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FROM THE EDITOR

Dear Distinguished Researchers and Readers,

JTES-KEG has been publishing articles in English since July 2019, and this will be our fifth issue fully in English. The change in the medium of publication as English, as we expected, has shortened the publication process up to nine months. This nine-month process is even shorter due to our OnlineFirst system in which we publish articles earlier than its normal issue.

In this issue, we decided to publish six (6) distinguished research articles. We hope that these articles published in the fourth and last issue of 2020 will contribute to the literature. Also, we will continue to show accepted manuscripts in OnlineFirst soon.

Finally, we should also express our sincere thanks to the Editorial Board, reviewers and authors for their invaluable contributions. We also look forward to receiving submissions of sufficient rigor and quality. See you at the 2021 January issue!

Fatih GÜNGÖR, PhD
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A Systematic Review of Corpus-Based Studies on Academic Writing in the Turkish Context*

Türkiye Bağlamında Akademik Yazım üzerine Derlem-Temelli Çalışmaların Sistematik Değerlendirmesi

Fatma YUVAYAPAN** **Ceyhun YÜKSELİR*****

Received: 13 December 2019 **Review Article** **Accepted:** 19 June 2020

ABSTRACT: Academic writing is rested on a view of academic negotiation between writers and readers in which writers ultimately aim to gain credibility in their academic discipline. In doing so, they utilize a wide range of linguistic devices based on cultural and disciplinary norms to communicate with readers and convince the readers about the truth of their claims. Based on a review of corpus-based studies about linguistic devices in academic writing conducted by Turkish scholars in the field of English Language Teaching and Linguistics, the present systematic review aims to show a general understanding of these devices in the lens of Turkish scholars in these fields. The systematic review has been carried out by postgraduate dissertations, MA theses and research articles in the past decade. Based on the results, it is found that Turkish academic writers had a different style of taking stance in their L1 and they mostly attempt to follow the linguistic conventions of both global and cultural communities in their discipline while writing academic genres in English.

Keywords: Systematic review, corpus-based studies, academic writing, Turkish context.

ÖZ: Bu çalışmada akademik yazım, yazarların akademik alanlarında inanılırlık kazanmayı amaçladıkları, yazarlar ve okuyucular arasındaki akademik uzlaşmaya dayanmaktadır. Bunu yaparken, okuyucularla iletişim kurmada ve okuyuculara iddialarının gerçekliklerini ikna etmede kültürel ve disiplinler arası normlara dayanan bir dizi dilbilimsel araçlardan faydalanmaktadırlar. Bu çalışmada, İngiliz Dili Eğitimi ve İngiliz Dilbilimi alanlarındaki Türk araştırmacılar tarafından yürütülen akademik yazım ile ilgili kültürlerarası derlem çalışmalarının incelemesi yapılmaktadır ve bu dilbilimsel araçların bu alanlardaki Türk akademisyenler tarafından nasıl algılandıklarının ortaya çıkarılması amaçlanmaktadır. Bunlar son on yıl içinde yapılan doktora ve yüksek lisans tezleri ve araştırma makaleleridir. Sonuçlara dayalı olarak, Türk akademik yazarların kendi anadillerinde farklı bir yazım şekli olduğu ve çoğunlukla İngilizce olarak akademik türde yazdıklarında hem küresel hem de kültürel grupların dilbilimsel kurallarını takip etme girişimleri olduğu bulunmuştur.

Anahtar kelimeler: Sistematik inceleme, derlem çalışmaları, akademik yazım, Türkiye bağlamı.

* This review study was presented as an oral presentation at 1st International Language and Literature Congress, November 6-8, 2019. This is the final version of the study.

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As our own experience as academicians amply indicate that academic writing requires a knowledge of the conventions of the disciplines for the organization of academic texts, communication with readers and mitigation of stance, which ultimately assist us to gain credibility as a member of our discipline. For Hyland (2009), academic writing (AW) is "the ways of thinking and using language which exists in the academy" (p. 1). He further explains that its significance lies in the fact that it creates academics based on particular social roles and relationships. Academic community exists with academic writing through which academicians construct knowledge either by competing or collaborating with other members of that community.

In recent decades, there has been a shift from faceless and impersonal academic discourse to a more personal discourse in which authors basically convince their readers rather than merely to present the findings of research. Lafuente-Milán (2010) explains the essence of this traditional view. Academic writing can be deemed as impersonal and objective because science is based on empirical results which are not associated with personal judgments or subjective ideas. Due to this change, academic discourse is coming to be viewed as a social discourse centred on credible and persuasive presentation of the content and claims.

Murray and Moore (2006) state that the development in our academic community as an academic writer depends on what we write. It is this realization which puts academic writing at the core of academic performance and success. It is a process of negotiating ideas in a socially-constructed academic text through expected conventions. Similarly, Burke (2010) contends that academic writing is a social process. In general, writers, researchers, academicians address to meaning together with severe arguments and finally reach a consensus with their readers. To achieve this, they use strategies objectively at the interpersonal level. Another way is to make rhetorical choices expected in a particular discipline.

Hyland (2009) explains the relationship between academic discourse and community sustained by academic persuasion. This social act is created by writers' attempts to convince their readers about the right choice of the content and their claims. To do this, they must make use of various linguistic devices that are bound to expectations and conventions of disciplinary communities. Simply put, disciplinary academic communities are responsible for yielding these conventions to their members. On one hand, the employment of these devices conveys cultural authority to guarantee the truth of knowledge. On the other hand, if we accept the fact that in the globally-oriented academic communities English is the medium, academicians not only follow the cultural conventions of their disciplines and publish in their own language but also publish in English for the participation of global academic communities of their discipline.

There are clearly differences among disciplines that are culturally and globally oriented and the key to exist in these different dimensions of disciplinary communities is to develop an understanding and awareness of linguistic devices of both dimensions and apply them appropriately in various kinds of academic genres. In the light of this information, the ultimate purpose of this review is to provide an evaluation of corpus-based academic writing studies conducted by Turkish scholars in the field of English Language Teaching and Linguistics. In doing so, we intend to present how Turkish writers of English foreground their stance by using various linguistic devices in

different academic genres compared to native speakers of English. Revealing linguistics conventions of Turkish scholars in English may provide us with appropriate cues while writing academic genres in English. To our knowledge, no previous studies have been concerned with L2 cultural conventions of Turkish communities by concentrating on all major linguistic devices. The significance of this review lies in the fact that it reflects an overview of major linguistic devices used by Turkish-speaking academic writers. It is assumed that the results will be beneficial especially for postgraduate students and novice academic writers in the disciplines related to English language.

Linguistic Devices in Academic Writing

Because academic discourse is disciplinary and culturally mediated, academic writers need to follow the conventions of their disciplines to construct their stance, organize their texts and to negotiate with their readers. In the literature of academic discourse, linguistic features have received considerable attention. In this review, we will first examine a concept, authorial stance which is maintained through the use of various linguistic devices. Authorial stance in academic texts is considered to have a central role in gaining a credible place in these communities. For Biber (2006), stance refers to the expression of "many different kinds of personal feelings and assessments, including attitudes that a speaker has about certain information, how certain they are about its veracity, how they obtained access to information, and what perspective they are taking" (p. 99). In a way, stance-taking is a means of developing an identity rested on the conventions of the disciplinary community.

Stance-taking in academic writing can be maintained through a wide range of linguistic devices. Biber, Johanston, Leech, Conrad and Finegan (1999) explain different ways of expressing stance in the Longman Grammar of Spoken and Written English. Writers signal their stance through grammatical or lexical means and among them adverbials and complement clauses with verbs and adjectives are two common grammatical devices used to express stance. They also suggest a semantic distinction of stance markers including three categories: epistemic, attitudinal, style of speaking. Epistemic stance markers convey speaker's attitudes towards the propositional content while attitudinal markers indicate personal attitudes or feelings. Style of speaking is used to convey speaker's comments on the communication itself. A high number of previous studies have been published on these stance categories (Ağçam, 2015; Arrese, 2009; Biber, 2004; Charles, 2003; Dancygier & Sweetser, 2000; Simon-Vanderbergen, 2008).

Metadiscourse (MD), which includes linguistic devices for the construction of stance in academic genres, has become an important research field since it was firstly defined by Zellig Harris in 1959. In its broad terms, it is described as "expressing the writer's acknowledgment of the reader" (Dahl, 2004, p. 1811). Adel (2006) defines it as "text about text. Metadiscourse is an element of the discourse about the evolving discourse, or the writers' explicit commentary on her own ongoing text" (p. 2). Broadly speaking, MD refers to organization of the interactions between writers and readers (Hyland, 2005). MD has been a question of interest with its disciplinary and cultural aspects (Abdi, 2009; Blagojevic, 2004; Burneikaite, 2008; Cao & Hu, 2014; Hyland, 1998; Hyland, 2004; Hyland, 2010; Özdemir & Longo, 2014).

Another linguistic device employed in academic writing is called lexical bundles (LBs). Biber et al. (1999) define them as "recurrent expressions, regardless of their idiomaticity, and regardless of their structural status" (p. 990). They can consist of two or more words recurred frequently. They are also widely used by different speakers in different situations. Hyland (2008a) states that bundles pave the way for meaning-making and creating distinctiveness in a register and participation in a community. In order to maintain a new language or a register, novices have to be aware of the expert's preferences of lexical bundles. This linguistic device has also received critical attention (Biber, Conrad & Cortes, 2004; Cortes, 2004; Lu & Deng, 2019; Karabacak & Qin, 2012; Muşlu, 2018).

Overall, stance devices, MD and LBs are among the mostly used rhetorical devices that academicians employ to maintain various functions: organization of the text, stance-taking, negotiation with readers and most prominently becoming a member of the discipline. Clearly, they are all shaped by culturally and globally-oriented conventions of academic communities. Hence, it is a prerequisite for academic writers to be aware of them and use them appropriately to meet the expectations of particular academic communities in terms of these two layers.

Method

The data used in this study were comprised of four doctoral dissertations, one MA thesis, six research articles (RAs) related to stance-taking, five RAs concerning with MD and 4 RAs examined LBs (*see Appendix A*). All these studies were associated with cross-linguistic and cross-cultural issues of academic writing carried out between 2009 and 2019. The dissertations and thesis were downloaded from the database of Higher Educational Council and the research articles were compiled from different journals based on the linguistic features to be investigated.

In this systematic review, all studies were selected from cross-cultural corpus-based studies in the field of English Language Teaching and Linguistics. The main reason for this choice is that corpus linguistics paves the way to capture language use in real contexts. Since our aim is to figure out L2 cultural conventions of Turkish-speaking academic writers in these fields, we need to concentrate on the studies that present detailed analysis of linguistic devices. As stated by Meunier (2002), corpus-based studies have led the identification of patterned norms of English language with regards to grammatical and lexical patterns. Focusing on grammatical patterns in various text types in language can make grammatical description of different types of communication in various contexts clearer.

So as to supply a comprehensive review of the studies, we followed a systematic review process. Petticrew and Roberts (2006) state that systematic reviews are a means of comprehending large bodies of information by providing a step-by-step process of synthesizing studies to reach general conclusions. It can be applied:

• when there is uncertainty,

• when it is known there is a wide range of research on a subject but where key questions remain unanswered,

• when a general picture of the evidence in a topic area is needed to direct future research efforts (p. 21).

The first step of this systematic review is to clarify the criteria for the selection of the studies to be reviewed:

• Only accessible studies that were written in English language were considered.

• Only cross-cultural corpus-based studies were selected since they will yield the real data necessary for this review.

• The most recent research about linguistic devices in academic writing was determined by putting check between the years 2009 and 2019 so that the last decade of research would appear.

• Since the use of linguistic devices varies across academic genres, we attempted to examine different types of them (doctoral dissertations, MA theses and research articles).

Secondly, we categorized the studies into three areas depending on the linguistic devices they examined: stance, metadiscourse and lexical bundles. Finally, the studies appropriate for this review were evaluated to provide a comprehensive overview of L2 cultural conventions employed in the disciplines related to English language by Turkish academic writers.

Results and Discussion

In this study, the studies taken into consideration, as stated before, are based on the linguistic devices; stance, metadiscourse and lexical bundles. The following sections show these linguistic devices respectively by giving information about the genre, corpus, aim and results of the studies. This first table of the present review is mainly concerned about stance-taking studies in English. All of them were published between 2009-2019 in Turkish context.

Table 1

Studies about Stance-Taking

Author	Genre	Corpus	Aim	Results
Ağçam, 2014	PhD thesis	136 PhD theses written by native and non-native academic writers of English	To investigate the epistemic stance devices used for stance-taking in Academic English.	The overuse of certainty devices in nonnative corpora reflect that they were confident in presenting their claims.
Çandarlı, Bayyurt and Martı (2014)	RA	Three corpora including argumentative essays (English essays by Turkish students, Turkish essays by Turkish students and LOCNESS)	To compare Stance features in L1 and L2 corpora by Turkish learners of English	Based on the findings, it seems more authorial presence markers in the Turkish essays than the English essays by either the Turkish and American students.
Çakır (2016)	RA	240 abstracts from the disciplines of six disciplines written by Turkish and native writers of English	To explore how academic writers from different disciplines put author stance in	This study reveals that native writers of English used stance adverbs highly compared to the Turkish writers of

			the abstracts of research articles	English.
Işık-Taş (2018)	RA	130 research articles in Turkish and in English in Sociology	To figure out how authorial identity is shown through first person pronouns	The findings revealed extensive similarities in the frequency and discourse functions of first person pronouns in English RAs written by native and Turkish researchers.
Kafes (2018)	RA	45 research articles published in Social Behavior and Personality between 1993 and 2007	To investigate author stance in research articles	American academic writers employed more stance devices than Spanish and Turkish academic writers of English
Karahan (2013)	RA	40 research articles written by Turkish and non-Turkish authors	To find out the distribution of "I" and "we" pronouns	Turkish writers used less "I" and "we" pronouns than non-Turkish writers.
Yuvayapan (2018b)	RA	Doctoral dissertations by American academic writers, Turkish academic writers of English who earned their PhD at Turkish universities and Turkish academic writers of English who did their PhD in the USA.	To examine the self-mentions distribution	Turkish writers used less self-mentions than American academic writers However, Turkish writers who did their doctoral studies in the USA used more self-mentions than Turkish writers who completed their doctoral studies in Turkey.

Table 1 summarizes some studies comparing stance-taking conventions of native and Turkish-speaking academic writers of English. Focusing on epistemic stance devices, Ağçam (2014) found out that epistemic stance devices were employed more frequently by native academic writers when compared to Spanish and Turkish academic writers. It is likely that non-native academic writers adopted L1 conventions in their L2 dissertations and mitigated a more confident stance while presenting their claims whereas native academic writers stamped a more cautious style. Çandarlı, Bayyurt and Martı (2014) examined the linguistic devices of stance in L1 and L2 essays written by Turkish-speaking students of English and concluded that they tended to utilize more authorial presence markers in their Turkish essays compared to their English essays written by Turkish students and those by American students, which might indicate that they tried to adopt English linguistic conventions in their L2 essays. In another study, Çakır (2016) pointed out that the abstracts of research articles by native writers of English included more stance adverbs than those by Turkish writers. This attempt showed that native writers aimed to emphasize the truth of propositional content. Kafes (2018) specifically focused on the use of modal verbs to stamp stance in research articles and found out that Spanish and Turkish academic writers of English tended to

employ less stance devices than American academic writers. He reported that Turkish and Spanish academic writers in that study developed a style of combining the global and cultural linguistic conventions of their disciplines. Yuvayapan (2018b) also investigated the distribution of self-mentions and concluded that American academic writers build a more explicit stance with the use of more self-mentions unlike Turkish academic writers. Another researcher, Işık-Taş (2017) explored how authorial stance is constructed with first-person pronouns and observed striking similarities in the use of first-person pronouns in English research articles by native and Turkish academics. Karahan (2013) also investigated "I" and "We" pronouns and reported that Turkish had a tendency of using less first-person pronouns than non-Turkish writers.

Taken together, these studies show that the linguistic mechanism used by academic writers of English to stamp their stance vary depending on the disciplines, cultures and genres. As Hyland (2004) puts, disciplinary communities have an influence on rhetorical practices of arguing the claims and engaging readers into texts. Seemingly, they indicate the rarity of stance expressions in the genres written by Turkish academic writers of English when compared to native academic writers of English. For instance, the less use of first-person pronouns in this community clearly prove that they avoid taking an explicit stance. In addition, Turkish academic writers express their stance differently in L1 and L2 academic genres. They tend to hold the conventions of native academic writers while writing in English. It seems that they feel obliged to follow the conventions of their cultural academic community as well as to adhere the global conventions of their discipline to be credible in L2 academic discipline. However, the mixture of linguistic devices of two culture may lead to problems in stance-taking and getting credibility in the global academic community.

Table 2

Studies about Metadiscourse

Author	**Genre**	**Corpus**	**Aim**	**Results**
Çapar, 2014	PhD thesis	150 research articles (50 English research articles written by American academic writers (AAWs), Turkish academic writers (TAWs) and 50 Turkish research articles written by TAWs	To examine the use of interactional metadiscourse markers (IMM) in research articles	Based on the results, AAWs used significantly more IMMs in English research articles compared to IMMs in English and Turkish research articles written by TAWs.
Yuvayapan, (2018a)	PhD thesis	120 doctoral dissertations written between 2010 and 2015	To compare the use of interactional metadiscourse markers (IMDMs) by native academic authors of English (NAAEs) and Turkish-speaking academic authors of	The results show that Turkish-speaking academic authors of English underused IMDMs regarding the overall use of 5 subcategories of IMDMs.

			English (TAAEs)	
Algı (2012)	MA thesis	104 (52 Turkish and 52 English) argumentative paragraphs	To investigate the types, frequencies and functions of hedges and boosters in L1 and L2 argumentative paragraphs	This study concludes that the number of hedges and boosters in L2 paragraphs were not much higher than that of L1
Akbaş (2012)	RA	90 abstracts of dissertations in the Social Sciences	To explore metadiscourse in the dissertation abstracts written by Native Speakers of Turkish (NST), Turkish Speakers of English (TSE) and Native Speakers of English (NSE) in the Social Sciences	The results of the study show that English-speaking writers wrote their abstracts with more interaction and guidance unlike Turkish writers.
Akbaş (2014)	RA	20 discussion sections from MA dissertations written by Turkish writers in L1 and L2	To figure out how interactional metadiscourse is used by Turkish writers in Turkish and English in this section	The results reveal that there were some similarities and statistically significant differences between the two corpora regarding interactional metadiscourse
Ekoç (2010)	RA	40 MA theses abstracts	To reveal Turkish MA students' use of lexical hedging strategies in MA theses abstracts from different fields	The study concludes that MA students use different hedging strategies
Yuvayapan (2019)	RA	60 doctoral dissertations	To examine the use of metadiscursive nouns written by American academic writers of English and Turkish-speaking academics of English	As for the results, both groups of academic writers in the study showed similarities on the total preference of metadiscoursive nouns
Özdemir and Longo (2014)	RA	52 thesis abstracts	To investigate cultural variations in the use of metadiscourse between Turkish and USA postgraduate students' abstracts in English MA thesis	The results show that there were some cultural differences in metadiscourse amounts and types

Regarding metadiscourse, one of the most frequently applied linguistic device of stance-taking, this review included eight studies. Out of eight, five are research articles, two PhD studies and just one MA study. In a corpus including research articles, Çapar (2014) examined the use of interactional metadiscourse markers (IMMs) and observed that American academic writers made use of more IMMs than Turkish academic writers in their L1 and L2 research articles. Yuvayapan (2018a) compared the use of interactional metadiscourse markers by native academic writers of English and Turkish-speaking academic writers of English. In this doctoral dissertation, the writer found out that these devices were statistically underused by Turkish academic writers. Algı (2012) investigated how hedges and boosters were employed in L1 and L2 argumentative paragraphs written by Turkish learners of English and concluded that these devices were more frequented in L2 paragraphs than that of L1 paragraphs. Akbaş (2012) conducted a study to figure out MD in dissertation abstracts written by native and Turkish speakers of English in Social Sciences and revealed that Turkish speakers of English mitigated their stance by using a mixture of global and cultural norms of their L1 and L2. In a similar vein, Akbaş (2014) also investigated the interactional metadiscourse in the discussion section of dissertations and observed that Turkish academic writers signalled a more objective stance in their L1 while they maintained a more personal stance with the use of self-mentions in English. Ekoç (2010) tried to identify hedging strategies in MA abstracts produced by Turkish academic writers and found disciplinary variations. Yuvayapan (2019) examined the use of MD nouns written by American academic writers of English and Turkish writers of English and reported similarities on the overall use of MD nouns. On the contrary, Özdemir and Longo (2014) observed cultural differences in the distribution of MD.

The cultural and disciplinary differences become more apparent with the review of studies concerned with MD. In accordance with Mur-Duenas's study (2011) conducted in Spanish context, this particular linguistic device is predominantly a convention of native academic community and virtually it is the means of engagement, construction of stance and organization of texts. The relative underuse of it by Turkish academic writers of English may underline a preference of impersonality and less interaction with readers since such investment do not carry a certain risk about the truth of the propositional content in the lens of readers. On the contrary, native academic writers of English feel comfortable in explicitly aligning themselves in their academic texts and directing their readers to ensure the accurate understanding of the content with the frequent use of MD.

Table 3

Studies about Lexical Bundles

Author	**Genre**	**Corpus**	**Aim**	**Results**
Güngör (2016)	PhD Thesis	250 research articles in the discipline of educational sciences	To explore four-word lexical bundles in L2 English and L1 Turkish	Based on the results, on account of cross-linguistic influence, there was different employment of lexical bundles in

				L2 English and L1 Turkish
Güngör and Uysal (2016)	RA	Research articles in the discipline of educational sciences	To compare the structural and functional characteristics of the lexical-bundle use in L1 and L2 research articles written in English	The results reveal that the deviation of the usages of lexical bundles by the non-native speakers of English
Güngör and Uysal (2020)	RA	A three-million word based on research article corpus, each of which contains one million words in L1 English, L2 English and L1 Turkish articles in the field of educational sciences	To find out any crosslinguistic influence of L1 Turkish and L2 English	The results show that there is the transfer of 54 bundles from L1 Turkish to their L2 English
Karabacak and Qin (2013)	RA	Argumentative papers written by three groups of university writers, Turkish, Chinese, and Americans a reference corpus, New York Times articles	To investigate the use of lexical bundles in argumentative papers by three groups of university writers: Turkish, Chinese and Americans.	The results of the study show that American students applied to five-word bundles more frequently than both Turkish and Chinese students Bundles used by Turkish and Chinese students were not employed by American students
Muşlu (2018)	RA	Louvain Corpus of Native English Essays (LOCNESS), Japanese International Corpus of Learner English (JPICLE) and Turkish International Corpus of Learner English (TICLE)	To find out the most common stance LBs used in argumentative essays written by native English speakers and Turkish and Japanese EFL learners.	Native speakers use lexical bundles least; whereas, Japanese EFL learners use them most frequently.

Table 3 shows the studies about lexical bundles. There are four studies and one of them is doctoral dissertation in the Turkish context. Güngör (2016) examined four-word LBs in L2 English and L1 Turkish in doctoral dissertation and concluded that there were different employments of LBs due to cross-linguistic difference. Güngör and Uysal

(2016) also carried out a comparative study and revealed different use of LBs by non-native speakers of English from native speakers. In argumentative essays, Karabacak and Qin (2013) investigated the use of LBs and claimed that American students applied five-word bundles more frequently than both Turkish and Chinese students. Pointing to finding out the most common LBs in argumentative essays, Muşlu (2018) calculated that LBs were more frequented in essays by Japanese EFL learners than those of Turkish and American.

LBs are another linguistic device that enhance communicative competence in academic writing. They seem to be highly influential in organizing the texts, persuading readers and mitigating stance in academic writing. The use of these formulaic patterns seems to vary enormously based on disciplines and cultures. The studies above suggest that there is a heavy reliance of LBs by Turkish academic writers while writing in English compared to native academic writers of English, which may be tied to inefficiency in English and the lack of the control of academic writing norms in L2 (Hyland, 2008b). It is also probable that they may transfer some bundles applied in their L1 Turkish to L2 context, as claimed by Güngör and Uysal (2020). Overall, this systematic review enabled us to suggest that academic writers stamp their self in their academic texts through different linguistic devices based on cultural and disciplinary norms, as emphasized by Dahl (2004).

