

SPELLING DEVELOPMENT IN TURKISH:
PHONOLOGICAL ENCODING AND RAPID NAMING SKILLS
IN FIRST AND SECOND GRADERS



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Spelling Development in Turkish: Phonological Encoding
and Rapid Naming Skills in First and Second Graders

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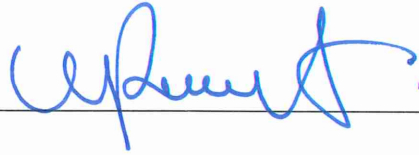
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ABSTRACT

Spelling Development in Turkish: Phonological Encoding and Rapid Naming Skills in First and Second Graders

The present study explored spelling development of Turkish- speaking children in grades 1 and 2. It was designed to investigate the predictors of word spelling and reading skills and the developmental relationship between spelling and reading abilities. In particular, the role of phonological encoding (PE) skills and rapid automatized naming (RAN) in reading and spelling was examined. Besides, children's spelling errors in word and text level were investigated in terms of different task modality (copying vs. dictation). A total of 71 students attending Grade 1 and 2 participated in the study. Data were gathered through a battery of tests and analyzed both quantitatively and qualitatively. The results indicated that there was no significant difference between the performance of the first and second graders in PE and word spelling skills although the second graders performed significantly better in RAN and word reading tests. In addition, multiple regression analyses showed that PE was a significant predictor of spelling skills while RAN was a strong predictor of reading skills in Turkish. Besides, PE significantly contributed to the reading skills of the second graders while it did not account for significant amounts of variance in word reading ability of the first graders. The findings of the qualitative analysis of spelling errors showed a variety of error patterns across task modalities, however, they were found not to be significantly different across Grade 1 and 2.

ÖZET

Türkçe’de Yazım Gelişimi: 1. ve 2. Sınıf Öğrencilerinin Fonolojik Kodlama ve Hızlı Otomatik İsimlendirme Becerileri

Bu çalışma, 1. ve 2. sınıf çocuklardaki Türkçe yazım gelişimini araştırmaktadır. Kelime yazma ve okuma becerilerinin öngöstergelerini ve bu beceriler arasındaki gelişimsel ilişkiyi araştırmak için dizayn edilmiştir. Özellikle, fonolojik kodlama (FK) ve hızlı otomatik isimlendirme (HOTI) becerilerinin okuma ve yazmadaki rolünü incelemektedir. Ayrıca, çocukların kelime ve metin yazma testlerindeki yazım hataları farklı test türleri (kopyalama ve dikte) açısından incelenmiştir. Çalışmaya toplamda 1. ve 2. sınıfa devam eden 71 öğrenci katılmıştır. Bir grup test aracılığıyla veri toplanmış ve hem nicel hem nitel olarak analiz edilmiştir. Sonuçlar, 1. ve 2. sınıf öğrencilerinin FK becerilerinde önemli bir fark olmadığını, buna rağmen 2. sınıf öğrencilerinin HOTI ve kelime okuma testlerinde oldukça başarılı olduklarını göstermiştir. Regresyon sonuçları, Türkçe’de FK’nın yazma becerilerini önemli ölçüde yordadığını, HOTI’nin ise okuma becerilerinin önemli bir göstergesi olduğunu ortaya koymuştur. Bunun yanı sıra, FK, 1. sınıftaki öğrencilerin kelime okuma becerisini önemli ölçüde etkilemediği halde, 2. sınıf öğrencilerinin okuma becerilerine önemli ölçüde katkıda bulunmuştur. Yazım hatalarının analizi, test türüne bağlı olarak hata örüntülerinin çeşitlendiğini, fakat sınıf düzeyi açısından önemli bir fark bulunmadığını ortaya koymuştur.

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CHAPTER 1

INTRODUCTION

Literacy is a skill that everybody needs in almost every aspect of daily living such as at school, at work or at home. Although the definition has widened in scope considerably in the last few decades, literacy is basically the ability to read and write. It encompasses the knowledge and ability to read and spell. Thus, reading and spelling are the two skills that are important to the development of literacy (Otto, 2008).

