*=14). On the other hand, the number of teachers who experienced culture shock among teachers is also significant (*n*=42).

Consequences of Language Conflict in Bilingual Students

The teachers' opinions were gathered under "consequences of language conflict in bilingual students" (Figure 6).

Figure 6

MAX Maps Code Theory Model of Consequences of Language Conflict in Bilingual Students



According to the teachers' opinions, the most major problem arising from language conflict among bilingual students was the inability to acquire basic skills of Turkish (*n*=77). Due to language conflict, students cannot acquire language skills such as reading, writing, speaking, and listening. Undoubtedly, the lack of vocabulary in the second language at the desired level (*n*=24) is also seen as one of the critical problems. In such cases, students cannot acquire and acquire the second language sufficiently. This situation leads to the formation of level groups (*n*=14). Ultimately, academic failure (*n*=32) becomes inevitable. Participant views on these situations are as follows:

> The student does not know where to talk or speak (D36).
>
> He starts 3-0 (three zeros) before starting his education. First, they try to adapt the grammatical structure of Kurdish to Turkish in terms of language. This situation causes Kurdish words to be confused with Turkish all the time. Secondly, speaking in a different language at home and speaking in another language at school causes them to have difficulties finding words to express themselves (T62).
>
> They have some difficulties in reading, understanding and writing. For example, while trying to read and understand a text or listen to a text, they think of the words in Kurdish and translate them into Turkish in their minds. This situation causes children to understand what they read longer than what they listen to. Furthermore, unfortunately, their academic success is declining (T80).

Inadequate command of the second language can make students more anxious (*n*=2) and have a negative attitude towards language (*n*=12). In addition, students sometimes feel like they are in a foreign (*n*=11) environment. As a result, the loss of self-confidence in bilingual students (*n*=19) becomes inevitable, and they start to have a negative attitude towards school (*n*=21).

> First of all, when they think they are not understood, they take a negative attitude towards the school and start isolating themselves. In addition, even if they understand Turkish, they can close themselves to speaking because of the concern that I will be condemned when speaking Turkish is not appropriately enough (T101).
>
> I think there is prejudice against language (T111).
>
> Since character development occurs at this age, they grow up as individuals who lack self-confidence in the future. For this, we, classroom teachers, should make a tremendous effort (T2).

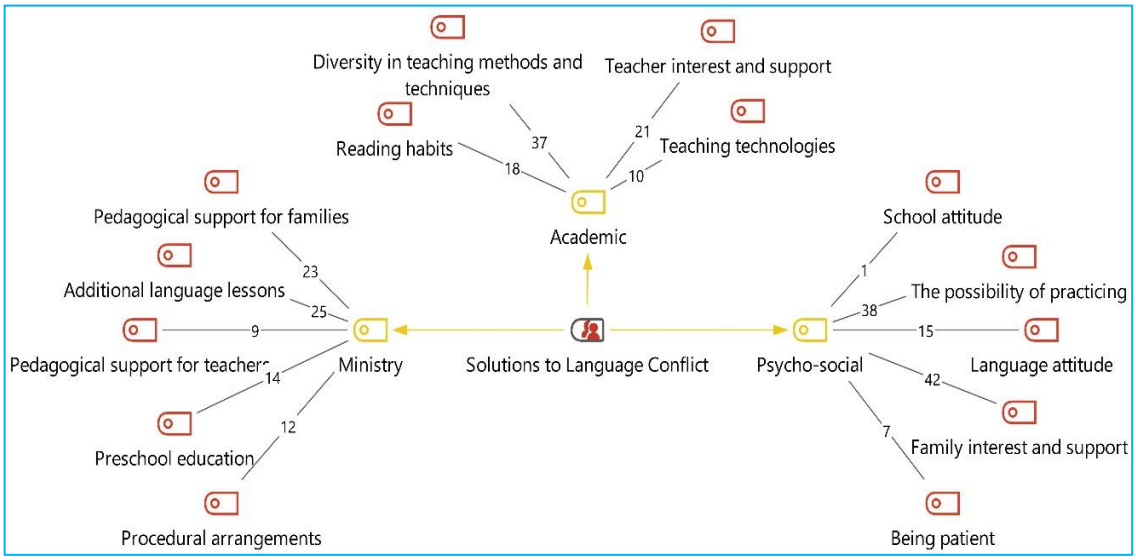
It should be noted that there are a limited number of teachers' opinions stating that there is no conflict among bilingual students (*n*=5) and that students do not have difficulty in this sense.

Solution Suggestions for Resolving Language Conflict in Bilingual Students

The teachers' opinions were gathered under "consequences of language conflict in bilingual students" (Figure 7).