Conclusion

In this review study, corpus-based studies on linguistic devices of academic writing conducted by Turkish scholars in the field of English Language Teaching and Linguistics in the last decade have been reviewed and implications for future research and practice have been suggested. The studies included in the study were selected in accordance with systematic review such as accessible studies, cross-cultural corpus-based studies and linguistic devices (stance, metadiscourse and lexical bundles). Taking these studies into consideration, the studies were evaluated in order to give a comprehensive view and insight of L2 cultural conventions of Turkish academic writers. Based on the studies reviewed, it can be said that academic genres are characterized by different linguistic devices depending on cultures and disciplines. The appropriate use of them is the reflection of academic writers' disciplinary competence both in their cultural and global community. A kind of impersonal and implicit academic negotiation is created by Turkish academic writers of English by the less frequent use of stance and MD features. The abundant employment of lexical bundles may indicate that Turkish academic writers may be less confident in shaping their texts, positioning themselves and their readers while writing in English, which is not parallel to the rhetorical conventions of native academic community.

After all, this review is an attempt to provide an overview of cross-cultural corpus-based studies on academic writing. In relation to this, some of the pedagogical implications can be given. First, Turkish writers of English seem to hold impersonal attitude in their L1 and L2 compared to native speakers. This situation can lead to lessen the academic quality of the studies published in English-medium global context. So, the writers have to put emphasis on undertaking an explicit stance with the use of global rhetorical conventions while writing their paper in L2. Second, the underuse of metadiscourse linguistic device create less interactive atmosphere with the readers, thus

the writers do not communicate with their readers persuasively, which increases the risk of being rejected by their readers. Regarding this, Turkish writers of English should explicitly align themselves in the studies through frequent use of metadiscourse devices. Last but not least, the awareness of common global lexical bundles in their disciplines is essential for Turkish academic writers of English. The abundant use of them may not indicate a native-like employment, as can be concluded from our review.

As stated before, the ultimate aim of academic writing courses should be to help academic students to develop academic identity with the conscious and appropriate use of linguistic devices of their disciplines both in global and cultural academic discourse. In the implementation of courses, the following points need to be taken into consideration.

• It is essential for EAP teachers to highlight dissimilar ways in different disciplinary environments (Pang, 2010). The most effective way of doing this is using corpus-informed lists and concordances as a teaching material to identify the linguistic norms of their disciplines (Hyland, 2008b).

• It is also beneficial to concentrate on genre-based and disciplinary-specific norms of academic writing to develop academic students' awareness of the cultural and universal norms of academic genres in their disciplines should be developed.

• Consciousness-raising method suggested by Hyland (2005) would create academic writers who are aware of the linguistic conventions their disciplines. This approach includes four steps: a- analysing the text to get familiar with the linguistic features; b- while manipulating texts students change sample texts; c- implementing some activities to understand the audience is also necessary to raise audience awareness; d- in the last step, students create their own academic texts.

The present study is an attempt to reveal L2 linguistic conventions of Turkish academic community through the synthesis of the current studies conducted in the last decade. Further studies should focus on the changes in the linguistic conventions in Turkish academic community from a historical perspective. To illustrate, the present study is limited to the last decade. A systematic review study emphasizing the conventions in the last five decades can shed a light on how these conventions have changed historically.

Statement of Responsibility

Fatma Yuvayapan; conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing - original draft, writing - review & editing, visualization, supervision, project administration. Ceyhun Yükselir; conceptualization, methodology, validation, writing - original draft, writing - review & editing, visualization, supervision, project administration.

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Investigating Flexibilities of the Classroom Teachers for Four Operations in the Basis of Different Strategies*

Sınıf Öğretmenlerinin Farklı Stratejiler Temelinde İşlemde Esnekliklerinin İncelenmesi

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ABSTRACT: Four operations algorithm is among the major topics occupying a significant position in primary school schedule. Moreover, utilizing alternative strategies during the education process and improving operation flexibility of students also considered important in teaching of mathematics. Flexibility in computing is the ability of solving any operation also by using various cognitive or model based calculation strategies with different methods. Giving place for these strategies in education process for improvement of skills of using different strategies and guiding students enabling them to develop their own strategies is important. In this study, in addition to the teaching the standard algorithm, covering a massive place in our courses, it is aimed to review the classroom teachers' opinions for the alternative strategies of four operation that means their flexibility in the procedural process (procedural flexibility). The procedural flexibility is discussed through strategies and standard algorithms using preliminary learning such as modeling, mental processing and place value concept. It is a qualitative study conducted in 2018-2019 academic year with 45 classroom teachers. In the study, a 2-question open-ended question form based on multiplication and consisting of two different scenarios was used as data collection tool. The most favorite strategy preferred by teachers according to the findings obtained from this form is standard algorithm followed by mental process strategy. However, teachers showed no flexibility in the process, they did not prefer other alternative strategies given about multiplication and they reported negative opinions about some of them.

Keywords: Flexibility, standard algorithm, mental processing, modeling, place value concept.

ÖZ: Dört işlem algoritması ilkokul programında önemli yer tutan konu başlıklarındandır. Ayrıca, öğretim sürecinde alternatif stratejilerin kullanımı ve öğrencide işlemde esnekliğin geliştirilmesi de matematik eğitiminde önemsenmektedir. Hesaplamada esneklik herhangi bir işlemi çeşitli zihinsel veya model temelli hesaplama stratejilerini de kullanarak, farklı yollarla çözebilme becerisidir. Farklı stratejileri kullanma becerisinin öğrencilerde gelişmesinde öğretim sürecinde bu stratejilere yer verilmesi, öğrencilerin kendi stratejilerini geliştirmesinde onlara rehberlik edilmesi önemlidir. Bu araştırmada şu an hizmet yürüten sınıf öğretmenlerinin, derslerimizde büyük yer kaplayan geleneksel algoritmanın öğretimine ek olarak, dört işlemin alternatif stratejilerine yönelik görüşlerini yani işlem sürecindeki esnekliklerini incelenmek amaçlanmıştır. İşlemde esneklik modelleme, zihinden işlem, basamak kavramı gibi ön öğrenmelerin kullanıldığı stratejiler ve geleneksel algoritma üzerinden ele alınmıştır. Araştırma 2018-2019 öğretim yılında, 45 sınıf öğretmeni ile birlikte yürütülen bir nitel araştırmadır. Araştırmada veri toplama aracı olarak, çarpma işlemini temel alan ve iki ayrı senaryodan oluşan, 2 soruluk açık uçlu bir soru formu kullanılmıştır. Bu formdan elde edilen bulgulara göre öğretmenlerin en çok tercih ettikleri strateji geleneksel algoritma, hemen ardından da zihinden işlem stratejisi olmuştur. Buna karşın öğretmenler işlemde esneklik göstermemiş, çarpma işlemi ile ilgili verilen alternatif stratejileri hem tercih etmemiş, hem de bazıları hakkında olumsuz görüş bildirmişlerdir.

Anahtar kelimeler: Esneklik, geleneksel algoritma, zihinden işlem, modelleme, basamak değeri kavramı.

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Although recently, four arithmetic operations algorithms have been implemented in our schools through a single method, nowadays the view that importance of learning and using multiple / diverse strategies gain weight. For instance, when multiplying 140 to 5, may think to carry on algorithm procedure by writing these numbers one under the other with the discourse of "5 times 1 equals 5". None the less the same procedure can be realized faster by multiplying half of 140 to 10. Or each piece, by taking 140 in two parts like 100 and 40, can be separately and mentally multiplied with 5. It is then possible to address the result of any procedure with a variety of strategies rather than a single strategy. Some studies and reports exhibit the fact that especially the existence and development of strategy diversity based on reasoning improves four operation algorithm learning (Baroody, 2003; Henry & Brown, 2008; National Council of Teachers of Mathematics [NCTM], 2000). Despite the fact that after giving the definition of any four operation, teaching directly the standard algorithm rule of this operation negatively affecting mathematical development (Baroody, 2006), it is a widely used approach.

Against this approach, two more different algorithm teaching approaches developed within the historical process (Van de Walle, Karp and Bay-Williams, 2013). In the first approach (explicit strategy instruction), students' opinions are supported and strategies are taught through meaning rather than memorized implementation. The last approach is considered as "guided invention" (Gravemeijer & van Galen, 2003). Students are more active in this approach and it is aimed to improve and utilize most appropriate strategies for their own learning by presenting them minor guidance. For instance, in 8 + 9 computation while a student develops a strategy adding one to two times eight, the other may prefer to subtract 3 from 20 because of one and two proximity of numbers 8 and 9 to 10. Another student, by taking one from 8 and adds it to 9 and may apply a strategy to realize the procedure as 7 + 10. This last strategy involves the existence of many strategies and a combination of these strategies in the teaching process. Teacher guides student in this process and assists development of the strategy diversity.

When NCTM (2000) mentions on gaining fluency in computational strategies and learning by understanding four operations during primary school, they emphasize the necessity of selecting effective / correct method by the students. While Van de Walle, et al. (2013) mention on the necessity of expanding our point of view towards calculation, focuses on three calculation types used in different methods of the four operation algorithm. Among those, a consecutive advancing development process is also defined. The first is direct modeling. At this stage, the student builds the process he/she deals with through direct manipulatives and basically attains the result with counting strategies. In development step following the modeling, student reaches to the result of the calculation by mostly using mental methods and by dividing the numbers. This approach is called student invented strategies. Last calculation type is a standard algorithm, numbers are written one under the other in this approach and place value of the number is taken into account thereby the process realized in steps.

All these strategies demonstrate that any four operations procedures can be handled flexibly. Flexibility in the procedural process (procedural flexibility) can be handled as a diversity of strategies used to solve a same kind of work (Whitacre & Rumsey, 2018). Flexibility in computing can be considered as a skill and tend to use

various mental calculation strategies, and being not flexible can be considered as being dependent on standard algorithms (Markovits & Sowder, 1994).

Capacity of having knowledge not only for a single algorithm but different strategies and to be able to use them jointly, namely procedural flexibility, cannot automatically developed by the students during school period. Whether teachers use different strategies in their lessons or not, and the content of applied programs set students' trend to develop different strategies or using these strategies (Fuson et al., 1997). When students encounter a problem status, for example when adding two digit numbers, they tend to apply the strategy that they learn for the first time and that they mostly encounter and apply. In this point, teachers should seek and utilize appropriate methods to make their student see there are also different solution strategies and to direct them towards these strategies. One of these methods can be making a discussion in the classroom what kind of strategies can be used and which other kind of strategies can also be used (Erdoğan & Erdoğan, 2015). The development and implementation of such approaches depends primarily on the teachers' approach to this task. For that reason whether teachers give place to different solution strategies when teaching four operations and their opinions for the functionality of these strategies affect their teaching process.

However studies in the literature demonstrated that teachers and preservice teachers both in Turkey and in abroad rather focused on memorizing not learning by understanding in their lessons, their lecture remained in rule transfer level, they usually utilize standard solution methods in a non-flexible way for the solution of problems and they do not have fluency and flexibility in the procedural process (Bachman & Walters, 2018; Baki, 2013; Hacıömeroğlu, 2013; İşleyen & Işık, 2003; Kılcan, 2006; Korkmaz & Gür, 2006; Thanheiser et al., 2014; Toluk - Uçar, 2011; Yenilmez & Uygan, 2015). None the less, number of studies made with classroom teachers unfortunately very limited in our country. There is no study dealing with approaches and competences of the classroom teachers in relation with the alternative strategies of the four operation processes executed in Turkey. This research contributes to the literature in this regard.

In this study, in addition to teaching the standard algorithms occupying a big space in our classes, it is also aimed to investigate classroom teachers opinions intended for alternative strategies of the four operations. In these alternative strategies, strategies utilizing pre-learning such as modeling, mental processing and place value concept will be discussed.

Method

The study is a descriptive qualitative research aiming to present the classroom teachers' approaches to alternative solution strategies used in the process through multiplication example.

Study Group

Forty five classroom teachers attended to this study from five separate public schools from two different districts in Ankara. The schools are those in which students from upper-middle and lower-middle socio-economic levels are educated. The study has been realized with the teachers who took part in an in-service training executed in coordination with Ankara Directorate of National Education (AMEM). The data were

collected by the researcher before in-service training. The teachers' participation was voluntary. An easily accessible sampling method was used in the study group of the study. The teachers' distribution by their years of service is given in Table 1.

Table 1

Distribution of the Teachers Attending to the Study According To Their Service Years

Service Years	1-10	11-20	21-30	31 and over
Number of Teachers (n = 45)	4	13	26	2
Percentage (%)	9	29	58	4

While twenty five of these teachers are graduated from faculty of education or teacher schools, twenty teachers are graduated from different departments such as chemistry department or agriculture engineering department of engineering faculty. There are thirty five female and ten male teachers in the study. The majority of the study group consists of experienced teachers. This situation is harmony with the general profiles of classroom teachers working in central districts in Ankara.

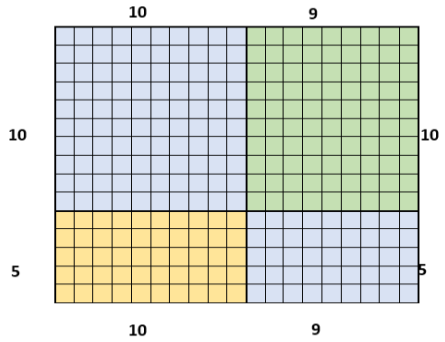
Data Collection Process and Data Analysis

Data were collected in the spring semester of the 2018-2019 academic year. An open-ended questionnaire consisting of two scenarios based on multiplication was used as data collection tool. The test developed in the "Integrating Mathematics and Pedagogy, [IMAP]" project by Ambrose, Philipp, Chauvot and Clement (2003) was used for the creation of the questionnaire. The first question in the questionnaire which was inspired by this test was also used in an other study by the Ören Vural, Aylar Çankaya (2020). The other question was presented to the expert opinion of an academician who has expertise in the field of mathematics education and the question was finalized according to his/her views. Since the ethics committee decision was not requested from the manuscripts in 2019, ethics committee decision was not taken in this study. However, ethical rules were followed at all stages of the research.

In the first question teachers were presented a scenario including four different answers of the students for "15 x 19" process was presented to the teachers (see Figure 1).

Figure 1. First Question in the Questionnaire

1. Aşağıda 4. sınıfa giden 4 öğrencinin "15 x 19" işlemi için vermiş olduğu yanıtlar bulunmaktadır.

Ali'nin Çözümü	Sinem'in Çözümü	Hakan'ın Çözümü	Elif'in Çözümü
15 x 19 135 + 15 285	15 ile 19'un çarpım sorusunu gördüğümde, aklıma 19'un 20 sayısına yakın olduğu geldi. Aralarında 1 fark var. Ben de önce 15 ile 20'yi çarptım. 300 buldum, ama sonucu bulmak için 300'den 15'i çıkardım. Böylece 285 buldum.	15 x 19 45 90 + 150 285	Kareli defterime bir kenarı 19 diğer kenarı 15 kareden oluşan bir dikdörtgen çizdim. Sonra kenarları 10'a 9 ve 10'a 5 olacak şekilde ayırdım. Dört tane dikdörtgen oluştu. Her dikdörtgenin alanını hesapladım. Sonucu 285 buldum. 

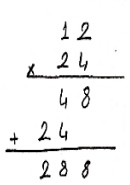
1. Below are the answers given by the four 4th grade students for multiplication "15x19". ***Sinem's solution:*** "When I saw the multiplication question of 15 and 19, I was reminded that 19 was close to the number 20. There's 1 difference between them. I multiplied 15 and 20 first. I found 300, but I subtracted 15 out of 300 to get the result. So I found 285.". ***Elif's solution:*** "I drew a rectangle of 19 squares on one side and 15 squares on one side. Then I splitted the edges into 10 to 9 and 10 to 5. Four rectangles were formed. I calculated the area of each rectangle. I found 285."

One of these answers presents solution with standard algorithm, the other is a strategy where mental calculation with easy applied multiplications are used, the other is a strategy appeared to be standard however a calculation executed as dominant with the place value concept and the last one presents an approach built over modeling. The teachers were first asked to examine the answers of the students and then to answer open-ended written questions about these answers. The open ended questions were about teachers' opinion weather they find students' answers meaningful and which of these answer / answers they prefer their students to use.

In the second question, a multiplication process performed by the teachers in a standard algorithm and the question presented by a student in the class through this process are given as a scenario (see Figure 2). The teachers were asked how they would respond to this question of students.

Figure 2. Second question in the questionnaire

2. Ahu çarpma işlemini öğrenirken öğretmenin yan tarafta yer alan tahtaya yazdığı işlemi görünce parmak kaldırır ve sorar : "Öğretmenim 2 ile 2'yi çarparken niçin bir basamak boşluk bırakarak yazıyoruz?" Siz öğretmenin yerinde olsanız Ahu'ya ne yanıt verirsiniz?



2. When learning multiplication Ahu raises her hand and asks following question when she see the calculation written by the teacher on the board: "Sir/mam why you leave a one-digit gap when multiplying 2 by 2? "How would you respond to Ahu if you were her teacher?

The data collection process was carried out in a classroom where the teachers wrote their answers individually in the questionnaire throughout approximately 40 minutes.

The data were investigated in a single question basis and assessed with content analysis. Codes on the teachers' responses were first attained for content analysis and then findings were started to be interpreted by creating themes over these codes. In addition, approximately 20% of the data (10 questionnaires) were also coded by an academician informed about the study and coding consistency was 92% according to Miles and Huberman's (1994) formula. Direct citations by using photograph were made from the teachers' scripts when reporting the findings. These citations were shared with new namings in line with their gender by keeping teachers' names confidential.

Findings

Findings were transferred by individually analyzing in question basis.

Solution Strategies for Multiplication Process

In the first question, the teachers presented four different solution strategies for multiplication process. In these strategies, Ali's response presented solution with standard algorithm, Sinem's response, a strategy with mental calculation and use of easy multiplications, Hakan's response, strategy appears to be standard but overlooking place value concept, Elif's solution presented a strategy built over an area model. Following these strategies the teachers were first asked the question "Which student / students' response did you feel more meaningful / correct?" and then "When you think about your own students, which solution method (s) do you want them to use, which one do you not want?" together with their justifications.

The teachers expressed the strategies that they found meaningful and wanted their students to use in. For instance some stated that they have found only Sinem's method meaningful and some said Sinem and Elif and some approved all the methods. The strategies they refer to and frequency of expressing these strategies are given in Table 2.

Table 2

Strategies Found to be Meaningful By Teachers

Strategies	Sinem	Ali	Ali, Sinem	Sinem, Elif	Ali, Hakan	Ali, Sinem, Hakan	All
Number of the teachers (n=45)	9	9	11	3	1	1	11

Despite the teacher mentioned about the strategies in different sorting, the strategy that they found most meaningful and included in most of their preferences was Sinem's strategy (n=35). Thereafter, they have stated that they have found Ali (n=33), Elif (n=14) and Hakan's (n=13) strategy to be meaningful, respectively. Number of the

teachers finding Elif and Hakan's answers to be meaningful is low. There were only eleven teachers specifying that they have found all responses meaningful.

In addition to finding meaningful or not, the teachers were asked which strategy and strategies they want their students to use. The teachers by giving similar responses to this question with the previous question, mentioned strategies in different groupings. Strategies mentioned by the teachers are given under Table 3.

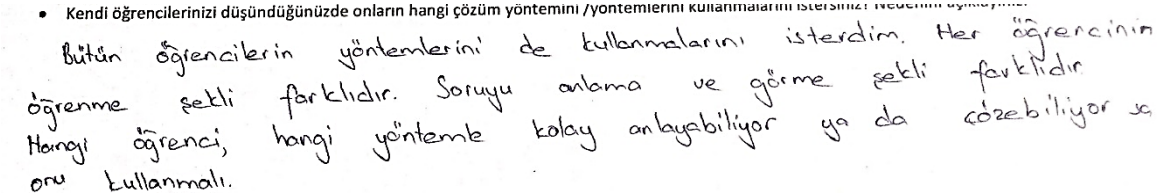
Table 3

Strategies that the Teachers Want Their Students to Use

Strategies	Sinem	Ali	Ali, Sinem	Ali, Hakan	Ali, Elif	Ali, Sinem, Hakan	Ali, Sinem, Elif	All
Number of the teachers (n=45)	5	7	11	2	1	5	2	12

The teachers' approach towards the strategies they want their students use is parallel with their opinion for these strategies. While forty teachers stated that they prefer Ali's method, thirty five teachers preferred Sinem's method, ten teachers preferred Hakan's method and fifteen preferred Elif's methods. Only twelve teachers stated that they wanted their students to use all strategies. Teacher Zehra as one of these teachers explained her justification as follows:

Figure 3. Zehra's response



I'd prefer them to use all students' methods. Each student has different forms of learning. Their method of understanding and observing the question is different. Each student should prefer his/her method where he/she understands or solves easily.

In responses given, the preference level of Hakan and Elif's strategies was found to be low. Although some teachers found Elif's strategy meaningful, they did not prefer this method due to long modeling time. Some teachers reported that they know the necessity to include other methods other than Ali's at their lessons, however since they think that student would make less mistakes by using standard algorithm they have preferred this method. The teachers' levels of finding strategies meaningful and level of preferring to use are close to each other despite minor changes. Teachers preferred to use strategies that they found meaningful, shown no procedural flexibility by not giving place to strategy diversity in their choices. Only 19 of the teachers (42%) made minimum three strategy choices (Ali-Sinem-Hakan, Ali-Sinem-Elif and all preferences).

When teachers' comments on four strategies given in the question reviewed separately, it was observed that negative views on Sinem's and Ali's strategies were either absent or in a limited level. The codes most frequently repeated by teachers regarding these four strategies are given in Table 4 with the distinction of positive and negative codes.

Table 4

Code Specified on Alternative Strategies

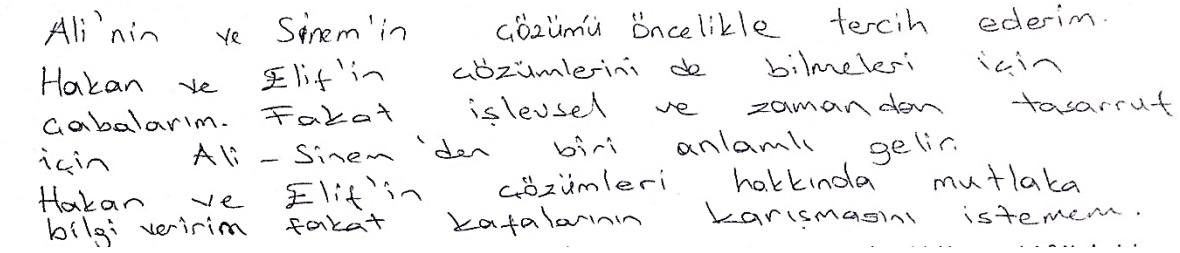
Strategies	Positive Codes	Negative Codes
Sinem	Practical Different Mental Logical	
Ali	Fast Easy Clear Short Classic Compatible with the curriculum Method thought Prevalent	Standard
Elif	Permanent Visual Meaningful Concrete Synthesis (over the concept of area) Top level	Long Post-primary school Not practical / not functional Suitable with its own idea Mixed
Hakan	Place value concept Described Ali's way Interesting	Post-primary school Not practical Suitable with its own idea Mixed

The teachers' views on standard algorithm (Ali's method). One of the methods most preferred by teachers in both sub-questions was the standard algorithm. As it can be seen from codes given in Table 4, some of the teachers emphasized the standard aspect of this method, explained that they were compatible with the curriculum and explained their preferences by citing that this was the most widely used strategy. Some teachers preferring this method stated that standard algorithm was shorter, easy and clear. While most of the teachers considered the standard aspect of this method as a positive parameter, some teacher even few stated that they have found this method to be very standard (negative code) and emphasized that it was closed to new and alternative approaches and so they made negative assessments.

The teachers' views on mental strategy (Sinem's method). One of the methods most preferred by teachers was Sinem's method reflecting a process from the mind. None of the teachers reported negative views for this strategy. Although some teachers stated that they found this method different and did not use it in their classrooms, they found that the content of the method to be reasonable. Some teachers specified that mental process was a significant skill and some found the method to be practical.