For a better understanding of languages, it is highly significant to understand how these literacy skills are gained (Caravolas & Samara, 2015). To this end, several studies have been conducted in order to understand how reading is acquired (Ziegler & Goswami, 2005). In contrast to the large body of research on reading in alphabetic systems, spelling has attracted less attention although spelling is an area that deserves plenty of attention in terms of literacy skills (Tainturier & Rapp, 2001).

As one of the necessary abilities for literacy development, spelling is an important skill that is aimed to be gained by students in the first years of schooling. Being a linguistic skill, spelling is the visual representation of spoken language. In other words, as defined by Kress (2010), it is the knowledge of how to write words correctly.

Learning how to spell is one of the challenging skills in early years of schooling. With the increasing interest in spelling development in recent years, research on the spelling ability provides information about children's knowledge of graphic and phonological features of spelling and how they gain this major aspect of

literacy (Pollo, Treiman, & Kessler, 2008). Also, the study of spelling helps to understand how children see the language on the printed paper (Deacon & Sparks, 2015).

Various stage theories are postulated in alphabetic writing systems in order to explain spelling development (Pollo et al., 2008). In these stage theories, largely based on phonological perspectives, the analysis of spelling errors gives insight to understand the development of the spelling ability as spelling errors provide a rich source of information. Also, they are likely to reveal the processes underlying the spelling development (Protopapas, Fakou, Drakopoulou, Skaloumbakas, & Mouzaki, 2012). It should be noted, however, that most research conducted so far has focused on the spelling development especially in opaque languages (e.g. English) (Frith, 1980; Gentry, 1982; Ehri, 1987; Caravolas, Hulme, & Snowling, 2001; Young, 2007). Spelling development in transparent languages, such as Turkish, also needs to be examined.

Several cognitive and linguistic factors can be identified in the development of the spelling ability. Among these skills, phonological awareness is found to be one of the critical predictors (Gentry, 1982). Phonological awareness (PA) refers to the awareness of the sound structure of spoken language. It involves the ability to recognize, identify, or manipulate any phonological unit within a word, namely sounds and phonemes (Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997). Numerous studies were conducted to identify the role of phonological awareness in literacy development and these studies have revealed that there is a close relationship between phonological awareness and literacy development. In other words, phonological awareness has been found to be a significant predictor of learning to read and spell in different languages such as English (Bradley & Bryant 1983;

Torgesen, et al., 1997; Caravolas, Hulme, & Snowling, 2001), Czech (Caravolas, Volin, & Hulme, 2005), German (Goswami & Bryant, 1990), Greek (Nikolopoulos, Goulandris, Hulme, & Snowling, 2006) and Turkish (Öney & Durgunoglu, 1997).

Besides phonological skills, rapid automatized naming (RAN) is another fundamental skill in literacy development in order to assess automatization. RAN refers to the retrieval of phonological codes from long-term memory (de Jong & van der Leij, 1999). More specifically, it is defined as the ability to name visual stimuli, such as digits, letters, colors, and objects as correct and fast as possible (Georgiou, Torppa, Manolitsis, Lyytinen, & Parrila, 2012). As it is related to the process of accessing letters, digits, and words, rapid automatized naming (RAN) tasks were developed to find out the contribution of rapid naming to literacy skills (Denckla & Rudel, 1976a, 1976b). Since then, this ability has been explored in relation to reading ability in a number of studies in the literature. That is, rapid naming is found to be a strong predictor of reading (Bowers & Wolf, 1993; Kirby, Parrila, & Pfeiffer, 2003; Norton & Wolf, 2012; Wolf & Bowers 1999).

On the other hand, as in other aspects of literacy skills, the contribution of naming speed to the spelling ability has attracted less attention. A few studies have questioned the relationship between RAN and spelling, especially in English (Savage, Pillay, & Melidona, 2008; Wimmer, Mayringer, & Landerl, 2000). The results showed that RAN makes a significant contribution to the spelling ability in English. That is, while spelling in English, letters or letter chunks are retrieved automatically without using phoneme-grapheme conversion skills. However, the relationship between RAN and spelling in transparent languages remains less clear. In this sense, it is important to conduct more research in transparent languages in order to investigate the relationship between RAN and spelling.