Figure 7

MAX Maps Code Theory Model Including Solution Suggestions for Overcoming Language Conflict in Bilingual Students



Students need to be more intertwined with Turkish to have a positive attitude towards the Turkish language (*n*=15). Therefore, Turkish should not be limited to the school environment. Support from the family (*n*=42) is also essential in this sense. Bilingual students who are sufficiently exposed to Turkish also have the opportunity to practice the language sufficiently (*n*=38). However, to be rewarded for this process, both the teachers and the family must be patient (*n*=7). With this patience process, a positive attitude towards school (*n*=1) is developed in bilingual students. Participant views on these situations are as follows:

> I advise families to speak Turkish at home so that the child does not have dilemmas at home, and I give the task of rereading books; I think it makes an outstanding contribution to language development (T48)
>
> They need more exposure to learn Turkish faster and easier. Therefore, I suggest that parents accelerate learning Turkish by speaking Turkish at home (T64).
>
> It should be taught with small steps and patience. It is said that when they do it wrong, it is not a bad thing; they can learn words over time. In this way, the child will feel safe and not be biased against the second language (T85).

In order to minimize the negative consequences of language conflict among bilingual students, some solutions can be developed at the ministerial level. Some procedural arrangements (*n*=12) can be made in the context of regulations and directives. It is also essential to have additional language lessons (*n*=25) to improve Turkish language skills. It is understood from the teachers' opinions that it will be possible to overcome this process with minor damage with the pedagogical support to be provided to teachers (*n*=9) and similarly to families (*n*=23). In particular, making preschool education compulsory (*n*=14) was stated to be effective in carrying the

language development of bilingual children to a reasonable level. Participant views on these situations are as follows:

> I think teachers should get language training (T106).
>
> To be in constant communication with families and encourage Turkish to be spoken in the family. To open literacy courses for parents who do not speak Turkish. Encouraging families to speak Turkish and not be concerned about the environment they live in (Ö73).
>
> Kindergarten classes should be opened. Because unfortunately, many village schools do not have kindergartens. Furthermore, when a student who does not know Turkish starts directly from the first grade, both the student and the teacher have a lot of difficulties (T97).

Teachers' interest and support (*n*=21) can profoundly contribute to the students in this context. Providing diversity in teaching methods and techniques (*n*=37) by making use of instructional technologies (*n*=10) can be expressed as essential issues that should be taken into consideration by the teacher. In addition, it is imperative to develop reading habits (*n*=18) in students. Participant views on these situations are as follows:

> We try to complete the language acquisition process by constantly repeating everything they learn and explaining the meaning of everything they learn by enriching them with videos, movies, and games (T74).
>
> I am reading books, using visual pictures, watching educational videos, using the question-answer technique, connecting to a daily routine, expressing words with body language… (T83).

It is understood that teachers offer essential solutions to eliminate the language conflict experienced by bilingual students. However, how much the proposed solutions contribute to the problems should be questioned. Therefore, there is a need to discuss the solutions in the context of the literature.

Discussion

It is known that there are many bilingual students in rural areas in the east and southeast of Turkey (Koşan, 2015). Therefore, it can be said that bilingual students are introduced to systematic second language (Turkish) teaching and their school life (Özdemir, 2016; Tulu, 2009). However, while some of these bilingual students start school with a particular and satisfactory level of Turkish proficiency, many of them may fall far below the desired level of proficiency in this regard (Susar Kırmızı et al., 2016). Therefore, it is crucial to discuss language conflict (Turkish-Kurdish) comprehensively and other problems (Asrağ, 2009; Öztepe, 2019; Tulu, 2009; Yılmaz & Şekerci, 2016) among bilingual students in rural areas who are below a certain level of proficiency in Turkish. Therefore, the first of the discussion topics of the research is language conflict experienced by bilingual students, the causes and consequences of language conflict. In the same way, the proposed solutions to minimize language conflict were also discussed.

In the context of the first problem of the research, the first discussion topic is the dimensions of language conflict. The majority of the teachers participating in the study stated that bilingual students experience language conflict. This result; shows significant consistency with various research results (Guiberson, 2013; Saunders, 1988; Van Heuven et al., 2008). According to the EGR (2020), newborns in East and Southeast Turkey generally speak Kurdish with their families. This problem, which causes students to have insufficient Turkish skills, causes them to experience a language barrier at school. Fathima Seefa (2017) emphasizes that the mother tongue should avoid these

problems. Otherwise, there will be some conflicts. In the study conducted by Nicoladis et al. (2016), it is stated that there is no conflict in second language acquisition. Similarly, Cohen (2014) states that the probability of language conflict is very low in individuals who know and speak both languages at a certain level.