The teachers' views on place value concept (Hakan's method). One of the methods that teachers found different and interesting was this method. The teachers compared this method to standard algorithm. They've interpreted this as clarified form of Ali's method. Out of all these positive considerations, a vast amount of teachers reported negative views on this method. Some of the teachers reporting negative views failed to fully comprehend Hakan's logic that's why they have found the answer as confusing. Some of these teachers specified that Hakan created a solution in his own and the answer "was appropriate according to his view". This strategy with a correct result somehow failed to be included within these teachers' preferences. Teacher Serdar with an experience of 7 years has reported his view on this strategy as "Hakan complicated an easy procedure with his own solution". View claiming that this strategy is a bit hard for primary school also repeated by some of the teachers, these teachers also reported that this strategy could be used in post - primary school phases. Views on the fact that the strategy was hard, were generally consolidated in views intended to Elif's strategy. Teacher Ezgi with an experience of 19 years mentioned her approach to these strategies as follows.

Figure 4. Ezgi's respose



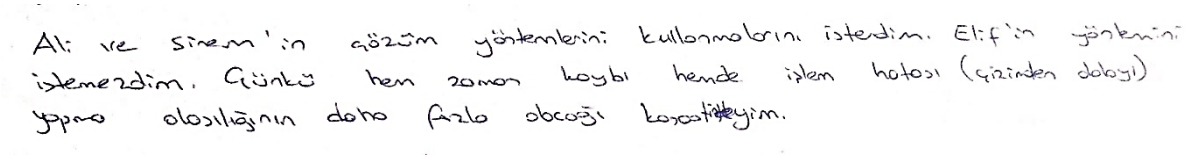
I would rather prefer Ali's and Sinem's solution. And I can spend efforts to let them know Hakan and Elif's solutions. However in terms of functions and time saving, one of the methods of Ali and Sinem's would be meaningful. I will absolutely inform about Hakan and Elif's solutions however I do not want to make their minds confused.

The teachers' views on strategy where modeling is used (Elif's method). The method that teachers least wanted their students to use was the method involving modeling. Teachers with affirmative views about this strategy mentioned that Elif knew the meaning of multiplication and she visualized this meaning with modeling and made it comprehensible. Unfortunately, numbers of these teachers were limited (n=12). 3 teachers with positive approach to this strategy, although they found strategy's level was over the primary school level, mentioned that this method thought was a smart approach since they have considered area and multiplication as a separate subject. These teachers failed to move beyond the meaning of multiplication process compromising repetitive adding and failed to consider area relevant model as the

conceptual content of the procedure. While a teacher with 15 years of experience making an assessment as "Elif has built up relation among subject and consolidated the area subject with multiplication process" by the way, a teacher with 6 years of experience claimed that "she made a synthesis by consolidating different subjects, a top level of process was realized".

Similar to the examples above, some of the teachers who purported negative opinions on modeling found Elif's method above the primary school level and they have stated that they shall not prefer this method in primary school level for that reason. Even, a teacher with 24 years of experience, by making an assessment that "Elif's solution was interesting, and had intelligence" and mentioned this strategy's level as far more advance classes. Other teachers, who reported negative opinions, evaluated this method as a long, mixed and complicated strategy and therefore having a high probability of making mistakes. The response of one of these teachers is given in Figure 5. Expressions of some teachers as "I never used Hakan and Elif's method, I need to think about them", "I took time to study Elif's method and Elif did it right", "It took me a while to figure out what Elif was doing, my students would never understand", etc., demonstrated that the teachers are not familiar with modelling intended for multiplication procedure and they could not attach meaning to the modelling processes.

Figure 5. Kaan's response



I would prefer that they use Ali's and Sinem's solution method. I don't prefer Elif's method. Because, it is both waste of time and also rises the probability of making calculation errors.

Conceptual Knowledge Dimension

The second question mainly reveals the conceptual knowledge dimension of teachers' understanding of standard algorithm teaching. In this question, teachers are expected to answer the student's question in the given scenario. The answers to this question were primarily encoded depending on the concepts that the teachers expressed most intensively. Thereafter these codes were grouped under the following themes; empty, no justification, rule transfer, conceptual content. The no justification theme consists of descriptions not containing effort of presenting justification. In the rule transfer theme there are definitions where algorithm information is only transferred in procedural level and definitions where conceptual basis is not discussed.The conceptual content theme contains explanations where information about the multiplication algorithm is presented at the conceptual and procedural level. Numeric distribution of teachers under these themes is given in Table 5.

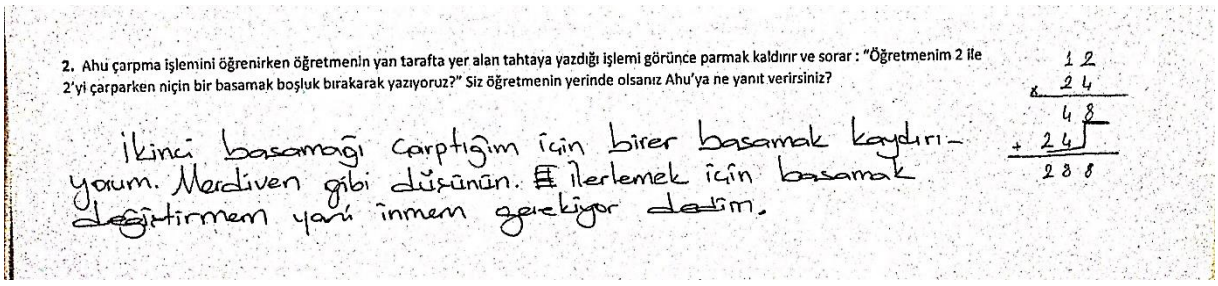
Table 5

Themes for the Second Question and Numeric Distribution of Teachers in These Themes

Themes	Empty	No justification	Rule transfer	Conceptual content
Number of Teachers (n=45)	3	4	31	7

As it can be seen from Table 5, the teachers' (31 teachers) responses to students were mostly related with the transfer of standard algorithm rule of the multiplication process. Responses of these teachers were gathered under codes "digits", and "digit dragging". The answers under this theme were explanations where superficial information was presented, even if the digit concept was mentioned not addressing the conceptual basis of the process of the algorithm. For instance, teacher Aysel with 20 years of experience explained her original stair rule developed by using "digit dragging" discourse as follows:

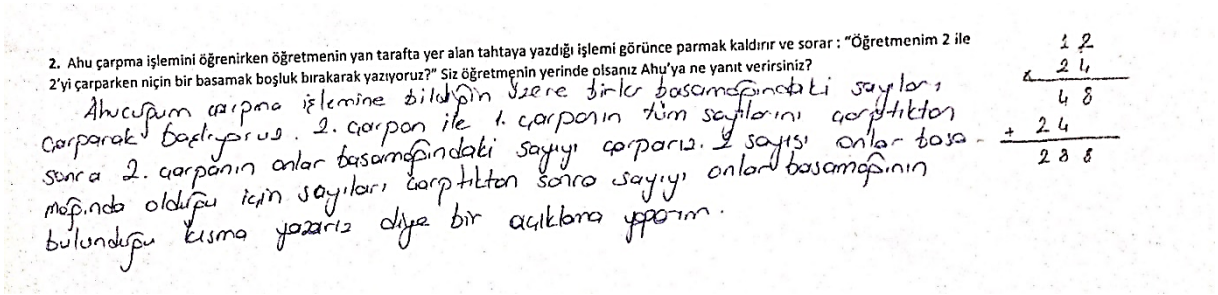
Figure 6. Aysel's response (Rule transfer theme)



Since I multiply the second digit, I drag one digit each. Think of it as a stair. I said I need to shift digits to go down to advance.

Another teacher's response under this theme is given in Figure 7. In this answer, the teacher focused only on the numbers, she didn't mentioned on the reason of the digit dragging.

Figure 7. Zeynep's response (Rule transfer theme)



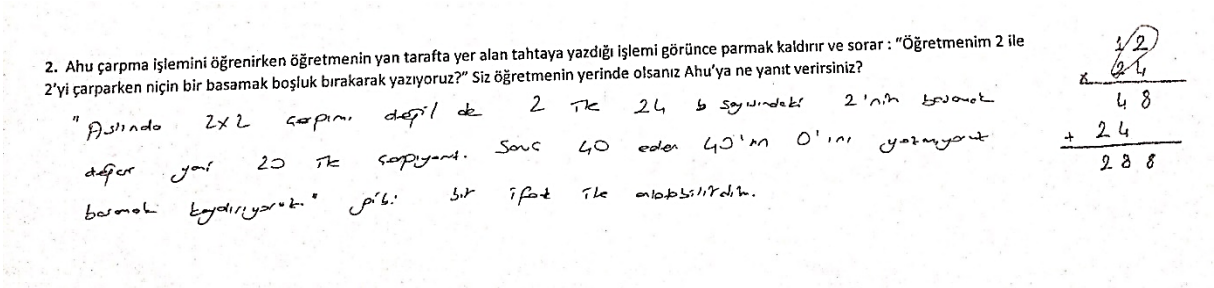
I would make a statement that "Ahu, as you know we start with the multiplication process by multiplying the numbers in units' digit. We multiply the number in tens digit of the 2nd multiplier after we multiply all numbers of 2nd multiplier and 1st multiplier. Since the number 2 is in tens digit we write the number on the part where tens digit exist after multiplying the numbers."

Teachers' statements with similar contents like "Since 2 is in the tens digit in the 24, we also start to write the result of the multiplication from the tens digit.", "Whichever digit we multiply by is written under that digit" exits under the same theme. In all these statements, an explanation was tried to be presented, but the explanation was limited with the exact transfer of the rule. All these clarifications are in procedural knowledge level.

Four teachers have come up with short responses like "if we shall not drag the result will be wrong, this is the rule", "I will explain how a multiplication should be made by one by one with rules", they gave no information on multiplication algorithm. For that reason, since these answers fail to present a justification to the student are gathered under theme "no justification". Answers of four teachers herein are encoded with codes such as "this is the rule" or "that's the truth".

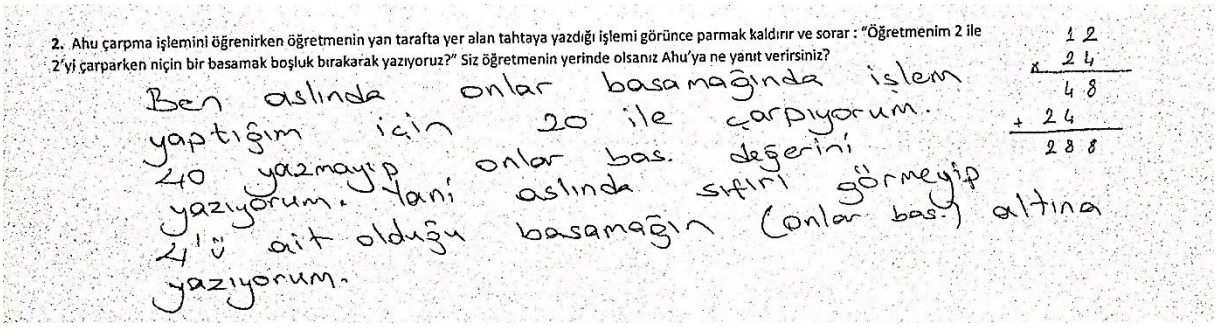
Only 7 of the forty five teachers, by mentioning digit dragging justification during multiplication specified that 2 times 2 is the multiplication of 20 times 2 in standard algorithm and they were able to give response with a conceptual content to the student's question. Answers under this theme are encoded with "place value" code. Teacher Mehmet's response under "place value" code is presented under Figure 8 and teacher Arzu's response where she has transferred standard algorithm of multiplication process grounding on place value of the numbers in the multiplication process is presented under Figure 9.

Figure 8. Mehmet's response (Conceptual content theme)



We could express with a statement that "In fact I multiply with the place value of 2 in 24 that is 20 instead of 2x2. Result is 40, we do not write "0" in 40, we drag digits."

Figure 9. Arzu's response (Conceptual content theme)



In fact, I multiply with 20 since I proceed in tens digit. I do not write 40 but write the place value of tens digit. That is, I do not see 0 but write 4 under its relevant digit (tens digit).

The teachers mostly approached the question by using the standard algorithm of multiplication on the axis of procedure / rule teaching and made statements not mentioning conceptual basis of the algorithm. Only 7 teachers made a consideration that assesses both conceptual and procedural knowledge together.

Discussion and Recommendations

In the study, the classroom teachers with different years of service were asked to develop educational explanation for the standard algorithm over the example of multiplication. Similar with other studies made with preservice teachers (Baki, 2013; Kinaach, 2002; Millsaps, Underwood-Gregg, 2018; Toluk Uçar, 2011) descriptions developed by vast amount of teachers in this study remained in procedural knowledge level (rule transfer). Only seven teachers (approximately 16% of teachers) were able to develop explanations referring to the conceptual basis of the process.

The findings obtained from the first question of the questionnaire used for the study demonstrated that the classroom teachers preferred solution primarily realized with standard algorithm and thereafter they have preferred mental process. In Hacıömeroğlu's (2013) study realized with preservice classroom teachers and executed over subtraction computation, a vast amount of preservice teachers preferred standard algorithm to other strategies. In another study that Ören Vural and Aylar Çankaya (2020) conducted with preservice classroom teachers by using the same question, in contrary with these findings, standard algorithm was the last preference strategy of the preservice teachers. In that study, the preservice teachers were skeptical about the process and the result achieved with the traditional algorithm, and they have mentioned that achieving the correct result did not show to hold conceptual knowledge of that computation. While the standard algorithm was related with "memorizing" and being "result focused" for them, for teachers in this study the standard algorithm was a(n) "classical", "easy" and "clear" strategy. In the Ören Vural and Aylar Çankaya's (2020) study, while the preservice teachers discussed learning by making a distinction between conceptual and procedural knowledge, in this study the classroom teachers have approached to learning and knowledge with more standard norms.

The standard algorithm is an algorithm that makes the process easier and faster to run, especially in multi-digit numbers. It is important not to see algorithm teaching as a transfer of procedural knowledge, and algorithm teaching be considered together with modeling and conceptual dimension. However, with thanks to this approach it shall be prevented to consider standard algorithm as memorized information and being applied accordingly. In this study, the classroom teacher's teaching method of the standard algorithm was not considered, however only their clarifications on algorithm were examined. In future studies, it will be useful to examine how the current teachers are teaching the standard algorithm in terms of gaining more detailed analysis of the current situation.

In this study, the classroom teachers did not find it necessary to use different strategies in a wide spectrum, in this respect they failed to demonstrate procedural flexibility. This finding also differentiated the finding of Ören Vural and Aylar Çankaya's (2020) study where the same question was used. In the study conducted with preservice teachers, while almost half of the participants stated that they found it important to use all the strategies, this rate was only 27 % in this study. In this study, in

parallel with the studies of Korkmaz and Gür (2006) and Hacıömeroğlu (2013), the teachers significantly preferred the standard methods. In addition to this method, the teachers preferred the strategy reflecting the mental method. The mental method and standard algorithms were two strategies that classroom teachers care about.

The findings demonstrated that the teachers abstained from alternative - flexible strategies and modelling, which were out of the standard algorithm and the mental method. The teachers were not familiar with other two strategies (modeling and place value method), they reported that they didn't use them in their lessons and also some of the teachers had difficulty to understand the strategies in the first phase. The teachers interpreted these strategies as strategies in parallel with "their own ideas". Same finding was detected in Hacıömeroğlu's (2013) study. In her study, a procedure similar to the procedure performed by Hakan based on the place value concept was used and some preservice teachers failed to completely understand this procedure and they used his / her "own method" identification. In spite of that in Hacıömeroğlu's study, in contrary with this study modeling was the second most preferred method.

There had been many studies on teachers' and preservice teachers' skills and their attitudes towards modelling. In Hacıömeroğlu (2013) and Ören Vural and Aylar Çankaya's (2020) studies while preferences of preservice teachers on strategy involving models were higher, in this study, teachers' negative opinions about modeling and model usage were higher. The origin of these negative opinions may be the difficulties that teachers have in understanding the model and modeling. At Saleh, Purwanto, Sudirman and Hidayanto's (2018) study conducted with preservice teachers, they were able to model the 23x45 on the area model, but they could not attribute meaning to the computation carried out on the model. The modeling is not only a topic forcing students, is also a topic forcing teachers and preservice teachers. Problems encountered by the teachers and preservice teachers during the modeling process are also revealed in some studies in our country. (Akgün, Ciltaş, Deniz, Çiftçi, Işık, 2013; Işık, Mercan, 2015; Özdemir, 2008; Tuna, Biber, Yurt, 2013). In this study, modeling skills of the teachers were not investigated, only the teachers' problems related to modeling were discussed through their views. The negative views of the teachers about modeling could be considered under the headings that "modeling took time", "the possibility of making mistakes" due to this and "not being suitable for primary school level". These findings of the study is consistent with the findings obtained from Akgün et al. (2013), Blum (1991), Işık and Mercan (2015) and Urhan and Dost's (2016) studies. However, modeling skills of the classroom teachers are another important topic that should be investigated. In addition to the findings of this study, modelling skills of the classroom teachers intended for four operation should be considered as a subject matter of a new study. It is important that the preservice teachers and teachers develop their knowledge and skills for modeling and pre-service and in-service regulations should be made for this. Headings like modeling, procedural flexibility, co-development of procedural and conceptual knowledge of four operations should be improved with in-service trainings to be organized for teachers.

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Supporting Learning Trajectories for the Development of Number Concept: Digital Games*

Sayı Kavramına İlişkin Öğrenme Yörüngelerinin Desteklenmesi: Dijital Oyunlar

Derya CAN**

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ABSTRACT: The aim of this study is to examine the games in ABCya (https://www.abcya.com/) based on the learning trajectories for the development of number concept. To achieve this aim in the study it was examined which ABC educational game application support the learning trajectory and the development level related to number concept of games. This research was designed in qualitative research methodology based on content analysis method. The ABCya application, which includes a dynamic structure, is suitable for manipulation and includes digital game features with mathematical content which make it appropriate to support the mathematical development of pre-school students. At the same time, the games included in this application support the active participation of children and have motivation-improving features. It is seen that the games mostly support the trajectories of the "recognition of number and subitizing" and "verbal and object counting" for the children aged between 4-6. For the trajectory of the "comparing, ordering and estimating numbers" there are games supporting the perceptual and counting comparison and ordinal numbers, but games supporting the estimation skills are limited. It is very important to introduce the digital platforms that include educational game activities to both teachers and families and to inform them about their contribution to academic development of the children. Digital games should be used as an educational tool by parents and teachers in supporting the development of children and their number sense, especially in the learning trajectory for recognition of number.

Keywords: digital games; learning trajectories; number sense.

ÖZ: Bu araştırmada ABCya (https://www.abcya.com/) uygulamasında yer alan oyunların sayı kavramının gelişimine yönelik öğrenme yörüngelerine göre incelenmesi amaçlanmıştır. Bu amaçla ABCya uygulamasında yer alan oyunlar, sayı kavramının gelişimine ilişkin hangi öğrenme yörüngelerini ve gelişim basamaklarını desteklediği konusunda incelenmiştir. Nitel araştırma yöntemine dayalı olarak gerçekleştirilen bu araştırmada içerik analizi yöntemi kullanılmıştır. ABCya uygulamasının tercih edilmesinin nedeni, bu uygulamanın küçük yaştaki çocukların matematiksel gelişimini desteklemeye yönelik içeriğe sahip ve dinamik, manipüle edilebilen yapıda oyunlar içermesidir. Aynı zamanda bu uygulamada yer alan oyunlar çocukların aktif katılımını desteklemekte ve motivasyonunu artırıcı özellikler taşımaktadır. Oyunlar daha çok 4-6 yaş grubundaki çocuklar için "sayıyı tanılama ve şipşak sayılama" ve "sözel ve nesne sayma" yörüngelerini desteklemektedir. "Karşılaştırma, sıralama ve tahmin" yörüngesi için algısal ve sayarak karşılaştırma yapma ve sıralı saymaya yönelik oyunlar bulunurken tahmin becerisini desteklemeye yönelik oyunlar daha sınırlıdır. Bu tür dijital ortamlarda yer alan eğitsel oyunların hem öğretmenlere hem de ailelere tanıtılması oldukça önemli olup çocukların akademik gelişimine katkısı hakkında gerekli bilgilendirmeler sağlanmalıdır. Özellikle sayı öğrenme yörüngesindeki gelişim basamaklarının ve sayı duyusunun desteklenmesinde dijital oyunlar aileler ve öğretmenler tarafından eğitsel bir araç olarak kullanılmalıdır.

Anahtar kelimeler: dijital oyunlar; öğrenme yörüngeleri; sayı duyusu.

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Children have strong mathematical ideas from an early age and develop and use them to make sense of their daily lives. However, children's opinions and interpretations of certain situations are different from those of adults. For this reason, teachers should interpret what they do and how they think from the point of view of children and act based on their point of view while interacting with the child (Sarama & Clements, 2009a). Researchers suggests that it is necessary to develop roadmaps for learning processes in order to support students' effective and productive learning, and that teachers should create instructional designs based on these roadmaps when planning the teaching process (Sarama & Clements, 2009b; Simon, 1995; Wilson, Mojica, & Confrey, 2013). Sarama and Clements (2009a) developed a theoretical model on these assumptions which is called learning trajectories. This model proposes that mathematical learning is consisted of three components (Sarama & Clements, 2009b): mathematical aim, developmental progression, and teaching activities. *Aims* include the great ideas about mathematics and the mathematical field that children should learn. The learning path that children follow to develop skills and understanding about a particular mathematical topic is defined as the *developmental progression*. It is important for teachers to be informed about this developmental path in that they can interpret what the child is doing and thinking and understand the child's perspective. Being informed about developmental trajectories supports teachers' understanding of student thinking, helps children evaluate their level of understanding and helps teachers to offer instructional activities appropriate to their level. *Teaching activities* include activity sets that match each level of thinking in the developmental process. These activities enable children to learn new ideas and employ the skills needed to become competent at that level.

Development of the Number Concept

Number and operation knowledge is the most important field that forms the basis of mathematics learning in early childhood (Clements & Sarama, 2007; National Council of Teachers of Mathematics [NCTM], 2000). Sarama and Clements (2009a) developed the learning trajectories for the number concept. The goal of these trajectories is to support the development of conceptual understanding about numbers in meaningful contexts. Learning trajectories are defined with some steps called developmental progression and age ranges (Table 1). However, age ranges are identified based on specific studies and may vary in accordance with the experience of students.

Table 1

Learning Trajectories and Development Processes towards the Development of the Concept of Number

Learning Trajectories			
Age	Developmental progression for recognition of number and subitizing	Developmental progression for verbal and object counting	Developmental progression for comparing, ordering, and estimating numbers
0-1	Pre-explicit number	Pre-counter Chanter	Many-to-one corresponder

1-2	Small collection namer	Reciter	One-to-one corresponder Object corresponder Perceptual comparer
3	Maker of small collection	Reciter (10) Corresponder	Firs-second ordinal counter Nonverbal comparer of similar items (one-four items)
4	Perceptual subitizer to four	Counter (small numbers) Counter (10) Producer (small numbers)	Nonverbal comparer of dissimilar items Matching comparer Counting comparer (same size) Mental number line to five
5	Perceptual subitizer to five Conceptual subitizer to five Conceptual subitizer to 10	Counter & producer (10+) Counter backward from 10	Counting comparer (five) Ordinal counter Spatial extent estimator-small Counting comparer (10)
6	Conceptual subitizer to 20	Counter form N (N+1, N-1) Skip counter by 10s to 100 Counter to 100 Counter on using patterns Skip counter Counter of imagined items Counter on keeping track Counter of quantitative units/Place value Counter to 200	Mental number line to 10 Serial orderer to 6 + Spatial Extent Estimator
7	Conceptual subitizing with place value and skip counting	Number conserver Counter forward and back	Place Value Comparer Mental Number Line to 100 Scanning with Intuitive Quantification Estimator
8	Conceptual subitizing with place value and multiplication	-	Mental number line to 1000 Benchmarks Estimator Composition Estimator

Developmental progression for recognition of number and subitizing starts with innate number sense of children and continues with their ability to designate small-size entities (groups covering 1, 2 and 3 objects). Nearly at the age of 3 children can make a group of objects (range 1-3) without using verbal counting. They can use the perceptual subitizing skills around 4-5 years of age to tell the number of quantities up to 4 and 5 (MacDonald & Wilkins, 2016). They experience a transition to the conceptual subitizing in the age of 5-6 years and can quickly group the number of quantitites (MacDonald & Shumway, 2016).

Developmental progression for verbal and object counting starts with random saying of number words and continues with repetition of the number words like singing a song. As their development progresses, children begin to gain cardinal value skills and

one-to-one correspondence (Gelman & Gallistel, 1978). They can say the numbers that come before and after a number around 4 years of age and can form groups of objects of small numbers. Around 5 years of age they can comprehend cardinality and count down. In addition, they can make counting by using number patterns. They also begin to comprehend the decimal system and place value (Sarama & Clements, 2009a).

Developmental progression for comparing, ordering and estimating numbers starts with perceptual and nonverbal comparing of similar items. At the age of 4 children can match and compare the groups of items (for instance, matching three cubes with three points and stating that they are in equal numbers), make comparisons by counting objects from 1 to 5 when objects are about the same size. However, if the physical size of an object in a group is larger, they may think that the number of that group is greater. Around the age of 5 they can compare objects without being affected by the physical size of the objects (Siegler & Booth, 2004). They can estimate the number magnitudes using the mental number lines, comprehend the concept of place value and compare numbers around 6 years old.

Theoretical Background

Although what kind of activities can be included in the series of educational activities varies in relation to the age and personal characteristics of children, physical and virtual manipulatives can be used in instructional designs planned to support learning trajectories from early childhood (Sarama & Clements, 2016).Virtual manipulative is defined as an interactive web-based representation of a dynamic object that provides an opportunity to construct mathematical information (Moyer, Bolyard, & Spikell, 2002). Virtual manipulatives play an important role in helping children understand multi-faceted ideas such as the use of algorithms from an early age and maintain their physical experience (NCTM, 2000). Virtual manipulatives which are in fact web-based and computer-assisted activities contribute to children's mathematical development from early age. For instance, Moyer-Packenham et al. (2015) analysed how different mathematical applications on tablets lead to a change in the performance and speed of children between the ages of 3-8. It is concluded that the performance of preschool children in seriation and counting activities did not show a significant change, but their speed increased over time. As a result of the research, it was found that different activities addressed to children in different age groups and that some activities had more impact on children's learning performance and speed than others.

Digital games are one of the tools that prevail over other teaching tools as they are fun and interesting for children. These games, unlike traditional methods, involve play-like activities and entertainment in the process and provide a latent learning environment by keeping the learners' motivation high (Bozkurt, 2014). Educational digital games with their strong potential in education that provide advantages for educators and students are very important in terms of children's cognitive development (Oblinger, 2004). Educational digital games are defined as games played with computer systems (video games, computer games and mobile games) that aim to support the learner's academic and psychological development (Samur, 2012). Research shows that educational digital games support children's mathematical development (Manginas & Nikolantonakis, 2018; Miller, 2018; Pope & Mangram, 2015; Rogowsky, Terwilliger, Young, & Kribbs, 2017). For example, in a study by Pope and Mangram (2015) the

focus was on whether a digital math game developed students' number sense or not. In the study conducted on a sample of the third grade students, the same teacher traditionally taught mathematics both in the experimental and control groups. In the experimental group, the students were allowed to play individual games three times a week for 10 minutes for four weeks. As a result of the activity the experimental group students playing the game called Wuzzit Trouble showed a significant increase in number sense. The study by Manginas and Nikolantonakis (2018) analysed the effects of special education program assisted by digital games on the understanding of students with mental disability in terms of basic mathematical concepts. The content of the games used included topics such as number identification, concept of place value, number comparison and mental computation. Four students aged eleven participated in the study, and two of them were placed in the experimental group and the remaining two in the control group. It was found that the students in the experimental group performed better in mathematical concepts and subjects than the students in the control group. Therefore, it can be argued that online digital games have positive effects on students with low levels of mental disability in understanding basic mathematical concepts. In the study conducted by Miller (2018), the effect of digital mathematical activities used in game-based learning environment on the number sense development of kindergarten children was examined. As a result of the research, it was observed that although there is a small positive difference in the numeracy skills of the experimental group students in terms of success, it increased the cooperation among the students. Rogowsky et al. (2017) designed a computer-assisted instruction to improve the literacy and numeracy skills of 47 children aged between 3,5 and 5,5. Virtual characters were included in this design, and the interaction of children was made possible in the design. Both experimental and computer-assisted group received 11-hour education per week, and the experimental group also received daily ten minutes individualized interactive education. The findings of the study showed that the literacy (e.g., letter-word identification, phonological awareness, etc.) and numeracy (e.g., counting, number recognition, comparisons, etc.) skills of the experimental group significantly increased.

Aim and Significance of the Study

Research shows that both virtual manipulatives and educational digital games positively support students' mathematical development (Manginas & Nikolantonakis, 2018; Miller, 2018; Moyer-Packenham et al., 2015; Pope & Mangram, 2015; Rogowsky et al., 2017). However, in this process, it is very important that teachers should identify the educational games and virtual manipulatives to be used in the teaching process based on the objectives of the teaching process. It is important for teachers to know the learning trajectories in terms of supporting the child's transition from one level to another in the mathematical developmental process. With digital games tailored to learning trajectories, teachers can have the opportunity to identify games that fit both the curriculum and the level of development of each child. Therefore, it is very important to guide teachers in showing how educational digital games support teaching programs. The aim of this study is to examine the games in ABCya (https://www.abcya.com) based on the learning trajectories for the development of number concept. To achieve this aim in the study it was examined which ABC educational game application support the learning trajectory and the developmental level related to number concept of games. It is thought that the results will guide

educators and families in using digital games to support the transition of children from their current level of development to a higher level.

Research Questions

How do pre-K and Kindergarten math games covered in ABCya support learning trajectories for the development of the number concept?

More specifically, how do these games in ABCya,

(1) Support the developmental steps concerning the learning trajectory of the "recognition of number and subitizing"?
(2) Support the developmental steps concerning the learning trajectory of the "verbal and object counting"?
(3) Support the developmental steps concerning the learning trajectory of the "comparing, ordering, & estimating numbers"?

Method

Research Design

This research was designed in qualitative research methodology based on content analysis method. Content analysis is a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data in order to describe and quantify specific phenomena (Downe-Wambolt, 1992, p. 314).

Sampling

The materials reviewed in the study are thirteen digital games in the ABCya activity which are designed to support the mathematical development of pre-school children. When selecting a computer game with mathematics content, the game should include features such as how the game develops the mathematical concept, the nature of the mathematical concept, the appropriateness of the children's characteristics in regard to the games, developing a competitive spirit among children, increasing motivation of children and ensuring the active participation of children (Jovanova-Mitkovska, 2018). In addition, an interactive, web-based visual representation of a dynamic object that presents opportunities for constructing mathematical knowledge (Moyer et al., 2002, p. 373). The ABCya application, which includes a dynamic structure, is suitable for manipulation and includes digital game features with mathematical content which make it appropriate to support the mathematical development of pre-school students (Jovanova-Mitkovska, 2018; Ortiz, 2017). In this context, it was decided to examine the 13 games in the ABC application which were found to support the development of the concept of number. The materials to be analysed in the study were formed by using the convenient sampling method, one of the purposeful sampling methods. In the purposeful sampling method, the elements are not randomly selected from the study universe, but because of their particular characteristics and/or according to the researcher's own decision/common sense (Böke, 2009, p. 125). There are 400 fun and educational games in the ABCya application that target children from preschool to 6th grade. The games are divided into subject areas and sub-subject areas based on the grade level. The games, which are determined as data sources, consist of 13 games that

cover the sub-subject areas in mathematics. While determining 13 games, the games that are stated to support the counting skills for pre-school period were selected within the framework of Common Core Standarts. The matching between achievements and games was made by ABCya application. However, since Common Core Standarts are unique to the USA, how games support the developmental stages of mathematical thinking in children was examined depending on the learning trajectories.

Data Analysis

In order to examine which digital games support which of the learning trajectories for the development in the concept of number the developmental steps developed by Sarama and Clements (2009a) were employed. These developmental steps are about three learning trajectories: recognition of number and subitizing, verbal and object counting, comparing, ordering, and estimating numbers. Before the analysis the definitions of the developmental stages under each learning trajectory were examined. In addition, through the web-based tool developed by the authors (https://www.learningtrajectories.org/) the examples of the definitions of learning trajectories that reflect children's thinking processes were reviewed through videos. The descriptions of learning trajectories and video samples were shared with an expert in preschool education. In order to ensure coder reliability, the preschool expert also analysed which digital games support which of the learning trajectories. A consensus was reached between the expert and the author about the learning trajectories that each digital game is thought to support. For example, a game called Counting Fish supports the counting skills of children, but it can also improve their subitizing skills when used appropriately. The game was defined by the author as one supporting both trajectories, and was defined by the expert as one supporting the counting trajectory. However, after discussing it they both concluded that the Counting Fish game could develop both counting and subitizing skills of children. In order to ensure the external reliability of the research the findings obtained were presented to the opinions of two experts in the field of preschool education and mathematics education, and an agreement was reached**.**

Below are the games and their brief descriptions included in the study, learning trajectories and development steps that can be developed through games:

Digital Math Games for Kindergarten *(https://www.abcya.com)*

1. Counting Fish. Recognition of number and subitizing: Perceptual subitizer to 4, perceptual subitizer to 5, conceptual subitizer to 5, conceptual subitizer to 10, conceptual subitizer to 20, conceptual subitizing with place value and skip counting

Verbal and object counting: counter (10), counter & producer (10+)

In this game, children are asked to determine the number of floating fish and mark the number representing the fish among three options. There are three steps: at the first step there are 1-5 floating fish; at the second step there are 5-9 floating fish and at the third step there are 10-20 floating fish (Figures 1a-1b-1c). When the wrong option is selected for the number of fish in the game, there is a warning about the number of fish which is more or less than the correct number of fish. This situation is supportive in terms of the comparison between the numbers of redundancy-multiplicity.

The game, which starts with a smaller number of fish first, supports the ability to

perform quick snapshots in multiples up to 4 and 5. In later stages, more fish (approximately 10-20) are displayed on the screen. The fact that children form subgroups to determine the total number of multiplicity is a feature supporting the conceptual subitizing skills. In addition, the way fish appear on the screen and their positioning can contribute to the development of conceptual subitizing skills. This game also supports the counter (10+) stage of counting development. At this stage, children can accurately count over 10 objects (usually up to 30) and have comprehended the cardinality. They can follow the counted and non-counted objects even if they are in different order. The ability of children to recognize the counted and non-counted fish while counting the fish and to say how many fish are in total (cardinality) supports the development of the counting learning trajectory.

Figure 1a

Figure 1b

Figure 1c

2. Birthday Candle Count. Verbal and object counting: corresponder, counter small numbers, counter (10)

In this game, children are asked to determine how old a child is by counting the candles (ranging from 1-10) on the cake (Figure 2a). When a candle is clicked it is lit and the ordinal numbers are verbalized (Figure 2b). Following the candles are counted, the child is asked to select the number indicating how old he or she is (Figure 2c). This game, which involves exercises on counting, also supports the principles of matching and cardinal value.

Children who are in the reciter stage can do verbal counting with at least 5 number words. When counting with objects, they can count again or skip without counting as they cannot keep the objects they have in mind. They can mix the places of numbers in the series of numbers above 5. In the next stage they can make up to 10 verbal counts, but they can also make mistakes such as skipping without counting objects or counting twice. This is a game that allows children to attribute a number word to each object. Therefore, it prepares children for the transition to the corresponder stage of the learning trajectories. Because in the Corresponder stage, children are expected to make exact matches between numbers and objects.

The game not only supports the counting by assigning a number word to the candles on the cake, but also requires that children should tell the number of candles on the cake. Because the age of the child for whom the cake was prepared is asked. This feature of the game plays an important role in helping children to move to the counter stage and to make practices. In the Counter (small numbers) stage, children correctly count at least 5 objects arranged linearly and answer the question “How many?” starting from the last number word he said. At the Counter 10 step children can count 10 objects in different sequences. Therefore, by counting the candles on the cake and telling how many candles are there (cardinality) this game supports the children's ability to count 10

objects in different sequences (counter 10).

Figure 2a

Figure 2b

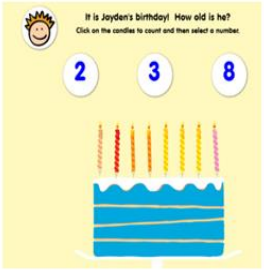

Figure 2c

3. Fuzz Bugs-Counting, Sorting, & Comparing. Recognition of number and subitizing: perceptual subitizer to 4, perceptual subitizer to 5, conceptual subitizer to 5, conceptual subitizer to 10

Verbal and object counting*:* corresponder, counter (small numbers), counter (10)

Comparing, ordering, & estimating numbers: perceptual comparer, counting compare (same size), counting comparer (5), counting comparer (10)

As the name implies in the game children are expected to classify, count and compare. They are required to classify the mixed Fuzz Bugs by color, count how many from each color (limited to numbers up to 10), and determine the minimum and maximum number of colors. At the end of the game, children are asked to create their own fuzz bugs in the colors they want. When counting the fuzz bugs accumulated in the jars, the fuzz bug touched comes out and this fuzz bug is given a number word. In this respect, the game supports the skills of one-to-one correspondence and counting (Figure 3b). In addition, the child can decide what the numbers are by subitizing. Therefore, the game also supports the perceptual and conceptual subitizing skills of children (Figure 3c). After the counting process is completed, children are asked to identify the group with the minimum and maximum number of fuzz bugs. This feature of the game supports children's ability to compare through counting something.

Figure 3a

Figure 3b

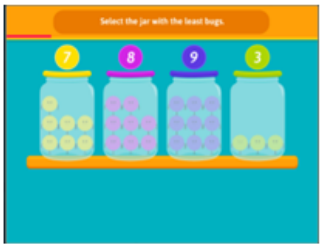

Figure 3c

4. Monster Mansion-Number Match. Recognition of number and subitizing: perceptual subitizer to 4, perceptual subitizer to 5, conceptual subitizer to 5, conceptual subitizer to 10

Verbal and object counting: corresponder, counter (small numbers), counter (10)

Comparing, ordering, & estimating numbers: counting comparer (same size)

In this game, children are asked to match quantities or objects with symbols. In the quantitative matching section, children are expected to match the same pair in

quantity (Figure 4a). The same format is also available in the form of a memory game. In the memory game, the windows remain closed and the children are expected to remember the number of quantities they have opened. In the formats of the game given in Figures 4a and 4b when children click on the windows, the number of quantities is verbalized. This feature of the game may prevent the child from developing a self-counting strategy. Therefore, after playing the game in this format, the child should be directed to the matching pairs to decide himself to develop his own counting strategies. In Figures 4c and 4d there are examples about the matching of quantities with symbols in the game. In this section, children are asked to identify and match the number corresponding to the multiplicity. With the aforementioned characteristics of the game, children's perceptual and conceptual subitizing, one-to-one correspondence, cardinal value and comparison skills can be supported.

Figure 4a Figure 4b Figure 4c Figure 4d

5. Adventure Man and the Counting Quest. Verbal and object counting: counter from N, skip counter, skip counter by 10s to 100

Adventure Man game, which jumps through the valleys and swamps to reach the hidden treasure, supports the development of the child's rhythmic counting skills. Children choose a number from 1 to 10 and then, count the numbers in a rhythmic fashion. The number to be chosen varies based on difficulty level in the game. For example, when the child starts from an easy level, he can perform rhythmic counting with single-digit numbers, but if he starts from more difficult stages rhythmic counting is done with two-digit or three-digit numbers. This game supports learning trajectories of rhythmic counting in verbal and object counting.

Figure 5a Figure 5b

6. Base Ten Bingo. Recognition of number and subitizing: perceptual subitizer to 4, perceptual subitizer to 5, conceptual subitizer to 5, conceptual subitizer to 10, conceptual subitizing with place value and skip counting, conceptual subitizing with place value and multiplication.

Verbal and object counting: corresponder, counter (small numbers), skip counter by 10s to 100, counter of quantitative units/place value.

The Base Ten Bingo game provides an opportunity for children to understand the concept of place value by using virtual manipulatives and to improve arithmetic processing skills. Once the children select the place value and grid you want (Figure 1a), they count the ones, tens, hundreds or thousands groups given on the right side and mark the proper number given in the left side (Figure 6b and Figure 6c). It is aimed to perform BINGO with the numbers coming together up or down. Determining how many unions supports children's perceptual subitizing in multiplicities up to 4 and 5, and conceptual subitizing in multiplicities up to 5 and 10. They can perform conceptual subitizing by using higher level skills such as skip counting, place value, multiplication thinking at the stage where decimal blocks are selected. It is also a game that supports developmental processes such as one-to-one correspondence, cardinal value, skip counting, grouping, digit value, and counting learning trajectories.

Figure 6a

Figure 6b

Figure 6c

***7.* Base Ten Fun.** Recognition of number and subitizing: maker of small collection, perceptual subitizer to 4 and 5, conceptual subitizer to 5, 10, 20, conceptual subitizing with place value and skip counting, conceptual subitizing with place value and multiplication

Verbal and object counting: corresponder, counter (small numbers), producer (small numbers), counter & producer (10+), skip counter by 10s to 100, counter on using patterns, counter of quantitative units/place value.

Base Ten Fun game has parallel features with Base Ten Number game. However, this game has been prepared by using snake image instead of ten base blocks and presented in 3 different modes. These three modes are as follows: read & make, listen & make, count & write. In the mode of read & make (Figure 7a) children have the chance to choose one, ten and hundred materials. Therefore, children can be given an opportunity to work gradually based on their level of development. For example, when the ones mode is selected, the image shown in Figure 7a is displayed and the child is asked to generate the number indicated on the screen. Children's attempt to reach the number by swiping these numbers on the right side of the screen, while the number line at the bottom of the screen progresses to the number of units added. The same process continues in the selection of the groups of tens and hundreds. In the mode of listen & make (Figure 7b) the number is verbalized instead of written on the screen. The child is asked to model the number with virtual manipulatives and at the same the unit progress as many as the numbers created in the number line. In the mode of count & write modunda (Figure 7c) on the right side of the screen, the groups of ones, tens and

hundreds are given and the child is asked to form the number of representations. This game supports many skills such as forming a specified number of group of objects, perceptual and conceptual subitizing, developing the concept of place value and multiplicative thinking through conceptual subitizing, counting, cardinal value, skip counting and exploiting number patterns. In addition, with the progression of the number of units in the number line, the child has an opportunity to practice the relative size, location, proximity and distance of the numbers. This is a feature that supports the development of number sense.

Figure 7a. read & make

Figure 7b. listen & make

Figure 7c. count & write

8. Blast off with Numerical Order. Verbal and object counting: counter from N, skip counter by 10s to 100, skip counter

Comparing, ordering, & estimating numbers: ordinal counter

In this game, children are asked to form a series of numbers given in mixed form by performing skip counting. Children are expected to select the appropriate number for their level (Figure 8a) and perform skip counting. (Figure 8b and Figure 8c). The formation of a series of numbers supports the skills related to the ordinal value and also, strengthens their perception concerning the relative size, location, proximity and distance to other numbers.

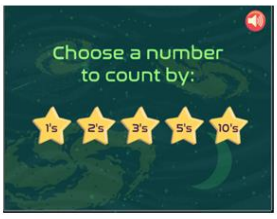

Figure 8a

Figure 8b

Figure 8c

9. Comparing Number Values. Recognition of number and subitizing: perceptual subitizer to 4 and 5, conceptual subitizer to 5, 10

Verbal and object counting: counter(small numbers)

Comparing, ordering, & estimating numbers: perceptual comparer, nonverbal comparer of dissimilar items, counting comparer(same size)

In this game, children are shown two groups of dots, and they are asked to compare the number of dots with large, small and equal signs (Figure 1a and Figure 1b). Children can determine and compare the number of dots, as well as perform perceptual comparing. This game supports the development of children's subitizing, counting and comparison skills.

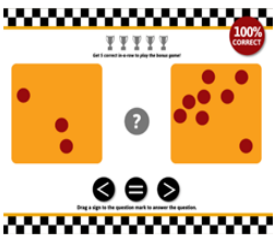

Figure 9a

Figure 9b

10. How Many Marbles. Comparing, ordering, & estimating numbers: scanning with intuitive quantification estimator, benchmarks estimator

In this game, children are asked to estimate the number of marbles in a rotating jar (Figure 10a and Figure 10b). Children are given feedback about their estimations. Children can estimate the number of marbles by considering how many marbles the bottom of the jar can take, and how many layers the jar has.

Figure 10a

Figure 10b

11. Molly's More or Less Quest. Recognition of number and subitizing: perceptual subitizer to 4and 5, conceptual subitizer to 5 and 10

Verbal and object counting: counter (small numbers)

Comparing, ordering, & estimating numbers: perceptual comparer, nonverbal comparer of similar items, counting comparer

In this game children are asked to compare the number of living beings and objects that a horse named Molly saw while she was walking. For instance, if she sees three birds on a branch and five birds on the grounds they are asked to answer some questions such as is "The number of birds on the branch smaller than those on the ground?". Children may make comparisons through counting or they may perform perceptual comparing. The game allows children to count objects individually or to perform perceptual and conceptual subitizing. They can also do nonverbal comparison without counting the small number of object groups.

Figure 11a

Figure 11b

12. Number Buble-Count to Ten. Verbal and object counting: corresponder

Comparing, ordering, & estimating numbers: ordinal counter

In this game, the chests lie on the floor in sequence and the numbers pass through the bubbles in the air. Some of the chests have numbers. It is expected that the children will explode the bubbles into the appropriate chest, taking into account the sequence of numbers. This game improves children's ability to match chests one-to-one with numbers and ordinal value because it requires sequencing according to the sequence of numbers.

Figure 12a

13. Number Bubble-Skip Counting. Verbal and object counting: counter to 100, skip counter by 10s to 100, skip counter

This game improves children's skip counting skills. At the beginning of the game, children are asked to decide how they want to count in a rhythmic fashion. Numbers are placed in some of the ordered chests according to the selected rhythmic number sequence. In addition, the numbers move in the bubbles in the air in accordance with the selected rhythmic number sequence. It is expected that the children will explode the number of bubbles into the appropriate chest, taking into account the rhythmic sequence. The game improves the ability of skip counting at intervals that children choose based on their level.

Figure 13a

Results

Within the framework of the learning trajectories determined for the development of the number concept, 13 games which are included in the educational game application called ABCya and which support the development of the number concept are introduced above. In addition, it is stated which game can support which development level of learning trajectories. Table 2 summarizes learning trajectories and games that support their development.