There are also various factors under the theme of language conflict. Among these factors; It is essential that the language used in the family is predominantly Kurdish and that the Turkish language learned at school is not sufficiently reinforced. These situations increase language conflict. Therefore, it becomes inevitable for students to use words from the first language (Kurdish) from time to time in the process of teaching Turkish. These results are consistent with various research results (Emeç, 2011; Öztepe, 2019; Tulu, 2009; Turan, 2019; Yılmaz & Şekerci, 2016). It is understood from Hardiyanti's (2017) research results that almost similar problems are experienced in some areas of Indonesia. Fathima Seefa (2017) also states that situations such as not having the opportunity to practice the language learned at school and not being exposed to the language sufficiently outside the school hurt language acquisition. Lack of family support: Hamidi (2015) also emphasized an obstacle in reducing language conflict and problems. Family support and cooperation (Özdemir, 2016; Songbatumis, 2017) are also crucial in overcoming the problems caused by language conflict. Peer support is another factor that draws attention under the theme of language conflict (Asrağ, 2009; Öztepe, 2019). Yılmaz and Şekerci (2016) also draws attention to the importance of this factor.

Another factor that draws attention under the theme of the dimensions of language conflict is related to teachers. It can be said that teachers need pedagogical support to overcome language conflicts (Asrağ, 2009; Kozikoğlu & Senemoğlu, 2018; Öztepe, 2019; Turan, 2019). Koşan (2015) also states that, according to his research, teachers need serious support in communicating with students who do not have a good command of Turkish (Özdemir, 2016). Kaya and Aydın (2013) also draw attention to this issue and state that teachers have problems in communication and need support, especially when they do not know the regional language (Yılmaz & Şekerci, 2016). Under the theme of the dimensions of language conflict, a separate parenthesis should be opened on instructional technologies. Accordingly, it is understood that the use of various instructional technologies and mass media effectively changes the course of language conflict. These findings are consistent with various research results (Asrağ, 2009; Ceyhan & Koçbaş, 2011; Hamidi, 2015; Koşan, 2015; Öztepe, 2019; Yılmaz & Şekerci, 2016). One of the most striking factors under the language conflict theme is preschool education. Conflict is almost non-existent in bilingual students with preschool education. These findings coincide with the results of various studies in the literature (Asrağ, 2009; Emeç, 2011; Hamidi, 2015; Öztepe, 2019; Tulu, 2009; Yılmaz & Şekerci, 2016).

In the context of the first problem of the research, the second topic of discussion is about psychological distance. As a result of the research, language conflict creates a psychological distance in bilingual students. Psychological distance manifested itself with the following symptoms: Self-confidence (Songbatumis, 2017), self-esteem, lack of self-efficacy and motivation, introversion and anxiety. Although it is rare, it is understood from the participant opinions that there is a tendency to aggression in students who acquire a second language. The symptoms and results of this study on the

psychological distance seen in bilingual students are consistent with the results of different studies (Coşkun et al., 2010; Ergün, 2017; Fırat, 2015; Turan, 2019; Uğur, 2017). Shin and Kim (2017) also states that language learning increases psychological distance. The more psychological distance is reduced, the more emotional and introversion can be reduced. Yılmaz and Şekerci (2016), on the other hand, state that students become introverted because they cannot express themselves in a second language.

In the context of the first problem of the research, the third topic of discussion is about social distance. Due to language conflict, bilingual students who acquire Turkish as a second language also experience social distances. Social distance in bilingual students; lack of belonging, lack of communication (Hamidi, 2015; Öztepe, 2019), exclusion in the classroom (Uğur, 2017; Yılmaz & Şekerci, 2016), not participating in the lesson, adaptation to school/class (Coşkun et al., 2010), showing closeness to the same language groups (Susar Kırmızı et al., 2016), academic failure. The listed symptoms cause students to isolate themselves and distance themselves from the classroom, teachers and the environment. These results regarding the social distance seen due to language conflict in bilingual students who acquire Turkish as a second language are consistent with various research results (Coşkun et al., 2010; Emeç, 2011; Ergün, 2017; İnal, 2019; Susar Kırmızı et al., 2016; Turan, 2019; Yılmaz & Şekerci, 2016). In particular, it can be said that the results of the research conducted by Sincar (2015) correspond to the results of this research to a great extent. Asrağ (2009) states that if the Turkish language skills are acquired sufficiently, the adaptation to school will be exceeded in bilingual students. Thus, it can be said that the distances will be exceeded.