Table 2

Digital Math Games Supporting Learning Trajectories

Age	Developmental progression for recognition of number and subitizing	Games
0-1	Pre-explicit number	-
1-2	Small collection namer	-
3	Maker of small collection	7
4	Perceptual subitizer to four	1, 3, 4, 6, 7, 9, 11
5	Perceptual subitizer to five	1, 3, 4, 6, 7, 9, 11
5	Conceptual subitizer to five	1, 3, 4, 6, 7, 9, 11
5	Conceptual subitizer to 10	1, 3, 4, 6, 7, 9, 11
6	Conceptual subitizer to 20	1, 7
7	Conceptual subitizing with place value and skip counting	1, 6, 7
8	Conceptual subitizing with place value and multiplication	6, 7
Age	Developmental progression for verbal and object counting	Games
0-1	Pre-counter Chanter	-
1-2	Reciter	-
3	Reciter (10)	-
3	Corresponder	2, 3, 4, 6, 7, 12
4	Counter (small numbers)	2, 3, 4, 6, 7, 9, 11
4	Counter (10)	1, 2, 3, 4
4	Producer (small numbers)	7
5	Counter & producer (10+)	1, 7
5	Counter backward from 10	-
6	Counter form N (N+1, N-1)	5, 8
6	Skip counter by 10s to 100	5, 6, 7, 8, 13
6	Counter to 100	13
6	Counter on using patterns	7
6	Skip counter	5, 8, 13
6	Counter of imagined items	-
6	Counter on keeping track	-
6	Counter of quantitative units/Place value	6, 7
6	Counter to 200	-
7	Number conserver	-
7	Counter forward and back	-
Age	Developmental progression for comparing, ordering, and estimating numbers	Games
0-1	Many-to-one corresponder	-
1-2	One-to-one corresponder	-
1-2	Object corresponder	-
1-2	Perceptual comparer	3, 9, 11
3	First-second ordinal counter	-
3	Nonverbal comparer of similar items (one-four items)	9, 11
4	Nonverbal comparer of dissimilar items	-
4	Matching comparer	-
4	Counting comparer (same size)	3, 4, 9, 11
4	Mental number line to five	-
5	Counting comparer (five)	3
5	Ordinal counter	8, 12
5	Spatial extent estimator-small	-
5	Counting comparer (10)	3
6	Mental number line to 10	-
6	Serial orderer to 6 +	-

6	Spatial Extent Estimator	-
7	Place Value Comparer	-
7	Mental Number Line to 100	-
7	Scanning with Intuitive Quantification Estimator	10
8	Mental number line to 1000	-
8	Benchmarks Estimator	10
8	Composition Estimator	-

It is seen that the games mostly support the trajectories of the "recognition of number and subitizing" and "verbal and object counting" for the children aged between 4 and 6. For the trajectory of the "comparing, ordering and estimating numbers" there are games supporting the perceptual and counting comparison and ordinal numbers. There is only one game supporting the estimation skills. It is important to include more games that support the skills about the relative size of the number, its position and their proximity to other numbers to improve this learning trajectory.

Perceptual and conceptual subitizing are ultimately significant for the "recognition of number and subitizing". Children build their knowledge of counting and cardinality at an early age on perceptual subitizing. Perceptual subitizing requires a small number of multiplicities (4 or 5) to be determined quickly and accurately without counting using mathematical operations (Clements, 1999), and conceptual subitizing requires dividing the number of large objects into small groups (Geary, 2003). Seven games out of 13 games support perceptual subitizing skills. However, both educators and families may need to provide some guidance to children to support this skill. For instance, in the first game named Counting Fish children should be directed to tell the number of fish at the stages covering 4-5 fish. One of the basic features of subitizing is to show and close objects to the child for a short time. Thus, perceptual and conceptual subitizing is performed without mathematical operation to determine the number of objects in the group. This game does not contain this feature. However, the user can turn off the display after the child is able to see the screen image quickly under the guidance of the user. At the stages where more fish are asked, children can be guided to recognize the number in groups more quickly and practically. In the third game named Fuzz Bugs-Counting, Sorting, & Comparing the number of Fuzz Bugs stacked in jars is asked to the children. The conceptual subitizing skill can be used in the early stages of development so that the child can see that grouping will faciliate the working with a large numbers. In the game named *Monster Mansion-Number Match* (the fourth game) children hear the number of dots when they open the windows. It may improve their counting skills. However, after playing the game in this manner for a while the child can be directed to decide about what the number is. Thus, by developing their own counting strategies, they can determine the same number of objects through the conceptual subitizing.

The games reviewed generally support the trajectory of "verbal and object counting" for children aged 3-6. The games mostly support one-to-one correspondence, determining the number of objects, counting and skip counting. The point here is that the games for counting and quantifying show parallelism with the games supporting the subitizing phase. Subitizing is seen as a prerequisite for counting and as a complementary skill for the development of counting (Butterworth, 1999). The

subitizing skills of the examined games have been revealed, but it is also stated that some instructions should be given to the child to play a supporting role for this skill. In the Common Core Standards section of the ABCya activities the standards set for the youngest age group start with the "counting & cardinality" stage. Therefore, it can be argued that there is no direct goal to support the subitizing in games. In the findings section, the correlations between games and learning trajectories were uncovered, and it also included some suggestions about what kind of guidance should be given to the child in order to provide the features to support the subitizing skill. The games numbered 3, 4, 6, 7, 9 and 11 support both subitizing and counting skills. However, in order to improve the subitizing skills games should have certain features, for instance, the objects should be given on the screen for a short period, all the objects in the group should be displayed at the same time, and the grouping should support the concept of counting through conceptual subitizing. Some of the games have these features. Therefore, they can be used to support subitizing under the supercision of an educator. Following the game, children should be allowed to play with features that improve their counting skills, and children should benefit from their contribution to the development of counting principles.

The number of games supporting the trajectory of "Comparing, ordering, and estimating numbers" is much more limited. The games reviewed mostly support the perceptual comparison, comparing the number of objects of groups using identical objects and the ordinal value principle. The game named How Many Marbles deals with the development of the estimation skills. In the game children are asked to make estimations about the number of objects in a group. In this learning trajectory, the development of children in terms of their relative size, proximity to other numbers, and their position is paid importance. This skill is one of the basic characteristics of number sense and supports children to understand the relationships between numbers. A number line is included in the Base Ten Fun game. However, this number line is somewhat different from the use of the mental number line. In the mental number line, the starting and ending points of the number line must be determined, and the number magnitudes must be estimated without specifying the numbers in the range. Therefore, adding or integrating such a component to the games can improve the estimation skills of children.

Discussion and Conclusion

Research suggests that both virtual manipulatives and digital games positively support the development of children's mathematical skills (Manginas & Nikolantonakis, 2018; Miller, 2018; Moyer-Packenham et al., 2015; Pope & Mangram, 2015; Rogowsky et al., 2017). However, teachers reported that they have no sufficient information about which games or manipulatives can support which mathematical skills in the teaching process (Kirriemuir & McFarlane, 2004; Koh, Kin, Wadhwa, & Lim, 2012), that they have limited time to explore these games and associate them with the teaching process (Kirriemuir & McFarlane, 2004), and that they have problems in finding appropriate games in terms of visual, contextual, and educational features of children (Baek, 2008). In addition, the most important obstacle in this regard is the inadequacy of the relationship between knowledge and skills in the game and educational arrangements (McFarlane, Sparrowhawk, & Heald, 2002). Without adequate information on the content of the game, its relationship with educational standards and its effectiveness in

the implementation process, teachers cannot obtain sufficient evidence of the necessity and importance of the use of these games in their classrooms (Wale, 2013). It can be argued that providing digital mathematical games that can help teachers in relation to the development levels of children will facilitate teachers' work. The educational activity set called ABCya was developed by two teachers who wanted to use digital games in their classrooms but faced some limitations both in terms of materials and in terms of the quality of the games. Teachers designed educational games using their competencies in programming and graphic design and started to use these games in their classrooms. As they observed that other teachers also used the games in their lessons and that these games had positive effects on the students, they continued to produce more educational games and put forward such an activity set. Associating the games in this practice, which arises from the needs of teachers and students, with the Common Core Standards, will facilitate the transfer of the games to the instructional process. However, the Common Core Standards include instructional objectives created by bringing together administrators and educators in states in the United States. Therefore, it is important to link games with progressive mathematical learning trajectories rather than country-specific curricula or achievements. Through such an association, teachers, families and researchers in different countries will be able to see the stages of a child's number development through their learning trajectories (Sarama & Clements, 2009a) and also, will have information about which games are useful in supporting these stages.

The aim stage of the learning trajectories tries to define the mathematical content that teachers are expected to bring to children. Developmental progression provides teachers with a tool for recognizing children's level of mathematical development and a higher level. Educational activities paired with developmental progression provide guidance on the type of activity that will support student learning and help to explain why the identified activities can be effective. Several components of the trajectories answers different questions, for instance, “the goal” component answers the question “where do you want to go?”; “the developmental progression” component answers the question “Where are you now?” and the “instructional activities” component answers the question “how can you reach your next goal?” (Clements & Sarama, 2014). Researcher argued that there would be no standard of instructional activities and that they could be diversified with the support of teachers, families and sociocultural environment depending on the developmental process. In this context, digital games are seen as important tools in structuring and diversifying instructional activities. Research emphasizes the effectiveness of computer-assisted instructional manipulatives, moving away from the traditional idea that children in particular can learn better with concrete materials (Clements, 2002; Sarama & Clements, 2016). Therefore, demonstrating the learning trajectory characteristics of the games can guide teachers and families about the instructional activities that will bring children to a higher level goal from their current level.

Gelman and Gallistel (1978) stated that in order to make meaningful counting, children should acquire some counting principles. The one-to-one principle is that each object is represented by a number word while counting a group of objects. The stable-order-principle states that there is a fixed order of number words in the counting, while the cardinal principle states that the last said number represents the sum of the plurality of objects in counting. The abstraction principle states that it is not important in

counting whether objects that can be counted in a group are associated or not. The order-irrelevance principle states that when we count an object plurality, it is not important to determine the number of object plurality from which object we start and which object we continue by counting. The games examined in the findings section support both the learning trajectories and these five counting principles.

Especially in countries where the curriculum is more strict and education system is more exam-oriented, teachers may feel themselves under pressure to complete the curriculum within the specified time. Even games with clear educational components can cause teachers to come across some problems that require time (Baek, 2008; Watson, Yang, & Ruggiero, 2012). For example, many variables can lead to time consuming activities, such as the loading time of the game, the introduction stages of the game, the learning of the children and teachers, and the involvement of children outside of the educational dimension of the game (Rutter & Bryce, 2006). In order to avoid this, the introduction of educational digital games, their content and which mathematical skills children will support can facilitate teachers to save time and encourage the use of digital games.

In the context of the use of digital games math class, teachers in Turkey reported that although they believe in the positive impact of the game they also experience some difficulties about finding educational games in native language, inaccessibility of some game software, worrying about program association, time limitation and limiting computer proficiency of teachers and students (Demirbilek & Tamer, 2010). Finding a digital math game written in Turkish is a serious problem. Therefore, it is argued that there is a need for digital math games with educational background designed in accordance with Turkish background. However, within the scope of the FATIH project, which was initiated in 2012, both pilot studies and the project implementations provided in hardware and software infrastructure in Turkish schools which included educational e-content, directing teachers to use interactive whiteboards and tablet computers and in-service training activities for teachers. In this context, it is thought that the potential difficulties that Turkish teachers may experience will be about introducing and using digital game platforms (in terms of which educational applications and which games can be used, which gains support etc.) beyond the introduction of digital platforms to the classroom environment. There are some experimental studies which use digital games to support children's counting skills and number sense (Manginas & Nikolantonakis, 2018; Pope & Mangram, 2015). In addition to the studies cited above this study contributes to the field in terms of making teachers much more aware of the educational games included in the ABCya activities. In addition, it is very important that the mathematical development of children should be supported by families in informal learning environments, especially from early childhood. For this reason, it is very important to introduce the digital platforms that include educational game activities to both teachers and families and to inform them about their contribution to academic development of the children.

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Effects of the Educational Games on Primary School Students' Speaking Skills and Speaking Anxiety*

Eğitsel Oyunların İlkokul Öğrencilerinin Konuşma Becerilerine ve Konuşma Kaygılarına Etkisi

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ABSTRACT: The aim of this study is to determine the effects of educational games used in lesson Turkish on primary school fourth-grade students' impromptu speaking skills and speaking anxiety. In the research, one of the semi-experimental models, pretest and posttest nonequivalent groups design was used. The study group consisted of 28 students in 4-A and 4-B classes in a public school in the city center of Burdur in the first semester of 2018-2019 academic year. In the experimental group, Turkish lessons were taught and supported by educational games for six weeks. In the control group, it was processed in accordance with the basic teaching-learning approaches in the Turkish Curriculum. According to the results of the study, it was concluded that educational games positively affected the three-dimensional speaking order and style of speech, including the use of voice, which are composed of audibility and meaningfulness dimensions, topic and thought transfer, refinement, and use of time. It was concluded that educational games did not affect students' speaking anxiety. The fact that the state of anxiety is not affected by this six-week practice of educational games may be due to the short implementation period. Therefore, a similar study can be repeated with a wider sample group with a longer application period.

Keywords: Educational game, speaking skill, speaking anxiety, primary school.

ÖZ: Bu araştırmanın amacı, Türkçe dersinde kullanılan eğitsel oyunların ilkokul 4. sınıf öğrencilerinin hazırlıksız konuşma becerilerine ve konuşma kaygılarına etkisini belirlemektir. Araştırmada yarı deneme modellerinden ön test-son test eşitlenmemiş kontrol gruplu model kullanılmıştır. Araştırmanın çalışma grubunu, 2018-2019 eğitim-öğretim yılı birinci döneminde Burdur il merkezindeki bir devlet okulundaki 4-A ve 4-B sınıflarındaki 28 öğrenci oluşturmaktadır. Deney grubunda Türkçe dersleri altı hafta boyunca araştırmacı tarafından eğitsel oyunlarla desteklenerek işlenmiştir. Kontrol grubunda ise Türkçe Dersi Öğretim Programındaki öğrenme-öğretme yaklaşımlarına uygun olarak işlenmiştir. Araştırma sonuçlarına göre; eğitsel oyunların, öğrencilerin konuşma sırasında işitilebilirlik ve anlamlılık boyutlarından oluşan ses kullanma becerilerini, konu ve düşünce aktarımı, ayrıntılandırma ve zaman kullanımı olmak üzere üç boyuttan oluşan konuşma düzenini ve üslubunu olumlu yönde etkilediği sonucuna ulaşılmıştır. Eğitsel oyunların öğrencilerin konuşma kaygılarını etkilemediği sonucuna ulaşılmıştır. Kaygı durumunun, eğitsel oyunlardan oluşan bu altı haftalık uygulamadan etkilenmemesi, uygulama süresinin kısa olması ile açıklanabilir. Bu yüzden benzer bir çalışma daha geniş bir örneklem grubu ile daha uzun bir uygulama süreci ile tekrarlanabilir.

Anahtar kelimeler: Eğitsel oyun, konuşma becerisi, konuşma kaygısı, ilkokul**.**

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Language skills have some subcomponents. For instance, receptive skills include reading and listening. Expressive skills are consisted of speaking and writing. In order to improve the language skills among children, it is necessary to give importance to all these skill domains. Improving only some of these language skills will be insufficient for comprehensive language development (Ünalan, 2001). Speaking can be seen as an important skill among other language skills (listening, reading and writing), because knowing a language is defined as speaking this language (Ur, 1996). Speaking can be defined as developing verbal expressions produced to convey meaning (Bailey, 2005). Since almost everyone knows how to speak, speaking education is seen as a negligible skill. However, it is very important for students to speak effectively and confidently in order to realize most of the basic skills (Bygate, 1987).

Speaking can be classified as planned and unplanned (impromptu) speaking depending on whether the speaker has plans for the speech or not. *Planned speaking* is predetermined and its aim, topic, place and date are determined before the speaking occurs in a planned (Yüceer, 2014). *Impromptu speaking* refers speaking that an individual makes in her daily life, in different environments, without any preparation (Sargın, 2006). There are some cognitive, affective and physical elements of speaking. Organizing ideas constitutes the affective elements such as cognitive element, vocalization physical element, attitude towards speech, self-efficacy, motivation, anxiety.

Anxiety studies generally focus on math anxiety, writing anxiety, reading anxiety, exam anxiety, writing and speaking anxiety in second a language (Cheng, 2004; Çeliktürk & Yamaç, 2015; Daly & Miller, 1975; Pekrun et al., 2004; Wigfield & Eccles, 1989; Wigfield & Meece, 1988; Woodrow, 2006). Anxiety is a negative condition that affects individuals emotionally and physically, and that has negative reflections on learning (Çeliktürk & Yamaç, 2015, p. 99). Speaking anxiety directly affects the success in speaking. Speaking anxiety may occur before, during or after the speaking. Speaking anxiety is one of the anxiety types that usually occurs when someone is speaking in front of the community or during dialogue with people and that is manifested by some physical symptoms such as sadness, anger, fear, sweating, and increased heartbeat (Demir & Melanlıoğlu, 2014; Keşaplı & Çifci, 2017). In their study, Topçuoğlu Ünal and Degeç (2012) identified the major problems of students in speaking activities as follows; embarrassment, excitement, insufficient word treasure, local dialect. Accordingly, these problems made students feel embarrassed and withdrawn. Another finding of this research indicates that academic achievements of the students were affected negatively in consequence of the problems faced by the students.

In order for speaking education to be effective, a well-programmed education and training process and an appropriate education and training environment where the barriers to speaking are eliminated are needed. Games have been more employed in the education and training process in recent years, and through games, the permanent and meaningful learning is targeted. According to Demirel (2011), Educational game technique, provides students with the opportunity to consolidate and repeat information in a comfortable environment. It is thought that games that carry each individual to a comfortable and natural learning environment will also reduce the speaking anxiety. There are some studies in the literature examining the effect of educational games on speaking skills (Dewi, Kultsum, & Armadi, 2017; Gedik, 2012). However, at the

primary school level, no research investigating the effects of educational games on speaking skills has been encountered. Similarly, no study that focuses on the effect of educational games on speaking anxiety has been found.

Some findings of the studies on the speaking skill, anxiety and educational games are given as follows: In the study on the evaluation of the speaking skills of primary school students carried out by Sargın (2006), it was observed that the students did not use proverbs and idioms at the expected level, frequently repeat words or sentences, did not go beyond the topic at hand and just reflected the main idea. In the study examining 7th grade students' impromptu speaking skills by Yeşiltepe Sağlam (2010), it was concluded that students' success levels in impromptu speaking were quite low. In the study conducted by Yüceer (2014), a meaningful relationship was found between the impromptu speaking skill level of preservice Turkish language teachers and their participation in theater and drama activities. In the study of Emiroğlu (2015), examining the number of words used by students from different educational levels, more specifically from primary school to university, the number of words used was found to increase from primary school to university. In the study of Sevim and Gedik (2014) examining speaking anxiety of high school students in terms of various variables, a significant difference was found between gender and attitude variables towards the lesson and speaking anxiety. In the study conducted by Tüzemen (2016), it was concluded that academic contradiction technique was more effective than the activities carried out within the framework of the Turkish Teaching Program in having the positive change of attitudes of students towards Turkish lesson, development of speaking skills and reduction of speaking anxiety.

Gedik (2012) analysed the effects of the educational games on 6th grade students' basic language skills and concluded that educational games are much more functional in contrast to the existing teaching methods in terms of long-lasting learning and improving the basic language skills. Varan (2017) analysed the effects of the educational games on the expansion of the fourth-grade elementary school students' lexical and found that vocabulary teaching through educational games improves their mental lexicons. Dewi et al. (2017) examined the effects of the communicative games on speaking skills of junior high students in Jakarta, Indonesia. They concluded that such games have positive effects on the fluency of students' speaking.

It is thought that pre-designed teaching activities may have an effect on reducing or eliminating speaking anxiety and improving speaking skills in students. Accordingly, this study was carried out to examine the speaking skills of primary school fourth-grade students and the effects of educational games on speaking anxiety. It can be said that the Turkish course is a course, in which students gain and improve their basic language skills. Including educational games in this course is also expected to add variety and richness to Turkish lesson in terms of method and activity. At the same time, the effects of educational games on the speaking skills will be tested. Anxiety, which emerged as a negative predictor in the academic and affective development of children, will be examined in this research whether educational games will have any effect on reducing speaking anxiety. In this context, the research problem/question of the current research is as follows; "What is the effect of educational games on the impromptu speaking skills and speaking anxiety of primary school fourth-grade students?"

Based on this general research question the study attempts to answer the following sub-research questions:

1. What is the effect of educational games on the impromptu speaking skills of primary school fourth-grade students?

   a. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *sound scores* of experiment and control groups?

   b. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *pronunciation scores* of experiment and control groups?

   c. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *speaking order scores* of experiment and control groups?

   d. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *vocabulary scores* of experiment and control groups?

   e. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *style scores* of experiment and control groups?

   f. Is there a significant difference between pre- and posttest impromptu speaking success in terms of *body language scores* of experiment and control groups?

2. What is the effect of educational games on speaking anxiety of elementary school fourth-grade students?

   a. Is there a significant difference between the pre- and posttest *speaking anxiety scores* of the experiment and control groups?

Method

Design of the Study

This study is designed as a pretest and posttest nonequivalent groups design which is part of *semi-experimental research designs*. Semi-experimental research designs are used where some variables cannot be taken under control or cannot be provided in experimental research designs (Karasar, 2007, p. 99).The difference of the pretest and posttest nonequivalent groups design, which is the model of this research, from the experimental research models is that the groups could not be determined objectively before the application. This model is preferred especially in cases where it is difficult to select individuals impartially in educational research (Baştürk, 2011).

Participants

The participants of the study are fourth-grade primary students attending a public school in Burdur during the school year of 2018-2019 fall semester. More specifically, eight male and seven female students from the 4-A class and four male and nine female students from the 4-B class participated in the study. They were chosen using the *convenience sampling* which is among the *non-random sampling* techniques. The experiment group included fifteen students from the 4-A class, whereas the control group, thirteen students from the 4-B class. The students in both groups have similar

characteristics (e.g gender, socioeconomic structure, academic achievement level). Before the study, the required permissions were provided. In addition, the research was carried out in accordance with ethical principles.

Data Collection Tools

The data of the study were collected through the use of the following tools: Personal Information Forms, Impromptu Speaking Topics, Turkish Lesson Plans, the Impromptu Achievement Rubric and Speaking Anxiety Scale.

Personal information form: This form was developed by the authors to have information about the demographical characteristics of the participants. It was also reviewed by the field experts before developing the final versions of the forms. In this form; there are questions such as gender of the student, education of mother and father, mother and father professions, income level of their families, whether the student has a room of his/her own.

Impromptu speaking topics: The topics were identified by the authors by examining the literature and the 4th grade Turkish Teacher Guide Book (Bıyıklı & Öztaş, 2017) and discussing it with classroom teachers and field experts. The suitability and level of the issues were discussed by pre-interviewing seven classroom teachers. Then, four classroom teachers were interviewed separately considering the results obtained from the previous interviews. Finally, field expert's opinion was consulted as a result a total of thirteen speaking topics were identified.

Lessons plans: These outlines were developed by the authors based on the textbook used by the Ministry of National Education for the fourth-grade Turkish languages courses for the school year of 2018-2019 and also, based on the yearly course outlines. During the six-week implementation process, these topics were supported by these texts and activities *through educational games*.

Impromptu speaking achievement rubric: It was developed by the authors. In the development process of the rubric, the studies on speaking skills were reviewed. Also, the "Learning Gains in Speaking Area" in the fourth-grade Turkish curriculum was examined and taken into account in creating rubric. In addition, the main categories and subcategories of the rubric were developed based on the findings/sources by Dülger (2011), Emiroğlu (2015), Taşer (2009), and Vural (2005). The original form of the rubric included six main and thirty-four subcategories. Following the reviews by a field expert, the rubric was modified to include six main and fifteen subcategories. The speech success rubric consists of the major components of voice, pronunciation, speaking order, vocabulary and body language. This rubric which is a four-point Likert type scale includes four levels of achievement: (1) beginner level, (2) intermediate level, (3) good and (4) very good. The maximum score from this rubric is 60.

Speaking anxiety scale: This scale was developed by Yıldırım (2015), and it was used in the study with permission by email. The scale is a twenty three-item, three-factor (speaking anxiety during the lesson, out-of-school speaking anxiety, speech anxiety for the immediate environment) and five-point Likert type scale. The Cronbach alpha reliability for the first factor was .0852, Cronbach alpha for the second factor .866 and the Cronbach alpha reliability for the third factor was .900. This scale, which was originally developed for secondary school students, was presented to the reviews of the field experts in order to decide whether it was suitable for fourth-grade primary school

students, and it was decided that it was suitable for the fourth-grade level based on the feedback from these experts. Confirmatory factor analysis could not be performed in the study due to the insufficient number of participants. Therefore, the difference between the experimental and control groups on item basis was investigated without taking any total score from the scale.

Data Collection Procedure and Data Analysis

Before the implementation process, experimental group and control group were informed about the experiment. Also, participants in both groups filled up a "Personal Information Form". "Speaking Anxiety Scale" and "Impromptu Speaking Achievement Rubric" were applied to the experimental and control groups as pretest and posttest. In order to identify the impromptu speaking achievement of the participants, 13 speaking topics were implemented in both experimental and control groups. More specifically, speaking topics were randomly distributed among the participants and it was requested from the participants to give a "two-minute speaking/narration" about the randomly assigned topics. In this phase, participants were allowed for a "30 seconds" thinking time. The Turkish language lessons in the experimental group were taught by one of the authors through the educational games for six weeks and eight hours a week. The control group received the Turkish language courses based on the basic teaching-learning approach stated in the education program of the course by classroom teacher. The procedure of the semi-experimental data collection is given in Table 1:

Table 1

Data Collection Steps

Steps of the implementation	Groups	Data collection tools
First Step	Experiment	Information on the semi-experimental procedure
	Control	Personal Information Form
		The Speaking Anxiety Scale (Pretest)
		Impromptu Speaking Achievement Rubric (Pretest)
Second Step	Experiment	Course outline for the first week
1.Week		Text Name: "Şerife Bacı Documentary"
05-09.11.2018		Educational Games: Prediction Game-Estimation game
Second Step	Experiment	Course outline for the second week
2.Week		Text Name: "The Man Who Even Repairs the Sun"
12-16.11.2018		Educational Games: Prediction game- Puppet Game-Silent Cinema Game-Story Man Game
Second Step	Experiment	Course outline for the third week
3.Week		Text Name: "Mom, I Am Not Disabled"
19-23.11.2018		Educational Games: Prediction Game-Ear-to-Ear Game-Empathy Building Game
Second Step	Experiment	Course outline for the fourth week
4.Week		Text Name: "Love is Happiness"
26-30.11.2018		Educational Games: Prediction Game-Fill Your Cart Game-Send Message to Your Neighbor Game-I Role-Play Game

Second Step	Experiment	Course outline for the fifth week
5.Week		Text Name: "Smart Pigeon Matuka"
03-07.12.2018		Educational Games: Prediction Game-Rope Pull Game-Chair Grabber Game
Second Step	Experiment	Course outline for the sixth week
6.Week		Text Name: "Little Inventors"
10-14.12.2018		Educational Games: Prediction Game-Time Machine Game-Ball Winding Game
Third Step	Experiment	The Speaking Anxiety Scale (Posttest)
	Control	Impromptu Speaking Achievement Rubric (Posttest)

Table 1 presents, the names of speaking text topics and educational games per week. For instance, at the sixth week of the semi-experimental research implementation process, "Little Inventors" as the speaking text topic, and "Prediction Game-Time Machine Game-Ball Winding Game" as the educational game were implemented. At this stage of the research, separate instructional/lesson plans were designed. In instructional plans, after the learning outcomes were defined, specific educational games were selected that can improve the speaking skills. Pre-defined texts were processed with the support of educational games given.

Pretest and posttest impromptu speaking skills scores were recorded in the sound recording for later analysis. The sound recordings were listened and evaluated by the researchers according to the Impromptu Speaking Achievement Rubric. Using the Pearson in-class correlation analysis, rater reliability was examined, and the correlation coefficient between the scores given by the raters was found to be .976. According to this result, a strong relationship between raters can be mentioned. All the data obtained in the research were transferred to the SPSS package program and tested through descriptive and relational tests.

Results

Descriptive Statistics

In the study, the standard deviation, mean, skewness and kurtosis values of the scores obtained from the participants in both groups were determined. For the dependent variables (speaking sounds, pronunciation, speaking order, vocabulary, style, body language, and speaking anxiety) in the study, it was determined that the skewness and kurtosis values were between -2.0 and +2.0 in the experimental and control groups, and these values were acceptable in terms of normality (George & Mallery, 2016, p. 114-115). In this study, due to the low number of samples, histogram and boxplot charts were drawn to visually examine whether the data show normal distribution in each group and it was determined that the data did not show a normal distribution. In order for the distribution to not deviate from the normal distribution, the sample size should be more than 30 or equal (Büyüköztürk, 2014, p. 8). In the Shapiro Wilk test results, some variable values did not show normal distribution; some variable values were found to show normal distribution. Nonparametric methods were used in the study since some of the sub research questions of the study did not show normal distribution and the sample of the study was relatively small ($N_{Experiment}$=15 and $N_{Control}$=13).

Findings on Sub-Problems

Mann-Whitney U tests were conducted to determine whether the pretest scores of the dependent variables in experimental and control groups differ statistically and it was calculated that all variables did not differ significantly between the experimental and control groups at the beginning of the study. However, the tenth item of the Speaking Anxiety Scale is found to have the score of p=.027 which was eliminated from the analysis (p>.05). In the research, posttest scores were analyzed in the analyzes since the groups were equal in terms of pretest scores and did not differ significantly.

Table 2

Mann-Whitney U Results of Post-Test on Speaking Sounds

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	17.27	259.00	56.00	.049
Control	13	11.31	147.00		

As seen in Table 2, there was a statistically significant difference between the experimental and control groups speaking sounds posttest scores (U=56, p=.049). According to this result, it can be said that the semi-experimental application has a positive effect on the sound in favor of the experimental group.

Table 3

Mann-Whitney U Results of Post-Test on Pronunciation

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	15.47	232.00	83.00	.400
Control	13	13.38	174.00		

As seen in Table 3, there was no statistically significant difference between the experimental and control groups pronunciation posttest scores (U=83, p>.05). According to this result, it can be said that semi-experimental application has no effect on pronunciation.

Table 4

Mann-Whitney U Results of Post-Test on Speaking Order

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	17.40	261.00	54.00	.039
Control	13	11.15	145.00		

As seen in Table 4, there was a statistically significant difference between the experimental and control groups speaking order posttest scores (U=54, p=.039). According to this result, it can be said that quasi-experimental practice has a positive effect on the speaking order in favor of the experimental group.

Table 5

Mann-Whitney U Results of Post-Test on Vocabulary

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	15.03	225.50	89.50	.704
Control	13	13.88	180.50		

As seen in Table 5, no statistically significant difference was found between the vocabulary posttest scores of the experimental and control groups vocabulary posttest scores (U=89.50, p>.05). According to this result, it can be said that semi-experimental application has no effect on vocabulary.

Table 6

Mann-Whitney U Results of Post-Test on Style

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	16.97	254.50	60.50	.046
Control	13	11.65	151.50		

As seen in Table 6, there was a statistically significant difference between the experimental and control groups style posttest scores (U=60.50, p=.046). According to this result, it can be said that semi-experimental application has a positive effect on the style in favor of the experimental group.

Table 7

Mann-Whitney U Results of Post-Test on Body Language

Group	*N*	Mean rank	Total rank	*U*	*p*
Experimental	15	15.67	235.00	80.00	.413
Control	13	13.15	171.00		

As can be seen in Table 7, there was no statistically significant difference between the vocabulary posttest scores of the experimental and control groups body language posttest scores (U=80, p>.05). According to this result, it can be said that semi-experimental application has no effect on body language.

Table 8

Mann-Whitney U Results of Post-Test on Speaking Anxiety

Item	Group	*N*	Mean rank	Total rank	*U*	*p*
1	Experimental	15	11.63	174.50	54.50	.040
	Control	13	17.81	231.50		
2	Experimental	15	13.07	196.00	76.00	.293
	Control	13	16.15	210.00		
3	Experimental	15	12.90	193.50	73.50	.239
	Control	13	16.35	212.50		
4	Experimental	15	12.67	190.00	70.00	.189
	Control	13	16.62	216.00		
5	Experimental	15	15.70	235.50	79.50	.384
	Control	13	13.12	170.50		
6	Experimental	15	14.60	219.00	96.00	.942
	Control	13	14.38	187.00		
7	Experimental	15	12.30	184.50	64.50	.117
	Control	13	17.04	221.50		
8	Experimental	15	13.70	205.50	85.50	.564
	Control	13	15.42	200.50		
9	Experimental	15	14.93	224.00	91.00	.751
	Control	13	14.00	182.00		
10	Experimental	15	15.10	226.50	88.50	.656
	Control	13	13.81	179.50		
11	Experimental	15	13.60	204.00	84.00	.521
	Control	13	15.54	202.00		
12	Experimental	15	12.93	194.00	74.00	.268
	Control	13	16.31	212.00		
13	Experimental	15	13.57	203.50	82.50	.479
	Control	13	15.58	202.50		
14	Experimental	15	14.53	218.00	90.00	.722
	Control	13	14.46	188.00		
15	Experimental	15	15.20	228.00	85.50	.571
	Control	13	13.69	178.00		
16	Experimental	15	14.63	219.50	86.50	.601
	Control	13	14.35	186.50		
17	Experimental	15	12.40	186.00	93.00	.823
	Control	13	16.92	220.00		

18	Experimental	15	12.90	193.50	81.50	.354
	Control	13	16.35	212.50		
19	Experimental	15	12.73	191.00	95.50	.920
	Control	13	16.54	215.00		
20	Experimental	15	13.97	209.50	65.50	.122
	Control	13	15.12	196.50		
21	Experimental	15	11.97	179.50	89.50	.685
	Control	13	17.42	226.50		
22	Experimental	15	13.10	196.50	96.00	.942
	Control	13	16.12	209.50		
23	Experimental	15	13.77	206.50	85.50	.557
	Control	13	15.35	199.50		

In the study, whether there is a significant difference between the experimental and control groups speaking anxiety posttest scores was examined on the basis of the items in the scale. As can be seen in Table 8, only the first item (U=54.50, p=.040) has been identified as a significant differentiation. (p>.05). In other items in the scale, no significant difference was found between the experimental and control group speaking anxiety posttest scores. The reason for this differentiation observed in only one article was interpreted that it may not be caused by semi-experimental application. Therefore, it can be argued that the semi-experimental practice does not have any effect on speaking anxiety.

Discussion and Conclusion

The findings obtained in this study aiming to determine the effects of the educational games on the impromptu speaking skills and speaking anxiety of fourth-grade elementary school students were discussed based on the previous findings. At the beginning of the research, no statistically significant difference was found between the students in the experimental and control groups in terms of their impromptu speaking skill scores (speaking sounds, pronunciation, speaking order, vocabulary, style and body language). At the end of the research, it was observed that the dependent variable of speaking sounds consisting of the dimensions of audibility and significance significantly differed in favor of the experimental group. Therefore, it is safe to argue that the educational games used in courses have positive effects for the speaking sounds which are part of the impromptu speaking skills. In the study conducted by Sargın (2006), it was found that the volume of the voice of the majority of students was at an appropriate level. In the meaningfulness dimension of the speaking sounds there are concepts such as rhythm, fluency, uniformity, emphasis, intonation and appropriate pause. Dewi et al. (2017) analysed the effects of communicative games on speaking skills. They found that such games positively affected the fluency of students' speaking. In this context, the research findings support each other.

The findings of the study suggest that pronunciation which refers to sound reduction was not better for the experiment group. Yeşiltepe Sağlam (2010) found that

students cannot pronounce the /r/ voice in the suffix "-yor", that they cannot pronounce the vowels in the words such as "ölcek (die), ordaki (there) and üniverste (university)" and that they experience sound erosion for the sounds /h/ and /ğ/ in the words, including "meşur instead of meşhur (famous) and ööretmen instead of öğretmen (teacher)". In the current study it is also found that the participants did not manage to pronounce the speaking sound /r/ in the suffix "-yor" or in the words like "bir (one)" and that they produced the following words "gitcek instead of gidecek (he will go) and gelcek instead of gelecek (he will come)" and that they used the form of "öörtmenim" instead of "öğretmenim (my teacher)". Therefore, the present findings are consistent with the previous ones.

The findings of the study also indicate that the speaking order or speaking dynamics which refers to the expression of topics and views, refinement (giving examples and description etc.) and the use of tense is much better for the experiment group. Yeşiltepe Sağlam (2010) found that the speaking by the students is mostly in line with the topics given but they cannot develop plans for their speaking and provide the events and the related information in an unplanned way.

According to the conclusion reached in this study, it can be said that the students' ability to give examples, description and detailing improved during the speaking as a result of the educational games used in the experiment group. It is stated by Yeşiltepe Sağlam (2010) that students do not use ways of developing thought in their speaking (such as defining, describing, sampling, comparing, showing witness, analogy, and making use of numerical data). Yüceer (2014) found that the students had fair levels of the definition, sampling and detailing. In the study conducted by Sargın (2006), it was concluded that students could not develop rich ways of thinking. In regard to this study, it can be stated that students' time management skills were developed during the impromptu speaking as a result of the educational games. The students made speaking for two minutes. It can be stated that many students could not complete two minutes during the implementation, and also several students exceeded two minutes while making their speaking. In a similar study by Yeşiltepe Sağlam (2010) the students were given three minutes to make a speaking, but they cannot fully use the time given.

Vocabulary, which is composed of the use of proverb and idiom, special nouns, expressions and the use of pronoun "şey (stuff)" does not show a significant difference in favor of the experimental group. Research suggests that the students do not employ proverbs in their speaking, but use some idiom while making a speaking. Yeşiltepe Sağlam (2010) concludes that impromptu speaking does not contain any use of proverbs and idioms. In the study by Sargın (2006), it is found that the speaking of the students lacked the proverbs, aphorism, and idioms etc. According to the results of the study conducted by Emiroğlu (2015), it can be said that the proverbs are used less, and the idioms are used a little more than the proverbs. In this study, it can be said that students mostly use the number "one" as the number expression. Again, in the study of Emiroğlu (2015), the most frequently used first five number expressions that students use are determined as "one, two, first, four and third". The use of the pronoun "şey" is accepted as an evidence of not finding the proper word. Some students employed the pronoun "stuff". In the study by Emiroğlu (2015) it is found that the students use words such as "something, so, another, that is, behold, for example, etc." Yeşiltepe Sağlam (2010) also

concluded that the students used some words such as "stuff, well, how can I tell, so" when they could not find the right words while expressing their ideas.

The dependent variable of style, which is defined as sound, speed, self-confidence, repeating words, prolonging the end of words, and making sounds like "eee / ıiıı / aaa / hımmm" in pauses, has been found to differ significantly in favor of the experimental group. When the style is analysed in terms of speaking sounds the excitement of the students and the control of voice were taken into consideration. In this study, it was seen that the voice of several students trembled for a short time. In the study conducted by Sargın (2006), it was observed that the students were excited while talking and 71% of them had shaking voices while making a speaking. When the style is analysed in terms of speaking rate it is found that the students talked fast ending their speaking immediately. When the style is evaluated in terms of self-confidence, it can be said that most of the students in the study are confident while making speaking. Hwang Hwang, Shih, Ma, Shadiev, and Chen (2016) found that a mobile system containing game-based activities supported the students in producing meaningful sentences and their speaking with confidence. When style is analysed in terms of repetition of the words, in this study it is found that most of the students repeat the words during their speaking. Sargın (2006) stated that 44% of students repeat words or sentences. When the style is evaluated in terms of extending the end of the words, it can be said that most of the students do not make any such extension while speaking. In the Sargın's (2006) study, it was concluded that 98% of the students did not lengthen the voices unnecessarily while speaking. When the style is evaluated in terms of producing meaningless sounds like "eee / ıiıı / aaa / hımmm" in pauses, some of the students are found to make such parasitic sounds in the pauses. According to the conclusions reached by Yeşiltepe Sağlam (2010) regarding the parasitic voices analyzed under the title of fluency, it was found that the students made meaningless voices such as "ıı, eee, aaa" in order to gain time to think.

The dependent variable of the body language, which is composed of posture, gesture, mimic and eye contact dimensions, did not show a significant improvement in favor of the experimental group. In the study, most of the students shake in place for some or all of the speaking time. It can also be stated that some of the students are standing still while some of them are not. It can be said that very few of these students confidently stood in a proper place while making a speaking. In the study by Sargın (2006) it was found that in regard to expressing self-confidence with the stance 62% of 207 students were identified not to feel self-confident based on their stances during speaking. In the study by Yeşiltepe Sağlam (2010), students' body language movements are partially measured and found that sometimes they do not control their body movements; however, it is stated that this is not at a very disturbing level. In this study, most of the students did not use their hands and arms during their speaking. It can be said that students who used their hands and arms while talking did not manage to use them at a sufficient level. It can also be stated that most students make movements with their hands and arms indicating that they are embarrassed or bored, while some of them hold their hands behind or in front, or they play with their jersey by putting them on their side or open and close their fingers. On the other hand, the facial expressions of the students were slightly better than their gestures. However, it should be added that this was not sufficient. In the study of Sargın (2006), 65% of 207 students made unnecessary

movements and did not know where to put their hands and how to hold their hands while speaking. In this study, most of the students are found to have eye contact with the audience; however, it can be said that they cannot use it effectively. Some students can be said to look down on the floor while speaking with their heads forward. In the study carried out by Sargın (2006), it was concluded that 54% of the students in general had eye contact with the audience. Yüceer (2014) found that in regard to eye contact the participants had a fair level of success.

At the end of the study, it was observed that the dependent variable of speaking anxiety consisting of three dimensions, namely speaking anxiety when talking to the others, out of school speaking anxiety and speaking anxiety during the lesson, did not show a significant difference in favor of the experimental group. Therefore, it can be stated that the educational games used in the study do not have a significant positive effect on the participants' speaking anxiety. The state of anxiety, which is a term belonging to the affective domain, was not affected by this six-week practice consisting of educational games. It can be due to the fact that there was a short implementation period and that the anxiety scale used was originally developed for the students at the middle school level.

In the study conducted by Tüzemen (2016), it was concluded that the academic contradiction technique used for twelve weeks was more effective than the activities carried out within the framework of the Turkish Teaching Program in reducing the students' speaking anxiety. In the study conducted by Bulut (2015), it was concluded that the teaching of the Speaking Education course with the micro teaching technique for 14 weeks reduced the speaking anxiety of the pre-service Turkish language teachers compared to the traditional method. The reason why the findings of this study and other studies are not similar is that the independent variables are different and the implementation durations are different. Based on the results of the study the following suggestions are developed:

- In the study, it is concluded that educational games improve students' speaking skills. In this context, teachers are recommended to include educational games in their lessons and to use the impromptu speaking techniques.
- During the implementation process in the study, it was observed that some students could not use non-verbal communication elements effectively. In future studies activities to improve these skills can be designed.
- The participants of the study are just twenty-eight students. In order to have much more generalizable findings the number of participants can be more.
- Future studies may employ the qualitative data collected from observations and interviews.
- In this research, the effects of educational games on students' speaking skills were examined. These effects can be analysed in relation to other language skills in future studies.

Statement of Responsibility

Huri Asan; conceptualization, methodology, data collection, validation, investigation, data curation, writing - original draft, writing - review & editing. Zuhal Çeliktürk-Sezgin; conceptualization, design of research process, methodology, validation, investigation, data curation, writing-reviewing & editing, and supervision.

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Prediction Validity of Teaching Efficacy on Task-Centered Anxiety: A Study on Physical Education Teacher Candidates*

Öğretim Yeterliğinin Görev Merkezli Kaygı Üzerindeki Yordama Geçerliği: Beden Eğitimi Öğretmen Adayları Üzerine Bir Çalışma

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ABSTRACT: This study aimed to determine the relationship between physical education teacher candidates' teaching efficacy and task-centered anxieties. Correlation survey model was used in this research. The research group consisted of 228 prospective physical education teachers, 84 of whom were female (37%) and 144 were male (63%), who were educated in the 3rd and 4th grades in 5 different universities. Personal information form, Teacher Occupational Anxiety Scale and Physical Education Teaching Efficacy Scale were used as data collection tools. In the analysis of the data in the research descriptive statistics were used. In advanced analysis, Pearson Moments Product Correlation Coefficient technique was used to determine the level and direction of the relationship between the teaching efficacy and task-centered anxiety levels of the physical education teacher candidates. In addition, whether the teaching efficacy levels of the physical education teacher candidates are predicting the task-centered anxiety levels were tested by multi-directional regression analysis. As a result of the analysis, It was determined that there was a moderate positive correlation between total teaching efficacy levels and task-centered anxiety levels, and when the results regarding the significance of regression coefficients were analyzed, only total teaching efficacy levels were significant and significant predictors of task-centered anxiety levels.

Keywords: Physical education teacher, teaching efficacy, task-centered anxiety.

ÖZ: Bu çalışmanın amacı; beden eğitimi öğretmeni adaylarının öğretim yeterlikleri ile görev merkezli kaygıları arasındaki ilişkinin incelenmesidir. Bu araştırmada ilişkisel tarama modeli kullanılmıştır. Araştırma grubunu, 5 farklı üniversitede 3. ve 4. sınıfta eğitim gören eğitim gören 84'ü kadın (%37) ve 144'ü erkek (%63) olmak üzere 228 beden eğitimi öğretmeni adayı oluşturmuştur. Veri toplama aracı olarak kişisel bilgi formu, mesleki kaygı ölçeği ve beden eğitimi öğretim yeterlik ölçeği kullanılmıştır. Araştırmada verilerin analizinde tanımlayıcı istatistiklerden faydalanılmıştır. İleri analizlerde ise beden eğitimi öğretmeni adaylarının öğretim yeterlikleri ile görev merkezli kaygı düzeyleri arasındaki ilişkinin düzeyi ve yönünü belirlemek amacıyla Pearson Momentler Çarpımı Korelasyon Katsayısı tekniği kullanılmıştır. Bunun yanında beden eğitimi öğretmeni adaylarının öğretim yeterlik düzeylerinin görev merkezli kaygı düzeylerini yordayıp yordamadığı, çok yönlü regresyon analizi ile test edilmiştir. Analizler sonucunda, toplam öğretim yeterliği düzeyleri ile görev merkezli kaygı düzeyleri arasında pozitif yönde orta düzeyde bir ilişki olduğu ve regresyon katsayılarının anlamlılığına ilişkin sonuçlar incelendiğinde ise sadece toplam öğretim yeterlik düzeylerinin görev merkezli kaygı düzeyleri üzerinde anlamlı ve önemli bir yordayıcı olduğu belirlenmiştir.

Anahtar kelimeler: Beden eğitimi öğretmeni, öğretim yeterlik, görev merkezli kaygı.

* A part of abstract of this study was presented as a verbal paper at the 15th International Congress of Sports Sciences.

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It is a known fact that the concept of efficacy, which is an indispensable element for every professional group, is also of great importance for the teaching profession. The concept of self-efficacy, which is stated to have an important place in Social Cognitive Theory (Güngör & Yaylı, 2012; Senler, 2016); it has been observed that people are defined as their judgment about their ability to organize and execute action plans needed to achieve expected performances (Bandura, 1986). Accordingly, teacher efficacy; despite all the negativities, it was seen that the teacher was expressed as their beliefs and opinions that they could enable students to learn better (Deringöl, 2018; Guskey & Passaro, 1994). In addition, it has been stated that one of the strongest predictors of teachers' pedagogical decisions and effectiveness is the professional efficacy of the teacher (Summers, Davis, & Woolfolk Hoy, 2017).

The education of teachers, an indispensable element of education in developed and developing countries, and "*How to train qualified teachers*?" it was stated that an answer to the question was sought (Bedir, 2015; Price & Weatherby, 2018). Located in Turkey in the category of developing countries; it was observed that the general efficacy of the teaching profession for all teaching branches were determined by making an update on the teacher efficacy by the Ministry of National Education (MoNE, 2017). According to this, it has been determined that the general efficiencies areas of the teaching profession are grouped under three main headings as (1) knowledge, (2) skills and (3) attitudes and values (Table 1).

Table 1

Efficiencies for Teaching Profession (MoNE, 2017).

(1) Knowledge	(2) Skills	(3) Attitudes & Values
1.1. Field knowledge	2.1. Education planning	3.1. National, spiritual & universal values
1.2. Field education knowledge	2.2. Creating learning environments	3.2. Approach to students
1.3. Legislation knowledge	2.3. Managing the teaching & learning process	3.3. Communication & collaboration
	2.4. Quantification and consideration	3.4. Personal & professional development

When the researches are examined it was stated that the professional efficacy level of the teacher directly affects the performance of the teacher (Boz, 2008) and in this direction, it was seen that the most important factor in the increase of the proficiency level was pre-service education and its quality (Woolfolk Hoy & Davis, 2005). In other words prospective teachers' feelings of preparation are determined to be an important determinant of their teaching self-efficacy as well as their ability to fulfill their teaching duties (Housego, 1990). It is stated that the most important factors that increase the pre-service quality are the teaching experience, applied education as well as the observation of experienced teachers (Brown, Lee, & Collins, 2015).