The situation discussed in the context of the second problem of the research is related to the consequences of language conflict in bilingual students. Language conflict experienced by bilingual students causes some negative consequences. These negativities are discussed separately in psycho-social and academic contexts. In the psycho-social context of students who acquire a second language; There are problems such as low school attitude, negative attitude towards Turkish language, feeling of foreignness (Fırat, 2015; Sincar, 2015), self-confidence problem (Turan, 2019) and anxiety (Sunitha & Jayanthy, 2019). These results show some consistency with the results of various studies (Coşkun et al., 2010; Kumar & Naik, 2016; Songbatumis, 2017; Susar Kırmızı et al., 2016; Uğur, 2017; Yılmaz & Şekerci, 2016). According to Ceyhan and Koçbaş (2011), students experience problems in the context of belonging (Aygül & Korkmaz, 2018) in school environments where their language is not used. Milon (2016) also points out that students who acquire a second language in the countryside have a negative attitude towards language and do not take the language seriously. This situation creates fear and anxiety (Fathima Seefa, 2017; Sunitha & Jayanthy, 2019). On the other hand, according to the results of Ergün's (2017) research, it has been revealed that students who acquire a second language have a positive attitude towards language (Turkish).

Another result of language conflict can be discussed as academic results. In this context; inability to acquire basic language skills (not being able to understand what they read, not being able to read fluently, speaking and listening problems), lack of vocabulary (Songbatumis, 2017), academic failures (Ceyhan & Koçbaş, 2011; Coşkun

et al., 2010) problems arise. These results show some consistency with various research results (Emeç, 2011; Fathima Seefa, 2017; İnal, 2019; Khong & Saito, 2014; Milon, 2016; Sincar, 2015; Uğur, 2017). Sunitha and Jayanthy (2019) also states that students who acquire a second language in the countryside experience problems in learning the basic skills of the language, and this is due to the inability to acquire the language sufficiently, language confusion and conflict. Aygül and Korkmaz (2018) states that these problems related to language conflict cause academic failure. On the other hand, according to Susar Kırmızı et al., 2016, bilingual students fall behind at various stages of their education life. Failure to take the necessary measures for this situation may further reduce the level of success in students. She stated that bilingual students who have problems with reading comprehension and written expression are sometimes referred to the school guidance service and even to the Counseling Research Center because of this situation. For this reason, he states that students are left in the classroom, left to their own devices in the back of the classroom, and experience psychological wear and tear.

The conclusion discussed in the context of the third problem of the research is related to suggestions for reducing the effects of language conflict in bilingual students. In this part of the research, teachers have suggestions to minimize the language conflict experienced in second language learners. The solution proposals that emerged in this research can be evaluated under three headings: solutions presented in academic, ministry and psycho-social contexts. Academic solution suggestions offered by the teachers participating in the research; developing reading habits (Turan, 2019), providing diversity in teaching methods and techniques in the classroom (Songbatumis, 2017), using instructional technologies (Emeç, 2011; Fathima Seefa, 2017; Öztepe, 2019) and teachers' interests/support. These solution proposals overlap with various research results in the literature (Asrağ, 2009; Elibariki, 2017; Kumar & Naik, 2016; Songbatumis, 2017). Endriyati et al. (2019) is also seen in the research results. Sunitha and Jayanthy (2019) also states that it is necessary to create a rich language-learning environment and provide diversity in teaching methods, techniques, and materials.

Solution proposals at the ministerial level are; providing pedagogical support to families and teachers (Ergün, 2017), introducing extra Turkish language lessons in schools (Turan, 2019), making preschool education compulsory (Koşan, 2015), and legal/procedural regulations in various fields (Elibariki, 2017) is expressed as allowing teachers to act flexibly. These solution proposals are consistent with various research results in the literature (Asrağ, 2009; Milon, 2016; Öztepe, 2019; Susar Kırmızı et al., 2016). Similarly, Emeç (2011) states that preschool education is of great importance in regions where Turkish is spoken less. Therefore, it has been stated that making preschool education a necessity effectively minimizes many problems. According to Hamidi (2015), the Turkish curriculum and system should be reviewed and addressed, new curriculums should be created for regions where bilingual students are the majority, and the content of the courses given to teacher candidates at the university should be prepared for students whose mother tongue is different. The students' cultures (Sincar, 2015) lists suggestions such as. Similarly, it was emphasized that teachers should be given seminars (Elibariki, 2017; Öztepe, 2019) during the in-service training process. Hamidi (2015) also states that Turkish teaching laboratories can be opened. Anyiendah (2017) also states that language course hours are essential in second language

acquisition and emphasizes that, in a sense, these hours should be increased. In this way, it may become possible to compensate for the lack of exposure to the language outside of school. On the other hand, according to Endriyati et al. (2019), they emphasize that teachers working in rural areas are more deficient in the pedagogical sense and should be supported more (Khong & Saito, 2014).