Similar results have been found in studies investigating the teaching efficacy of physical education teachers and prospective teachers (Humphries, Hebert, Daigle, &

Martin, 2012; Martin & Kulinna, 2005). A qualified teaching environment that will be offered to physical education teacher candidates, can give them proficiency in fulfilling the requirements of the profession. It has been observed that it also affects the viewpoints and feelings and thoughts about the profession (Aydın & Tekneci, 2013; Taşğın, 2006; Ünlü & Erbaş, 2018).

It is stated that one of the most prominent concepts among emotions about teaching profession is the concept of professional anxiety (Cabı & Yalçınalp, 2013). It has been observed that one of the most important determinants of professional anxiety in terms of teachers is the quality of pre-service education, as well as the experience gained in pre-service education and the opportunity for applied education (Kırbaşlar, Veyisoğlu, & Özsoy-Güneş, 2015).

By many researchers (Cabı & Yalçınalp, 2013; Saban, Korkmaz, & Akbaşlı, 2004) anxieties about the prospective teachers are given at specific times that concentrate on specific points. These anxieties are grouped under three main headings (Cochran-Smith, 2000; Fuller, 1969); (a) self-centered anxieties, (b) task-centered anxieties, and (c) student-centered anxieties. It is determined that the focus of the self-centered anxieties is the individual, and the focus of the task-centered anxieties is the teaching task of the individual and the focus of the student-centered anxiety is the students (Taşğın, 2006).

It has been stated that a teacher candidate who has task-centered anxiety is concerned about being a good teacher and therefore will start to research new teaching methods, materials and equipment that she/he can use in her/his field (Cabı & Yalçınalp, 2013). In this direction; the task-centered anxiety (Meek & Behets, 1999), which acknowledged as a focal point of a teacher candidate's teaching task , was thought to be directly related to the teaching efficacy of teacher candidates.

When the literature is examined some studies in the field of vocational anxiety towards physical education teacher candidates (Bartholomew, Ntoumanis, Cuevas, & Lonsdale, 2014; Kafkas, Açak, Çoban, & Karademir, 2010; Taşğın, 2006) were found. In addition, there are studies examining the relationship between physical education teaching efficacy and professional anxiety (Meek & Behets, 1999). However, no research was found on the relationship between the teaching efficacy of the teacher candidates and task-centered anxiety. It was considered as an important situation to determine the teaching efficacy, professional anxiety levels of the physical education teacher candidates and to reveal the direction and level of the relationship between these two variables. In this direction, it is aimed to investigate the relationship between the teacher efficacy of the physical education teacher candidates and their task-centered anxiety in this study. In line with this general purpose, the sub-problems of the research are listed below:

1. What is the level of teaching efficacy and task-centered anxiety of physical education teacher candidates?
2. Do the teaching efficacy levels and task-centered anxiety levels of the physical education teacher candidates differ according to gender, grade and sports branch variables?
3. Is there any relationship between teaching efficacy and task-centered anxiety of physical education teacher candidates?

4. Do the teaching efficacy levels of physical education teacher candidates predict their task-centered anxiety levels?

Method

This research is designed in correlational survey model. Correlation survey model; It is used in studies aiming to determine the existence of a change in two or more variables and the degree of this change (Karasar, 2009).

Research Group

The research group consisted of 228 prospective physical education teachers studying at 3rd and 4th grades in 5 different universities. Descriptive statistics of the research group are given in Table 2. 3rd and 4th grades prospective physical education teachers were selected due to the content of the data collection tools used.

Table 2

Descriptive Statistics of the Research Group

Variables		*f*	%
Gender	Female	84	37
	Male	144	63
Grade	3rd grade	130	57
	4th grade	98	43
Sports Branch	Individual sports	88	36
	Team sports	140	64
$M_{age} = 21.807 \pm 2.098$		*n*=228	

Data Collection Tools

Procedure. This study was carried out by obtaining an approval report from the Aksaray University Human Research Ethics Committee (6th meeting dated on 22.06.2020, Decision number: 2020/06-91). Accordingly, all data was collected in accordance with the ethical rules. Physical education teacher candidates who participated in the study were informed by researchers about scales, study and data analyses. All teacher candidates voluntarily participated in the study.

Personal information form. This form included the items regarding the genders, grades and sports branch of the physical education teacher candidates who participated in this study.

Physical Education Teaching Efficacy Scale (PETES). PETES, originally was developed by Humphries et al. (2012) and was adapted in Turkish by Erbaş, Varol, and Ünlü (2014); consisted of factors such as (a) efficacy about PE content knowledge (1st sub-dimension), (b) efficacy for applying scientific knowledge in teaching PE (2nd sub-dimension), (c) efficacy about accommodating skill level differences (3rd sub-dimension), (d) efficacy for teaching students with special needs (4th sub-dimension),

(e) efficacy about instruction (5th sub-dimension), (f) efficacy for using assessment (6th sub-dimension) and (g) efficacy for using technology (7th sub-dimension) and 35 items.

Each expression that takes place in the scale has a rating Likert type (1) "*I can't do*", (2) "*I can do in medium level*", and (3) "*I can do in high level*". Scoring the scale determined as; 35-49 points are very low level, 50-64 points low level, 65-79 points medium level, 80-94 points high level and 95 and above are very high level. Researchers (Humphries et al., 2012) have used internal consistency Cronbach Alpha parameters to calculate the reliability of the scale. Cronbach Alpha parameter that expressed the internal consistency of the items was calculated it was determined as .94 for the general of the scale. The 1st sub-dimension was calculated as .73, the 2nd sub-dimension was calculated as .70, the 3rd sub-dimension was calculated as .76, the 4th sub-dimension was calculated as .77, the 5th sub-dimension was calculated as .82, the 6th sub-dimension was calculated as .76, and the 7th sub-dimension was calculated as .84.

The internal consistency coefficient was recalculated in all sub-dimensions for this study, it was determined as .95 for the general of the scale. The 1st sub-dimension was calculated as .75, the 2nd sub-dimension was calculated as .80, the 3rd sub-dimension was calculated as .79, the 4th sub-dimension was calculated as .79, the 5th sub-dimension was calculated as .78, the 6th sub-dimension was calculated as .83, and the 7th sub-dimension was calculated as .71. and the Cronbach Alpha values are given in Table 3.

Occupational Anxiety Scale for Prospective Teachers. "*Task-Centered Anxiety*" sub-dimension, which is one of the 8 sub-dimensions of the Occupational Anxiety Scale developed by Cabı and Yalçınalp (2013), was used to measure the task-centered anxiety levels of prospective teachers in this study. The task-centered anxiety sub-dimension consists of 13 items and the highest score is 65, indicating that the higher the score, the lower the anxiety rate. The entire professional anxiety scale consists of 45 items and 8 sub-dimensions. These are respectively; (a) Task-Centered Anxiety, (b) Economic / Social-Centered Anxiety, (c) Student / Communication-Centered Anxiety, (d) Colleague and Parent-Centered Anxiety, (e) Personal Development-Centered Anxiety, (f) Appointment-Centered Anxiety, (g) Cohesion Center Anxiety and (h) School Management Center Anxiety. Each expression that takes place in the scale has a rating Likert type, (5) I am not anxious, (4) I am slightly anxious, (3) I am partially anxious, (2) I am anxious, (1) I am very anxious. The total reliability coefficient estimated from the whole scale was determined as .95. The lowest score that can be obtained from the scale is 45, the highest score is 225, and high scores indicate low occupational anxiety level. The internal consistency coefficient of the Task Center Anxiety sub-dimension was recalculated for this study and the Cronbach Alpha values are given in Table 3.

Data Analysis

Descriptive statistics were used for the analysis of the data in this research. In advanced analysis the t-test of arithmetic averages in independent groups was conducted to compare the teaching efficacy levels and task-centered anxiety levels of physical education teacher candidates in terms of gender, grade and sports branch. Pearson Moments Product Correlation Coefficient technique was used to determine the level and

direction of the relationship between the teaching efficacy and task-centered anxiety levels of the physical education teacher candidates. In addition, multiple regression analysis was used in order to test whether physical education teacher candidates' teaching efficacy levels affected their task-centered anxiety levels. Each of the sub-scale scores of physical education teaching efficacy scale was considered as an independent variable and task-centered anxieties of prospective physical education teachers was considered as a dependent variable in these analyzes.

Results

Teaching Efficacy and Task-Centered Anxiety Levels

The findings obtained are given in Table 3 regarding the 1st sub-problem of the research.

Table 3

Levels of Teaching Efficacy & Task-Centered Anxiety

Variables (*n*=228)	*M*	SD
Efficacy about PE content knowledge	10.386	2.398
Efficacy for applying scientific knowledge in teaching PE	8.622	2.043
Efficacy about accommodating skill level differences	11.600	2.404
Efficacy for teaching students with special needs	11.052	2.631
Efficacy about instruction	14.057	2.950
Efficacy for using assessment	11.434	2.413
Efficacy for using technology	11.675	2.597
Teaching Efficacy (Total)	78.828	13.917
Task-Centered Anxiety	39.271	8.726

When Table 3 is examined, it has been observed that prospective physical education teachers have high levels of teaching efficacy in 7 sub-dimensions and, as a reflection of this, their teaching efficacy levels are high. In addition, it was determined that task-centered anxiety levels were also intermediate (optimum level).

Comparison of Teaching Efficacy and Task-Centered Anxiety Levels According to Gender, Grade and Sports Branch Variables

The findings obtained are given in Table 4 regarding the 2nd sub-problem of the research.

Table 4

Comparison of Teaching Efficacy and Task-Centered Anxiety Levels According to Gender, Grade and Sports Branches

Variables			*n*	*M*	*SD*	*Df*	*t*	*p*
Teaching Efficacy	Gender	Female	84	80.547	13.111	226	-1.427	.155
		Male	144	77.826	14.316			
	Grade	3rd grade	130	78.430	12.544	226	-.497	.620
		4th grade	98	79.357	15.605			
	Sports Branch	Individual	88	81.113	13.034	226	1.978	.059
		Team sports	140	77.392	14.304			
Task-Centered Anxiety	Gender	Female	84	39.976	7.867	226	-0.930	.353
		Male	144	38.861	9.192			
	Grade	3rd grade	130	39.884	8.601	226	1.222	.223
		4th grade	98	38.459	8.869			
	Sports Branch	Individual	88	38.318	8.479	226	-1.310	.191
		Team sports	140	39.871	8.856			

**p<.05*

When Table 4 is examined, it was observed that the differences between arithmetic averages of teaching efficacy levels and task-centered anxiety levels were not statistically significant in terms of gender, grade and sports branch.

Relationship between Teaching Efficacy and Task-Centered Anxiety

The findings obtained are given in Table 5 regarding the 3rd sub-problem of the research.

Table 5

Relationship between Teaching Efficacy & Task Centered Anxiety Levels

Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
(A)	1								
(B)	.652**	1							
(C)	.366**	.486**	1						
(D)	.546**	.629**	.570**	1					
(E)	.503**	.508**	.622**	.687**	1				
(F)	.511**	.531**	.540**	.628**	.708**	1			
(G)	.468**	.491**	.569**	.631**	.679**	.648**	1		
(H)	.717**	.753**	.747**	.846**	.860**	.823**	.813**	1	
(I)	.410**	.298	.278**	.459	.373**	.241	.239	.479**	1
M	10.386	8.622	11.600	11.052	14.057	11.434	11.675	78.828	39.271
SD	2.398	2.043	2.404	2.631	2.950	2.413	2.597	13.917	8.726

***p<.01*

(A) Efficacy about PE content knowledge

(B) Efficacy for applying scientific knowledge in teaching PE

(C) Efficacy about accommodating skill level differences

(D) Efficacy for teaching students with special needs

(E) Efficacy about instructions

(F) Efficacy for using assessment

(G) Efficacy for using technology

(H) Teaching Efficacy (Total)

(İ) Task-Centered Anxiety

When Table 5 is examined, It was determined that there was a moderate positive relationship between the total teaching efficacy levels (r=.479, p<.01) and task-centered anxiety levels. In addition, it was observed that there was a positive and low level relationship between the adequacy levels of the (p<.01) sub-dimensions efficacy about PE content knowledge (r=.410, p<.01), efficacy for teaching students with special needs (r=0.459, p<.01), efficacy for applying scientific knowledge in teaching PE (r=.298, p<.01) , efficacy about accommodating skill level differences (r=.278, p<.01), efficacy about instruction (r=.373, p<.01), efficacy for using assessment (r=.241, p<.01), efficacy for using technology (r=.239, p<.01), and task-centered anxiety levels.

Prediction Validity of Teaching Efficacy on Task-Centered Anxiety

The findings obtained are given in Table 6 regarding the 4th sub-problem of the research.

Table 6

Regression Analysis Results Regarding Prediction of Task-Centered Anxiety Levels

Variables	*B*	Standard Error $_B$	*β*	*T*	*p*	Dual *r*	Partial *r*
Constant	57.422	3.152	-	18.218	.000	-	-
Efficacy PE content knowledge	.370	.458	.102	.808	.420	.410	.054
Efficacy for applying scientific knowledge in teaching PE	.650	.479	.152	1.357	.176	.298	.091
Efficacy about accommodating skill level differences	.652	.482	.180	1.352	.178	.278	.091
Efficacy for teachings students with special needs	.293	.503	.088	.583	.560	.459	.039
Efficacy about instruction	.436	.518	.134	1.215	.219	.373	.063
Efficacy for using assessment	1.325	.531	.366	2.495	.013	.241	.166
Efficacy for using technology	1.180	.484	.351	2.438	.016	.239	.162
Teaching Efficacy (Total)	-.854	.308	-1.362	-2.773	.006*	.479	-.184
R=.430		R^2=.185					
$F_{(7.\ 220)}$=7.122		p=.000					

When Table 6 is examined; the equation for predicting task-centered anxiety levels of teaching competency scale sub-dimensions (F=7.122, p<.01) was noted as important. The variables constituting the sub-dimension of teaching efficacy, accounted for 19% of the total variance in task-centered anxiety levels. According to the standardized regression coefficient (*β*), the predictor variables' order of was as follows: total teaching efficacy levels, efficacy for using assessment, efficacy for using technology, efficacy about accommodating skill level differences, efficacy for applying scientific knowledge in teaching PE, efficacy about instruction, efficacy about PE content knowledge and efficacy for teaching students with special needs. When the results related to the significance of the regression coefficients were examined, it was observed that only the total teaching efficacy levels coefficients variables were a significant and important predictor of task-centered anxiety levels.

Discussion and Conclusion

In this study, it was observed that the prospective physical education teachers had a high level of efficacy in 7 sub-dimensions and as a reflection of this, the level of teaching efficacy was high. In addition, it was determined that task-centered anxiety levels were also at mid-level (optimum). In addition, the differences between the teaching efficacy levels and task-centered anxiety levels of physical education teacher candidates are not statistically significant in terms of gender, grade and sports branch. It

was determined that there was a moderate positive relationship between the total teaching efficacy levels and task-centered anxiety levels. In addition, it was observed that there was a positive and low level relationship between the adequacy levels of the sub-dimensions efficacy about PE content knowledge, efficacy for teaching students with special needs, efficacy for applying scientific knowledge in teaching PE, efficacy about accommodating skill level differences, efficacy about instruction, efficacy for using assessment, efficacy for using technology, and task-centered anxiety levels. However, when the results related to the significance of the regression coefficients are analyzed, it was determined that only the total teaching efficacy levels are a significant and important predictor of task-centered anxiety levels.

It has been observed that the teaching efficacy levels of physical education teacher candidates are high in both scale total and 7 sub-dimensions. Many studies (Karacaoğlu, 2008; Saracaloğlu, Certel, Varol, & Bahadır, 2012; Varol & Türkmen, 2017) were found to produce similar results. In addition, studies that differed from the research results (Erbaş, Varol, Erdoğdu, & Ünlü, 2014; Pehlivan, 2010; Slaybaugh, Evans, & Byrd, 2004; Ünlü, 2013) were found. In some studies, it has been stated that prospective physical education teachers receive training on real practice that they will encounter in the field of teaching, and that prospective teachers have the opportunity to apply the theoretical knowledge they received in their practice training as a reason that increases their teaching efficacy (Aydın, 1998). Especially in recent years, because of the more strict control of prospective teachers' school experience and teaching practice lessons by the Ministry of Education, the increase in the practice experience of prospective teachers can be considered as a factor in this result.

Task-centered anxiety levels of physical education teacher candidates were found to be optimal. Although there are studies that support this result, some studies with different results have been found. There is a direct relationship between the level of anxiety and performance; in cases where anxiety rate is too low or too high, performance generally decreases, while anxiety is at optimal level, it is stated that high performance is obtained (Gould, Udry, Tuffey, & Loehr, 1997). In this study, it is thought that the task-centered anxiety levels of the physical education teacher candidates with high teaching efficacy levels are an expected result considering the relationship between performance and anxiety.

It was observed that the differences between the teaching efficacy levels of the physical education teacher candidates and the arithmetic averages of task-centered anxiety levels were not statistically significant in terms of gender, grade and sports branch. While this result is in line with some similar studies (Alrabai, 2015; Cheok & Wong, 2015; Erbaş, 2014), many similar studies have shown different results (Gözler, Bozgeyikli, & Avcı, 2017; McLean, Abry, Taylor, Jimenez, & Granger, 2017; Muñoz, Penalba, Sánchez, & Santos, 2017; Saracaloğlu, Kumral, & Kanmaz, 2009). In two different studies, it was observed that gender factor is an important variable and especially female teacher candidates' perception of teaching efficacy is high and their professional anxiety are at optimum level (Erbaş, 2014; Saracaloğlu et al., 2009).

Although the grade is an important variable for teaching efficacy and task-centered anxiety, due to the fact that prospective teachers' school experience lesson and teaching practice lessons show parallelism in the field of application; This study can be

considered as the reason for the absence of a significant difference. Again, the reason for not having a significant difference in terms of gender, which is seen as an important variable; It can be thought that it is due to the ratio of female-male teacher candidates in the research group. As a matter of fact, it has been stated in some studies that female teacher candidates have higher levels of anxiety compared to males in terms of research and teaching efficacy level, and they also have higher levels of anxiety than males. As a reason, it was stated that female individuals in Turkish society are more anxious in terms of acquiring a profession and being able to perform the profession (Pehlivan, 2010; Taşğın, 2006).

It was determined that there was a moderate positive relationship between the total teaching efficacy levels and task-centered anxiety levels. In addition, it was observed that there was a positive and low level relationship between the adequacy levels of the sub-dimensions efficacy about PE content knowledge, efficacy for teaching students with special needs, efficacy for applying scientific knowledge in teaching PE, efficacy about accommodating skill level differences, efficacy about instruction, efficacy for using assessment, efficacy for using technology, and task-centered anxiety levels. This result is in line with similar studies (Brown, et al., 2015; Dickson, McMinn, & Kadbey, 2017; Palmer, Dixon, & Archer, 2015; Song, 2016). Furthermore, there are also different studies from these results. It was observed that Senler (2016) showed a negative relationship between the attitudes of science teacher candidates towards science teaching and their anxiety levels and that the attitude towards science teaching had a negative effect on anxiety (Senler, 2016). As mentioned before; there is a direct relationship between the level of anxiety and performance; In cases where anxiety rate is too low or too high, performance generally decreases, while anxiety is at optimal level, it is stated that high performance is obtained (Gould, et al., 1997). Accordingly, the positive relationship between high level physical education teaching efficacy and task-centered anxiety can be explained. Since anxiety score increases here, it means that the level of anxiety decreases, the positive relationship should be evaluated in this direction.

When the results related to the significance of the regression coefficients are analyzed, it was determined that only the total teaching efficacy levels are a significant and important predictor of task-centered anxiety levels. This situation can be evaluated as the result that Fuller's (1969) theory on anxiety is tested again in terms of task-centered anxiety. Some studies supporting this result have been found (Fuller, 1969; Meek & Behets, 1999; Wendt, Bain, & Jackson, 1981). Teaching efficacy is a reflection of the pre-service education process of physical education teacher candidates, and it can be considered as an expected result that the level of anxiety expressed by the situation they will encounter before starting the task is a meaningful and important predictor.

Implications

In line with all these results; it has been concluded that the quality of pre-service education, which is considered to be the most important determinant of the task-centered anxiety of a physical education teacher candidates who will start to work, and to increase and update the quality of undergraduate programs that train physical education teachers in this direction.

Statement of Responsibility

Mustafa Kayıhan Erbaş; conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing - original draft, writing - review & editing, visualization, supervision. Hüseyin Ünlü; conceptualization, methodology, validation, writing - review & editing, supervision.

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Physical Education and Sports Course Value Orientations of Secondary School Students

Ortaokul Öğrencilerinin Beden Eğitimi ve Spor Dersi Değer Yönelimleri

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ABSTRACT: The aim of this study was to examine the value orientation of secondary school students in Physical Education (PE) in terms of gender, age, doing regular sports, participating in school teams, and family income variables. In this research, the general scanning method was used. The study sample consisted of 419 volunteer students who studied at secondary schools in central Malatya, selected using a simple random sampling method. The Physical Education Course Student Value Orientation Scale was used for research purposes. In the research, frequency and percentage analysis, Variance analysis, and the Tukey test were used. As a result of the research, the PE value orientation of male students was higher than that of female students, the sportive virtue behavior of students was higher than that of the age group of 13 compared to that of the age group of 15, and students with low family incomes were more likely to act in solidarity than students with high incomes. The most remarkable result of the study is that students who doing regular sports and participating in school teams have higher PE lesson value orientations than other students. These results show that students can be developed some responsibility behaviors through PE.

Keywords: Physical education and sports, sportive virtue, solidarity, self-confidence, sensitivity.

ÖZ: Bu araştırmada, ortaokul öğrencilerinin beden eğitimi ve spor dersi değer yönelimlerinin cinsiyet, yaş, okul içi ve dışında spor yapma, okul takımlarına katılma ve aile gelir düzeyi değişkenlerine göre incelenmesi amaçlanmıştır. Araştırmada genel tarama modeli kullanılmıştır. Araştırmanın örneklemini Malatya ili merkez ortaokullarında öğrenim gören, basit rastgele örnekleme yöntemine göre seçilen 419 gönüllü öğrenci oluşturmuştur. Araştırmada "Beden Eğitimi Dersi Öğrenci Değer Yönelimi Ölçeği" kullanılmıştır. Araştırmada, frekans ve yüzde analizi, Varyans analizi ve Tukey testi kullanılmıştır. Araştırma sonucunda, erkek öğrencilerin beden eğitimi ve spor dersi değer yönelimlerinin kız öğrencilere göre daha yüksek olduğu, 13 yaş grubundaki öğrencilerin sportif erdem davranışlarının 15 yaşındaki öğrencilere göre daha yüksek olduğu görülmüştür. Ayrıca aile gelir düzeyi düşük olan öğrencilerin gelir düzeyi yüksek olan öğrencilere göre dayanışmaya yönelik davranışlarının daha yüksek olduğu görülmüştür. Araştırmanın en dikkat çekici sonucu ise, düzenli spor yapan ve okul takımlarında yer alan öğrencilerin beden eğitimi ve spor dersi değer yönelimlerinin diğer öğrencilere göre daha yüksek olmasıdır. Bu sonuçlar, beden eğitimi ve spor yoluyla öğrencilere bazı sorumluluk davranışlarının kazandırılabileceğini göstermektedir.

Anahtar kelimeler: Beden eğitimi ve spor, sportif erdem, dayanışma, özgüven, duyarlı olma.

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Education is a concept based on human foundations. Sport is one of the building blocks of education in this context. Sport, which is part of education, needs to be addressed in aspects that contribute to the integrity of individuals and societies, such as health, tranquility, and peace (Erdemli, 2008). The aim of education is to provide students with national, spiritual, social and cultural values, such as cooperation, sharing, solidarity, love, respect, tolerance, and honesty, which form the foundations of the social structure. It is only by gaining these values that the individual can know himself or herself and others. Sport is one of the tools that enable individuals to perform these functions. In a sporting environment, individuals have the opportunity to know themselves and others in many ways (Öztürk, 1998).