The solution suggestions presented by the teachers participating in the research in the psycho-social context; is expressed as developing positive attitudes in students towards school and Turkish language, providing opportunities to use the Turkish language more, getting the support of families (Emeç, 2011; Öztepe, 2019; Turan, 2019) and being patient in this process. These solution proposals are consistent with various research results in the literature (Asrağ, 2009; Songbatumis, 2017). According to the results of his research, Milon (2016) states that it is essential for students to develop positive attitudes towards language and increase their participation. Likewise, the possibilities for students to use the second language should be further expanded. Similarly, Sunitha and Jayanthy (2019) state that second language learners should use the language more by ensuring that they are sufficiently exposed to the language. On the other hand, Fathima Seefa (2017) emphasizes that it is essential to create a classroom environment where students will feel comfortable to develop a positive attitude towards the second language.

The fourth and last problem of the research is related to the language and culture shock experienced by the teachers. The second discussion topic of the research is teachers. When the opinions of the teachers participating in the research are examined, it is seen that the majority of the teachers experience language shock. These results show a certain level of consistency with various research results in the literature (Aygül & Korkmaz, 2018; Coşkun et al., 2010; Emeç, 2011; Susar Kırmızı et al., 2016; Turan, 2019). Similarly, Dhillon and Wanjirude (2013) emphasizes that teachers also experience confusion and shock due to language confusion and conflict experienced by students in classes where different languages are spoken (Khong & Saito, 2014). Yılmaz and Şekerci (2016) also state that bilingual students' use of Kurdish words from time to time in the classroom forces teachers (Sunitha & Jayanthy, 2019).

Another issue discussed in the context of the fourth problem of the research is about culture shock in teachers. According to another result of the research, it is understood that most teachers experience culture shock against the traditions, food culture, dominant language, and life of the region. These results are consistent with various research results (Aygül & Korkmaz, 2018; Emeç, 2011; Hamidi, 2015; Khong & Saito, 2014; Kotluk & Kocakaya, 2018). Likewise, Emeç (2011) states that the unorthodox economic, social and cultural environment creates problems for teachers. Cultural difficulties; It is emphasized that there are obstacles in ensuring students' success and contributing to families (Khong & Saito, 2014). It can be said that teachers isolate themselves from the environment in this sense from time to time. İnal (2019) also talks about the difficulty of cultural conflicts experienced by teachers from the west and cannot be easily overcome. Stevick (1982), on the other hand, states that teachers' perceptions of the cultures of second language learners have a positive/negative determinant role on language learning processes.

Suggestions

In order to improve or reinforce Turkish language skills, additional Turkish language teaching courses can be included in the programs on certain days/times of the week at the primary school level. In addition, language lessons can be added to the IYEP (training program in primary schools) program. Therefore, all of these primary school students can participate in IYEP. Preschool education can be made compulsory to minimize the effects of language conflict. In addition, the content of preschool education programs can be enriched, especially for bilingual students in rural areas. Parents should be provided with teaching materials support for the use of the Turkish language in the lives of bilingual students outside of school. Tablet application to be distributed to students in rural areas can be an important initiative in this sense. In addition, language development can be supported with the programs/applications on these tablets. Teachers assigned to rural areas in the east from the western regions of Turkey should be given seminars not to experience language and culture shock. In universities, solutions should be offered by giving training to teacher candidates on issues such as language conflict, language and culture shock. Researchers can extensively investigate the academic consequences of language conflict in students. In addition, the relationship between the language and culture shock experienced by teachers and teachers' performance can also be examined.

Limitations

The research is limited to the data collected online from primary school teachers and preschool teachers. In addition, the research is limited to qualitative data.

Conflicts of Interest

I declare that I have no financial, commercial, legal or professional relationship or conflict of interest that may affect the research.

Author Bio

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References

Antoniou, M. (2019). The advantages of bilingualism debate. *Annual Review of Linguistics, 5*(1), 1-21. https://doi.org/10.1146/annurev-linguistics-011718-011820

Anyiendah, M. S. (2017). Challenges faced by teachers when teaching English in public primary schools in Kenya. *Front. Educ., 2*(13). https://doi.org/10.3389/feduc.2017.00013

Asrağ, A. C. (2009). *İlköğretim birinci kademe öğrencilerinin anadil öğrenim problemleri ve sınıf iklimine etkisi: Türkçe konuşma problemleri Şanlıurfa ili örneği* [Unpublished master's thesis]. Selçuk Üniversitesi.

Aygül, H. H., & Korkmaz, U. (2018). Öğretmen-öğrenci etkileşiminde kültürel farklılıkların başarıdaki eşitsizlikleri üretmedeki etkisi (Hakkari/Yüksekova örneği). *Tarih Okulu Dergisi (TOD), 11*(XXXV), 795-828. https://doi.org/10.14225/Joh1345

Banaszkiewicz, M., & Buczkowska, K. (2015). Cultural conflict, tourism. In J. Jafari, & H. Xiao, *Encyclopedia of Tourism* (pp. 1-2). Springer International Publishing.

Benyelles, L. C. (2011). *Language contact and language conflict.* University of Abou Bekr Belkaid.

Büyüköztürk, Ş., Çakmak, E., Akgün, Ö., Karadeniz, Ş., & Demirel, F. (2016). *Bilimsel araştırma yöntemleri.* Pegem Akademi.

Ceyhan, M. A., & Koçbaş, D. (2011). *Göç ve çok dillilik bağlamında okullarda okuryazarlık edinimi.* İstanbul Bilgi Üniversitesi Göç Çalışmaları Uygulama ve Araştırma Merkezi.

Chaudhary, N. S., & Yadav, R. (2018). Cross-cultural conflicts: Concept, causes and elucidations. In N. Sharma, V. K. Singh, & S. Pathak, *Management techniques for a diverse and cross-cultural workforce* (s. 79-96). Pennsylvania.

Citrin, J., Reingold, B., Walters, E., & Green, D. P. (1990). The "official English" movement and the symbolic politics of language in the United States. *West. Polit. Q, 43*, 535-559. https://doi.org/10.1111/pops.12047

Cohen, C. (2014). *Input factors, language experiences and metalinguistic awareness in bilingual children.* Salford, UK.

Coşkun, V., Derince, M. Ş., & Uçarlar, N. (2010). *Dil yarası: Türkiye'de eğitimde anadilinin kullanılmaması sorunu ve Kürt öğrencilerin deneyimleri.* Diyarbakır.

Danbolt, L. D. (2011). The challenge of bilingualism in a multilingual society: The Bolivian Case. *Journal of Intercultural Communication, 27*, 1-32.

Derince, M. Ş., & Eyüboğlu, B. (2012). *Anadili temelli çokdilli ve çokdiyalektli dinamik eğitim: Kürt öğrencilerin eğitiminde kullanılabilecek modeller*. DİSA Yayınları.

Dhillon, J. K., & Wanjirude, J. (2013). Challenges and strategies for teachers and learners of English as a second language: The case of an urban primary school in Kenya. *International Journal of English Linguistics, 3*(2), 14-24. https://doi.org/10.5539/ijel.v3n2p14

EGR (Eğitime Erişim Raporu). (2020). *Risk altındaki çocukların eğitim hakkına erişiminin izlenmesi*. 15 April 2021 retrieved from https://www.stgm.org.tr/sites/default/files/2020-11/egitime-erisim-raporu.pdf

Elibariki, M. (2017). *Challenges facing primary school pupil in learning English as a foreign language: A case of primary schools in Itigi district council.* Dar es Salaam, Tanzanya.

Emeç, H. (2011). *Türkçenin yeterince etkin ve güzel konuşulmadığı yerlerde ilkokuma yazma öğretiminde öğretmenlerin karşılaştıkları sorunlar (Erzurum ili örneği)* [Unpublished master's thesis]. Atatürk Üniversitesi.

Endriyati, Prabowo, Abasa, & Akmal. (2019). Challenges in teaching English at rural and urban schools and their solutions. *İnternational Journal of Scientific & Technology Research Volume, 8*(10), 3706-3710.

Ergün, Ö. R. (2017). *Sınıf öğretmenlerinin ana dili farklı öğrenciler ile yaşadıkları* sorunlar [Unpublished master's thesis]. Mehmet Akif Ersoy Üniversitesi.

Erol, M., & Özdemir, F. (2020). Öğretmen adayları için Doğu ve Güneydoğu Anadolu'ya atanma kaygısı ölçeğinin geliştirilmesi. *Ulak Bilge Sosyal Bilimler Dergisi, 50*, 742-753. https://doi.org/10.7816/ulakbilge-08-50-02

Fan, S. (2010). Language shock: A Challenge to language learning. *The International Journal - Language Society and Culture, 31*, 42-51.

Fathima Seefa, K. R. (2017). A learners' perspective of the challenges face in learning English as a second language. *Proceedings of 7th International Symposium.* Oluvil.

Fırat, D. (2015). *Ulus devlet, dil ve kimlik politikaları bağlamında anadili Kürtçe ve Arapça olan öğretmen ve akademisyenlerin anadilinde eğitime ilişkin görüşleri* [Unpublished master's thesis]. Ankara Üniversitesi.