Sport has a structure which affects and shapes children and young people. To be honest, to strive, to work together, to congratulate the winner, to accept defeat, and to adopt a healthy lifestyle in all respects is one of the main characteristics that sport brings to children and young people (Özdenk, 2019). Sport is considered as an important tool for the education of values, as it helps the person to expose the virtues that reside in him or her and to apply them in other areas of their lives (Kuter & Kuter, 2012).

It is useful to know the meaning and conceptual framework of values that is one of the current issues of recent years. Allport (1968) treated values as psychological approaches and described them as “meanings perceived in connection with the self”. Allport (1968) characterized the individual's psychological attachment to anything as striving to achieve and maintain and value it. The Turkish Language Association has defined values as “the abstract measure for determining the importance of something, the value of something, the value of something”, and “the whole of the material and spiritual elements of the social, cultural, economic and scientific values of a nation.” (Turkish Language Association [TDK], 2019).

Values that have been influential in every stage of human life over the centuries have played an important role in shaping people's lifestyles. People are trying to live their lives according to the values they believe in. Values kind of guide the formation of people's personal perspectives. The viewpoints formed by the values are transformed into actions and the desired behavior is achieved (Özden, 1999).

Values are criteria that give meaning to society and culture as a consensus system that society’s value and share (Zevalsiz, 2014). Such criteria help to explain why people make good, beautiful, helpful, valuable, positive, and similar value judgments (Bacanlı, 2011). Such values statements demonstrate that values play a significant role in the process of developing a personal outlook, coordinating interpersonal relationships, making individual or collective decisions, achievement, happiness, sadness, and evaluation.

The transition of the ideals that form the fundamental building blocks of society to the younger generations is primarily accomplished by training and education (Tulumcu, 2015). Education practices aimed at values are among the activities of the Ministry of National Education, which carries out the development and renovation of educational programs. As a result, education values have been seen as a common core component of the curriculum as a whole, and 10 core values have been identified which are intended to be shared with students in all disciplines. These core values are respect, love, justice, friendship, honesty, self-control, patience, responsibility, patriotism, and

benevolence (Ministry of National Education [MEB], 2017). In line with the program implemented by the MEB, one of the lessons that play an important role in bringing values to students through various activities in and out of school is physical education and sports lesson.

Education of principles, which has become particularly relevant in recent years, is also included in the teaching programs for physical education and sports courses. Accordingly, the unit of acquisitions is seen as justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, benevolence as the basis of education such as beliefs, attitudes, and actions, and is correlated with physical education and sports classes (MEB, 2018). Thanks to physical education and sport, which play an important role in the realization of sports activities in schools, children and young people are provided with values such as solidarity, cooperation, compliance with the rules, sharing, justice, tolerance, and benevolence (Kayışlıoğlu, Altınkök, Temel, & Yüksel, 2015). For this reason, there must be opportunities for students inside and outside the school to implement the values passed on (Özdemir, 2017). Activities in the field of physical education and sport can be used as an effective tool in terms of values education. Thanks to the structure of physical education and sports that attract young people and are fun-oriented, education can be carried out in order to gain value. Because many concepts that form the basis of values of education are included in games and sporting activities (Kuter & Kuter, 2012).

Literature in Turkey demonstrates that there is a limited amount of research on physical education and sports courses and values education. In his research for secondary school students, Yücekaya (2017) found that the student values for physical education and sports were high in terms of awareness, well-being, nutrition, respect, national culture and solidarity. In their research on secondary school students, Işıkgöz Esentaş, and Işıkgöz (2018) found that students often exhibit values for physical education and sports. Görgüt (2018) covered values education and physical education in Turkey. In their research, Sağın and Karabulut (2019) found that the value orientations of secondary school students towards physical education and sports course were high levels of sports culture, wellness and nutrition, respect, solidarity, national culture, and awareness.

The researchers determined that high student levels would contribute to the health of the social structure and socio-cultural development. Albayrak (2019) has researched children's games in terms of values education, which are included in the elementary school's course of physical education, a booklet on the compilation of courses. Research has shown that students have gained a lot of value, especially respect, love, sympathy through physical education and play.

Looking at the relevant foreign resources, Freire, Margues, and Miranda (2015) stated that, in their research on the methods of transferring values of education to students by physical education teachers, the transfer of values to students is one of the primary objectives of teachers and that moral values are at the top of this transfer. In their research to develop a value-based training program for sports coaches and trainers, Koh, Camire, Bloom, and Wang (2017) reported that participants were aware of teaching values-based training through physical education and sport and that participants felt adequately equipped to pass values to students and athletes. Kretschmann (2018) stated that physical education and sports course have a positive

impact on students' value gains and moral development. Sivan and Chan (2013) noted that value education research is seen more in structured value education programs, with little research being done to learn the values and attitudes of students and teachers.

In Turkey, although a large amount of research related to the mental, physical and cognitive benefits of physical education and sports; It is seen that a limited number of studies have been conducted on values education through physical education and sports lessons. This research aims to emphasize the importance of activities carried out in class in the transfer of values through physical education and sports lessons. In addition, it aims to draw attention to the gains that can be obtained when the activities are carried out properly. This research will also reveal whether the students display behaviors for gaining values in physical education and sports lessons. According to the results of this research, it is expected that researchers and trainers will apply programs-models for the acquisition of values in physical education and sports lessons more effectively.

The aim of this study was to examine the value orientation of secondary school students in physical education and sports in terms of gender, age, doing regular sports, participating in school teams, and family income variables. The sub-problems of the research are therefore as follows:

1. Does physical education and sports value the orientation of secondary school students differ by gender?
2. Does the value of secondary school students in physical education and sports differ by age?
3. Does the value of secondary school students in physical education and sports lessons differ by doing regular sports?
4. Does physical education and sports value the orientation of secondary school students differ by participating in school teams?
5. Does physical education and sports value the orientation of secondary school students differ by family income?

Method

In the research, a general scanning method was used. The general scanning method is a research method designed to describe a situation that exists in the past or now in the way it exists (Karasar, 2018).

Population and Sample of the Study

The study population consists of 56.407 secondary school students in the 2019-2020 academic year who study in secondary schools in the center of the province of Malatya. For Cronbach Alpha=.05 and $_{+}^{-}$.05 sampling error; the sample size to be taken from the universe size of 56.407 was calculated and it was seen that 382 data were sufficient for the study (Yazıcıoğlu & Erdoğan, 2004). The current study sample consisted of 419 volunteer secondary school students who were selected using a simple random sampling method. The demographic information of secondary school students participating in the study is shown in Table 1.

Table 1

Demographic Information of Students

Variable	Level	*n*	%
Gender	Male	206	49.2
	Female	213	50.8
Age	13	165	39.4
	14	128	30.5
	15	126	30.1
Doing regular sports	I do	316	75.4
	I do not	103	24.6
Participating in school teams	Yes	135	32.2
	No	284	67.8
Family income	Low	167	39.9
	Middle	165	39.4
	High	87	20.8
Total		419	100

As shown in Table 1, 206 (49.2%) of the students surveyed were males and 213 (50.8%) were females according to their gender. By age, 165 (39.4%) were 13years old, 128 (30.5%) were 14-years old, and 126 (30.1%) were 15-years old. According to the doing regular sports, 316 (75.4%) of the students doing regular sports, while 103 (24.6%) do not doing regular sports. According to the participation of school teams, 135 (32.2%) of the students participate in school teams, while 284 (67.8%) do not participate. According to the family income, 167 (39.9%) were low, 165 (39.4%) were middle, and 87 (20.8%) were high. According to Table 1, 316 of the students are involved in sports and only 135 of them are participating in school teams.

Data Collection Tools

"Physical Education Course Student Value Orientation Scale" was used in the research.

Physical Education Course Student Value Orientation Scale. The original scale developed by the Yıldız and Güven (2013) to determine the student's orientation value in physical education and sports course was applied to 663 secondary and secondary school students. The scale is of a five-point Likert-type structure, consisting of 28 items and six sub-dimensions. The sub-dimensions of the scale are sportive virtue, solidarity, self-confidence, sensitivity, responsibility, and national culture. An example item can be given for each sub-dimension: "I share tools in physical education course.", "I carry out the responsibilities of the tasks I took on in physical education course.", "I control my emotions when I'm successful in physical education and sports activities.", "I take care not to harm the environment in physical education and sports course.", "I congratulate my friends who have been successful in their physical education and sporting activities." Cronbach Alpha value of the scale was calculated as .91, Guttman Split-Half coefficient of consistency was .85 and Spearman-Brown coefficient of

consistency was .85. In this current study, Cronbach Alpha value of the scale applied to 419 students was calculated as .85.

Data Collection Process

Prior to the data collection process, the permission was obtained from the ethics committee from A University for the implementation of the scale (E.17011). Thereafter, the necessary permission was obtained from the Malatya Provincial Directorate of National Education for the implementation of the scale. The scale has been applied to volunteer students. Students were informed of the research prior to the application. The students were informed that their information would be kept confidential, the data would only be used by the researchers, the participation was voluntary and they could quit the study if they did not want to after starting the questionnaire. Students have been observed to fill the scale within 25 minutes.

Data Analysis

In the analysis of the data collected by the researchers, frequency and percentage for descriptive statistics, Variance analysis (One-way ANOVA, Independent t-test) for comparison the mean scores of gender, age, doing regular sports, participating in school teams, and family income variables in unrelated measurements and Tukey test was applied to determine groups of significant differences. Before using the parametric tests in the study, when histogram and distribution graphs were examined, it was seen that the curve showed a symmetric distribution, and the Skewness and Kurtosis values were between −1.5 and +1.5 (Tabachnick & Fidell, 2013). In addition, the homogeneity of the sample was examined by Levene test according to gender, age, doing regular sports, participating in school teams, and family income variables, and p value was higher than .05. As a result of the analysis, it was seen that the data showed normal distribution and the group variances were equal. According to the results, it was decided that the data set is suitable for parametric tests.

Results

In this section, results in terms of gender, age, doing regular sports, participating in school teams, and family income variables related to secondary students' value orientation in physical education and sports were included.

Table 2

T-Test Results of Students' Physical Education and Sports Course Value Orientation Levels by Gender

Sub-dimensions	Gender	*n*	$\bar{X}$	*Sd*	*t*	*p*
Sportive virtue	Male	206	27.70	7.79	.853	.39
	Female	213	27.08	7.07		
Solidarity	Male	206	11.81	3.30	.953	.34
	Female	213	11.49	3.41		
Self-confidence	Male	206	20.01	4.83	2.299	.02*
	Female	213	18.90	5.02		

Sensitivity	Male	206	15.04	4.16	2.562	.01*
	Female	213	14.00	4.09		
Responsibility	Male	206	19.28	5.08	2.654	.00*
	Female	213	17.96	5.08		
National culture	Male	206	19.76	5.00	2.034	.02*
	Female	213	17.32	5.05		

$p<.05$*

When Table 2 was analyzed, significant differences were identified in the sub-dimensions of the students' physical education and sports course value orientation levels such as self-confidence, sensitivity, responsibility, and national culture according to gender. There have been no significant differences in the other sub-dimensions. Significant differences were found in favor of male students for self-confidence (t=2.299, p<.05), sensitivity (t=2.562, p<.05), responsibility (t=2.654, p<.05), and national culture (t=2.299, p<.05) sub-dimensions.

Table 3

One-Way ANOVA Results of Students' Physical Education and Sports Course Value Orientation Levels by Age

Sub-dimensions	Age	*n*	$\bar{X}$	*Sd*	*df*	*F*	*p*	Tukey
Sportive virtue	13	165	28.54	6.70	2	3.322	.05*	13*15
	14	128	26.73	7.86	416			
	15	126	26.55	7.75	418			

$p<.05$*

When Table 3 was analyzed, there was a significant difference in the level of physical education and the value of sports course orientation of students in the "sportive virtue" sub-dimension [$F(2,416)=3.322$, $p<.05$] by age. There were no significant differences were observed in other sub-dimensions ($p>.05$). According to the multiple comparison test (post-hoc) results, a significant difference was found between 13 years of age ($\bar{X}$=28.54) and 15 years of age ($\bar{X}$=26.55) in favor of 13 years of age in the sub-dimension of sportive virtue.

Table 4

T-Test Results of Students' Physical Education and Sports Course Value Orientation Levels by Doing Regular Sports

Sub-dimensions	Doing regular sports	*n*	$\bar{X}$	*Sd*	*t*	*p*
Sportive virtue	I do	316	29.19	5.93	9.595	.00*
	I do not	103	21.86	8.75		
Solidarity	I do	316	12.44	2.68	9.348	.00*
	I do not	103	9.20	3.99		

Self-confidence	I do	316	20.67	3.86	9.764	.00*
	I do not	103	15.70	5.98		
Sensitivity	I do	316	15.45	3.55	8.826	.00*
	I do not	103	11.63	4.55		
Responsibility	I do	316	19.81	4.34	9.206	.00*
	I do not	103	14.83	5.56		
National culture	I do	316	19.78	3.74	9.577	.00*
	I do not	103	15.03	5.35		

$p<.05$*

When Table 4 was analyzed, the value orientation levels of the students' physical education and sports course were significantly different in the lower dimensions of "sportive virtue, solidarity, self-confidence, sensitivity, responsibility, and national culture" according to their regular sports activities. In the sub-dimensions of sportive virtue (t=9.595, p<.05), solidarity (t=9.348, p<.05), self-confidence (t=9.764, p<.05), sensitivity (t=8.826, p<.05), responsibility (t=9.206, p<.05), and national culture (t=9.577, p<.05) a significant difference was found in favor of "I do".

Table 5

T-Test Results of Students' Physical Education and Sports Course Value Orientation Levels by Participating in School Teams

Sub-dimensions	School team	*n*	$\bar{X}$	*Sd*	*t*	*p*
Sportive virtue	Yes	135	29.96	5.41	5.017	.00*
	No	284	26.17	7.94		
Solidarity	Yes	135	12.75	2.51	4.753	.00*
	No	284	11.12	3.58		
Self-confidence	Yes	135	20.98	3.88	4.464	.00*
	No	284	18.72	5.24		
Sensitivity	Yes	135	16.09	3.34	5.543	.00*
	No	284	13.76	4.30		
Responsibility	Yes	135	20.47	4.20	5.281	.00*
	No	284	17.73	5.28		
National culture	Yes	135	19.18	3.67	4.334	.00*
	No	284	17.90	5.12		

$p<.05$*

When Table 5 was analyzed, the value orientation levels of the students' physical education and sports course were significantly different in the sub-dimensions of "sportive virtue, solidarity, self-confidence, sensitivity, responsibility, and national culture" according to the status of participation in school teams. In the sub-dimensions of sportive virtue (t=5.017, p<.05), solidarity (t=4.753, p<.05), self-confidence (t=4.464,

p<.05), sensitivity (t=5.543, p<.05), responsibility (t=5.281, p<.05), and national culture (t=4.334, p<.05) a significant difference was found in favor of "Yes".

Table 6

One-Way ANOVA Results of Students' Physical Education and Sports Course Value Orientation Levels by Family Income

Sub-dimensions	Family income	*n*	$\bar{X}$	*Sd*	*df*	*F*	*p*	Tukey
Solidarity	Low	167	12.12	3.10	2	3.298	.03*	Low> High
	Middle	165	11.49	2.97	416			
	High	87	11.04	4.31	418			

p<.05*

When Table 6 was analyzed, a significant difference was found in the "solidarity" [F(2,416)=3.298, p<.05] sub-dimension of the students' physical education and sports course value orientation levels according to their family income. There were no significant differences were observed in other sub-dimensions (p>.05). According to the multiple comparison test (post-hoc) results, a significant difference was found between low ($\bar{X}$=12.12) and high ($\bar{X}$=11.04) family income level in favor of low income level in the sub-dimension of solidarity.

Discussion and Conclusion

In this study, the value orientations of secondary school students in physical education and sports were analyzed according to gender, age, doing regular sports, participating in school teams, and family income variables. As a result of the research, the physical education and sports value orientation of male students was higher than that of female students, and the sportive virtue behavior of students was higher than that of the age group of 13 compared to that of the age group of 15. In addition, students with low family incomes were more likely to act in solidarity than students with high incomes. The most remarkable result of the study is that students who doing regular sports and participating in school teams have higher physical education and sports lesson value orientations than other students. These results show that students can be developed behaviors such as taking responsibility, controlling emotions, cooperating, sharing, showing the virtue of sports, helping, creating team spirit through physical education and sports.

In the study, significant differences were found in the value orientation levels of the students' physical education and sports courses in favor of male students in the lower dimensions of "self-confidence, sensitivity, responsibility and national culture". In this context, male students show more self-confidence, carrying out tasks and responsibilities, protecting tools, taking security measures, being in cooperation during the event, participating in national holidays, and caring than female students while performing activities in physical education and sports courses. It can, therefore, be argued that male students can be given more responsibilities in the fields of physical education and sports, and that their responsible behavior can be improved through sporting activities.

Looking at similar research on the subject, Feather (1984) found in his research that females are more sensitive to honesty, love, respectability, and inner harmony than males. Gutierrez and Gonzales-Herrero (1995) study found that male students achieved gains in achievement, social, power, justice, respect, and skill values, while female students achieved gains in values of mental and emotional control and personal creativity. In their research, Schwartz and Rubel-Lifschitz (2009) found that females care more about the values of benevolence and humanism than males. In their research on business students, Leventhal, Pournader, and McKinnon (2017) found that female students were more sensitive to gender ethical responsibility than male students. In the research conducted by Işıkgöz et al. (2018), they achieved results in favor of male students in the lower dimensions of wellness and nutrition, while in the lower dimensions of mindfulness, national culture, and togetherness in favor of female students. Bulut (2012) found a result in favor of boys in the lower dimension of "stimulation" of value trends by gender, while he found a result in favor of girls in the lower dimensions of "compliance, benevolence, and security." In their research, Başçiftçi, Güleç, Akdoğan, and Koç (2011) achieved results in favor of male students in the sub-dimension of safety, while in other sub-dimensions, they obtained results in favor of female students. Özcan and Erol (2017), achieved results in favor of male students in the lower dimension of "hedonism" of the value orientations of the students according to gender, while in the lower dimensions of "power, universalism, and benevolence" they achieved results in favor of female students. Doğan (2018) achieved results in favour of male students in terms of gender, while Dilmaç, Bozgeyikli, and Çıkılı, (2008), Arslan and Tunç (2013), Kızılgeçit, Acuner, and Toklu (2015), Sesli and Başaran (2016) and Yücekaya (2017) achieved results in favour of female students in terms of gender. Research results indicate that there are differences in the direction of value relative to the gender variable in favor of both males and females. This difference in research can be said to be due to the fact that the population and the sample groups in which the research is conducted have different environmental and structural characteristics.

In the study, a significant difference was found in the value orientation of students' physical education and sports courses in favor of the age of 13 in the "sports virtue" sub-dimension. Thus, students in the age group of 13 are more likely to behave in accordance with olympism during sporting activities, to control their emotions, to try to resolve disagreements, to behave in accordance with olympism. Therefore, students in the younger age group may be found to be more attentive to their virtuous behaviour. Looking at similar research on the subject, Yücekaya (2017) achieved similar results with these findings based on age variables, which determined that there was a decrease in the level of value orientation as the age of students increased. Işıkgöz et al. (2018) found that, as the age of secondary school students grew, there was a decline in the value of physical education and sports orientation. The reason for this, he suggested, was due to the anxiety of the examination during the transition period from secondary school to high school with an increase in age. However, the competitive nature of sport only in order to win, receive medals and awards causes the virtue of sport to lose its importance. This can be said to have led students to see sport as an activity that is only done to win and succeed as their age increases. Tanrıverdi (2012) argues that the understanding of sportsmanship is lost due to the diversion from the original purpose of

sport to focus solely on success. It can also be said that, as the age of students increases, the value of the orientation of physical education and sports courses decreases as they enter puberty and experience changes in their thinking and behavior in psychological and social terms during this period. Because this period is a complex period in which value priorities, interests, and assets can be replaced.

In the study, significant differences were found in the value orientation levels of the students in physical education and sports courses in favor of the students who doing regular sports in the sub-dimensions of "sportive virtue, solidarity, self-confidence, sensitivity, responsibility, and national culture". In this context, it is observed that students who doing regular sports show more behavior such as self-confidence, fulfilling duties and responsibilities, protecting the tools, taking security measures, being in cooperation during the event, participating in national holidays and caring, being tolerant, acting in accordance with the concept of olympism, controlling emotions, making efforts to resolve disputes, and congratulating friends during the sporting event than those who do not doing regular sports. Therefore, it can be stated that playing sports positively affects the value orientation of the students and that the students assimilate sportsmanship. In fact, in Koç (2013) research, he states that sportsmanship contains characteristics such as virtue, courage, self-confidence, self-control, respect for the thoughts of others, ability to act together, kindness, generosity.

The study found significant differences in the value orientation of students' physical education and sports courses in favor of students who participated in school teams in the "sportive virtue, solidarity, self-confidence, sensitivity, responsibility, and national culture" sub-dimensions. Looking at similar research on the subject, Sabirova and Zinoviev (2016) argued that migrant children who join sports clubs can interact and socialize more easily with their peers and the elderly. Yücekaya (2017) concluded that the physical education and sports course value orientations of secondary school students participating in school teams differed in favor of those participating in school teams. Işıkgöz et al. (2018) found that participating in the school team improves the quality of life of students, is positively affected both physically and spiritually, while active sports are effective in making them part of a sporting culture. Participation in school teams allows students to express themselves. By participating in school teams, students are able to experience emotions and behaviors that are important elements of sports culture, such as success, winning, self-confidence, self-acceptance, displaying abilities, belonging and sharing, more often and in different ways. Pehlivan (2004) emphasizes the moral and humanitarian objectives of school sports and states that school sports mediate the acquisition of physical, mental, and health-related values for children and young people. It can be said that participating in school teams has a positive effect and contributes value to the orientation of students' physical education and sports courses.

The study found a significant difference in the level of orientation of students' physical education and sport courses in favor of those with lower levels of family income in the "solidarity" sub-dimension. In this context, it is noted that students with a low level of family income are more likely to share tools and equipment during the activity, share the playing field equally, and cooperate to achieve goals than those with a high level. It can, therefore, be argued that students with a lower level of family income have more sharing and more cooperative behavior. It can be said that low-income families have developed a unique culture of solidarity due to the financial difficulties

they face and that students reflect on their daily activities. Particularly in crowded families, students sharing their rooms, clothes, toys, stationery, etc. with their siblings, being in constant, crowded family communication can be an important factor in their sharing and cooperative behavior. Dilmaç et al. (2008) and Bulut (2012) have determined that the value orientation of students with lower income levels is higher. Studies have paralleled the results of this research. Per contra, Sesli and Başaran (2016) found no significant difference between the value orientations of the students and their family income levels. The reason for the differentiation of these results can be cited as economic differences or living conditions in the geographical region where the research was conducted.

In this current study, value orientations of secondary school students were determined in physical education and sports course and it was determined that students showed responsible behavior in physical education and sports course. As a result of this research, considering how challenging human education is, it is seen that physical education and sports courses are an important source in the education of values to the students. This study was conducted only on secondary school students and in a city. The scope of the research can be expanded by including different age groups and different regions in future studies. Through physical education and sports lessons, course contents can be organized for students to develop values such as taking responsibility, sharing, helping each other, leading, self-control and respecting others. While creating these contents, models such as Personal and Social Responsibility, Sports Education, Peer Education, and Collaborative Learning can be used.

The results of this research show how effective sport is in imparting responsible behaviors to students. In this context, more environments should be created for students to participate in sports activities in and out of school. According to the research results, female students can be given more duties and responsibilities in physical education and sports classes, and more female students can participate in school teams. In older groups of students, activities can be organized as for all students can win and will enjoy. Thus, it will be emphasized that sport is not only an environment for winning or receiving awards, but also for displaying sportsmanship behaviors.

A large number of sports activities can be arranged so that students with high family income can spend time together in and out of school to communicate, mingle, and share more with other students. In order to increase the participation of the students in the school teams, sports participation can be provided in various branches for their interests and abilities. The cooperation and efforts of physical education teachers and parents of students are important for all these activities to take place.

Statement of Responsibility

Yasin Karaca; conceptualization, validation, investigation, resources, writing - original draft, writing - review & editing, visualization, supervision. Bijen Filiz; conceptualization, methodology, formal analysis, validation, data curation, writing - review & editing, supervision.

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