Genesee, F. (2008). Bilingual first language acquisition: Evidence from Montreal. *Diversité urbaine,*, 9-26. https://doi.org/10.7202/019559ar

Grosjean, F. (2010). *Bilingual: Life and reality.* Harvard University Press. https://doi.org/10.4159/9780674056459

Guiberson, M. (2013). Bilingual myth-busters series: Language confusion in bilingual children. *American Speech-Language-Hearing Association (ASHA), 20*(1), 1-34. https://doi.org/10.1044/cds20.1.5

Hamidi, N. B. (2015). *Sınıf öğretmenlerinin ana dili farklı olan öğrencilere Türkçe öğretimi ile ilgili görüşlerinin incelenmesi (Diyarbakır ili örneği)* [Unpublished master's thesis]. Zirve Üniversitesi.

Hardiyanti, R. (2017). Analysis of the difficulties faced by a bilingual child in reading and writing. *Advances in Language and Literary Studies, 8*(4), 43-49. http://dx.doi.org/10.7575/aiac.alls.v.8n.4p.43

İnal, K. (2019). Türkiye'de Kürtçe konuşan insan olmak-bir 'yaşam alanı' olarak Türkçe. *Eğitim Bilim Toplum Dergisi, 17*(67), 89-121.

Kaya, I., & Aydın, H. (2013). *Türkiye'de ana dilde eğitim sorunu: Zorluklar, deneyimler ve iki dilli eğitim modeli önerileri.* Ukam.

Khong, T. H., & Saito, E. (2014). Challenges confronting teachers of English language learners. *Educational Review, 66*(2), 210-225. https://doi.org/10.1080/00131911.2013.769425

Kızıltaş, Y., & Kozikoğlu, İ. (2020). İki dilli öğrencilerin okuduğunu anlamada yaşadıkları sorunlar ve çözüm önerileri: Bir durum çalışması. *Ana Dili Eğitimi Dergisi, 8*(4), 1568-1584. https://doi.org/10.16916/aded.753248

Koşan, Y. (2015). *Okul öncesi eğitimin iki dilli çocukların okula hazır bulunuşluklarına etkisinin incelenmesi* [Unpublished master's thesis]. Hacettepe Üniversitesi.

Kotluk, N., & Kocakaya, S. (2018). Türkiye için alternatif bir anlayış: Kültürel değerlere duyarlı eğitim. *YYÜ Eğitim Fakültesi Dergisi, 15*(1), 749-789. http://dx.doi.org/10.23891/efdyyu.2018.86

Kozikoğlu, İ., & Senemoğlu, N. (2018). Mesleğe yeni başlayan öğretmenlerin karşılaştıkları güçlükler: Nitel bir çözümleme. *Eğitimde Nitel Araştırmalar Dergisi - ENAD, 6*(3), 341-371. https://doi.org/10.14689/issn.2148-2624.1.6c3s16m

Kumar, K., & Naik, L. (2016). How to create an online survey using google forms. *International Journal of Library and Information Studies, 6*(3), 118-126.

Luo, X. (2014). There are various difficulties for international students in adjusting to a new academic culture when studying abroad. *3rd International Conference on Science and Social Research* (s. 979-982). Tianjin.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis*. Sage Publications Inc.

Milon, R. K. (2016). Challenges of teaching English at the rural primary schools in Bangladesh: Some recommendations. *ELK Asia Pacific Journal of Social Sciences, 2*(3), 1-9.

Mohamed, K. O. S. (2018). Bilingualism as an effective factor in a successful translation. *Global Journal of Arts, Humanities and Social Sciences, 4*(2), 1-5.

Muarich, H. (1999). *The problem of second language acquisition.* Ramadi.

Nicoladis, E., Charbonnier, M., & Popescu, A. (2016). Second language/bilingualism at an early age with emphasis on Its impact on early socio-cognitive and socio-emotional development. *Encyclopedia on Early Childhood Development*, 1-4.

Özcan, E. S. (2016). Kürtler ve Türkler:Kıldan ayyakabı giyenler ve küçük gözlüler. *e-Şarkiyat İlmi Araştırmalar Dergisi, 1*(15), 476-492.

Özdemir, H. (2016). *Ortaokul beşinci sınıfta okuyan iki dilli öğrencilerin yazma becerilerinin değerlendirilmesi* [Unpublished master's thesis]. Yüzüncü Yıl Üniversitesi.

Öztepe, D. (2019). *Ana dili farklı ilkokul öğrencilerine Türkçe ilkokuma ve yazma öğretiminde karşılaşılan güçlüklere ilişkin öğretmen görüşlerinin incelenmesi* [Unpublished master's thesis]. Trabzon Üniversitesi.

Raju, V. N., & Harinarayana, N. (2016). Online survey tools: A case study of Google Forms. *Scientific, Computational & Information Research Trends in Engineering* (s. 1-12). Karnataka.

Ramírez-Esparza, N., & García-Sierra, A. (2014). The bilingual brain: Language, culture, and identity. In V. Benet-Martínez, & Y. Y. Hong, *Oxford library of psychology. The Oxford handbook of multicultural identity* (pp. 35-56). Oxford.

Rese, A. (2018). The Phenomenon of culture shock on western people in Senggigi, West Lombok. *Advances in Social Science, Education and Humanities Research, 166*, 44-49. https://doi.org/10.2991/prasasti-18.2018.8

Saunders, G. (1988). *Bilingualism children: From birth to teens.* Clevedon.

Saylag, R. (2014). Culture shock an obstacle for EFL learners. *Procedia-Social and Behavioral Sciences, 114*, 533-537. https://doi.org/10.1016/j.sbspro.2013.12.742

Schumann, J. H. (1978). Social and psychological factors in second language acquisition. In J. Richards. *Understanding second & foreign Language learning: Issues and approaches* (pp. 163-178). Rowley.

Schumann, J. H. (1986). Research acculturation model for second language acquisition. *Journal of Multilingual and multicultural development, 7*(5), 379-392. https://doi.org/10.1080/01434632.1986.9994254

Shin, H. I., & Kim, J. (2017). Foreign language effect and psychological distance. *Journal of Psycholinguistic Research, 46,* 1339-1352. https://doi.org/10.1007/s10936-017-9498-7

Sincar, F. (2015). *Anadili eğitim dilinden farklı olan öğrencilerin karşılaştıkları sorunlara ilişkin bir araştırma* [Unpublished master's thesis]. Zirve Üniversitesi.

Songbatumis, A. M. (2017). Challenges in teaching English faced by English teachers at MTsN Taliwang, Indonesia. *Journal of Foreign Language Teaching & Learning, 2*(2), 54-67.

Stevick, E. (1982). *Teaching and learning languages.* New York.

Sunitha, S., & Jayanthy, A. C. (2019). Learning difficulties of English as a second language in rural region. *The International Journal of analytical and experimental modal analysis, XI*(X), 834-839.

Susar Kırmızı, F. S., Özcan, E., & Şencan, D. (2016). Türkçenin az konuşulduğu bölgelerde ilk okuma yazma sürecinde karşılaşılan sorunlara ilişkin öğretmen görüşleri. *Uluslararası Türkçe Edebiyat Kültür Eğitim Dergisi, 5*(1), 412-445. https://doi.org/10.7884/teke.555

Trisnawati, I. K. (2017). Maintaining the identity of bilingual individuals in multicultural/multilingual settings. *Englisia, 5*(1), 8-16.

Tulu, Y. (2009). *Ana dili Türkçe olan ve ana dili Türkçe olmayan (iki dilli) 4-7 yaş çocukların dil düzeylerine etki eden faktörlerin incelenmesi* [Unpublished master's thesis]. Selçuk Üniversitesi.

Turan, A. V. (2019). *Öğretmen görüşlerine göre ana dili Türkçe olmayan ortaokul öğrencilerinin Türkçe derslerinde yaşadığı sorunlar ve çözüm önerileri* [Unpublished master's thesis]. Giresun Üniversitesi.

Uğur, N. (2017). *Ana dili eğitim dilinden farklı olan öğrenci ve velilerin yaşadıkları sorunların çözümlenmesi* [Unpublished doctoral thesis]. Ankara Üniversitesi.

Van Heuven, J. W., Schriefers, H., Dijkstra, T., & Hagoort, P. (2008). Language conflict in the bilingual brain. *Cerebral Cortex, 18*(11), 2706-2716. https://doi.org/10.1093/cercor/bhn030

Wei, L. (2000). Dimensions of bilingualism. In L. Wei, *The bilingualism reader* (pp. 3-25). New York.

Wei, L. (2008). Research perspectives on bilingualism and multilingualism. In W. L., & M. M. *The Blackwell guide to research methods in bilingualism and multilingualism* (pp. 3-17). Oxford.

Yakışır, A. N. (2009). *Bir modern olgu olarak çok kültürlülük* [Unpublished master's thesis]. Selçuk Üniversitesi.

Yıldırım, A., & Şimşek, H. (2013). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık.

Yılmaz, F., & Şekerci, H. (2016). Ana dil sorunsalı: Sınıf öğretmenlerinin deneyimlerine göre ilkokul öğrencilerinin yaşadıkları sorunlar. *Eğitimde Nitel Araştırmalar Dergisi - ENAD, 4*(1), 47-63. http://dx.doi.org/10.14689/issn.2148-2624.1.4c1s3m