The primary purpose of this study is to examine the role of phonological awareness (PA) and rapid automatized naming (RAN) in Turkish spelling and reading skills of children in Grade 1 and Grade 2. Despite detailed investigation of these factors and their roles in reading in the literature, little research has focused on phonological awareness and rapid automatized naming in spelling performances of Turkish speaking children (e.g., Babayiğit & Stainthorp, 2010; Sönmez, 2015). Thus, this study aims to gain more insight into Turkish spelling skills by examining the roles of PA and RAN in spelling performances of students in the early years of schooling.

In the current study, in accordance with Savage et al. (2008), PA was measured in the form of phonological encoding skills (PE) by using a nonword spelling task. As the nonwords are not directly retrieved from the lexicon, grapheme-phoneme correspondence rules are needed for their processing in the spelling task. Thus, these kinds of tasks are generally considered as a direct measure of the ability to apply encoding skills (Savage et al., 2008). RAN was measured through the digit naming task as it is an efficient way to measure the retrieval of phonological representations of words.

The present study also aims to explore the nature of spelling errors by Grade 1 and Grade 2 students. Based on data from an error analysis, it is aimed to investigate the characteristics of the most common spelling errors in Turkish at the word and text level and compare the errors across grade levels and task modality (copying vs. dictation). Furthermore, the current study seeks to detect error patterns in the spellings of first and second graders. Thus, this study can provide a good opportunity to understand how spelling develops in a transparent language, Turkish,

by comparing error patterns across grade levels and what characteristics spelling errors in Turkish have in the early years of literacy development.

This chapter has provided a short introduction to main points and the factors and constructs of the current study. The next chapter presents an extensive literature review of previous research in the field. Chapter 3 describes phonological characteristics of Turkish. Chapter 4 gives detailed information on the methodology of the study, -including the design, participants, tasks and procedures used in the study. Following methodology section, Chapter 5 presents the results of the study. Finally, Chapter 6 presents the discussion of the findings and the conclusion.

CHAPTER 2

LITERATURE REVIEW

The purpose of this chapter is to provide background on the development of spelling skills based on phonological approaches. Moreover, it discusses the relationship between the literacy skills, reading and spelling, with a focus on the role of PA and RAN. Lastly, it presents the findings of previous research conducted on spelling errors made by Turkish speaking children.

2.1 What is spelling?

Spelling is one of the key components of the ability to write during literacy development. According to Perfetti (1997), spelling is the encoding of linguistic units like phonological strings, morphemes etc. into written forms. It relies on one's phonological, morphological, and orthographic knowledge of the language (Perfetti, 1997). Sebba (2007) defines spelling as the application of orthographic rules of a specific language when writing actual words. According to Kress (2010), spelling is either putting what is stored in the brain- or memory- into letter form or translation from the medium of sound into medium of graphic- letters.

To put it simply, spelling means knowing how to write words correctly. It is mostly considered as the process of understanding how the sounds of words can be represented by letters or letter groups (Lehtonen, 2006).

2.1.1 Development of spelling skill

As spelling skills constitute an important aspect of literacy acquisition, a large amount of research in different frameworks has examined learners' spelling skills and how these skills develop over time -from a "no knowledge stage" to an "increasingly more sophisticated one" (Ehri, 1987; Frith, 1985; Gentry, 1982).

According to Pollo et al. (2008), there are three current approaches of early spelling development in alphabetic writing systems: (i) the constructivist view, (ii) the statistical-learning view, and (iii) the phonological perspective. These will be explained respectively in this section.

Researchers following the constructivist approach have the Piagetian viewpoint for explaining literacy development with a focus on what children know about the characteristics of writing before they start school. They suggest that children know a lot about features of writing like how to write words at early ages. Researchers with this perspective tend to emphasize that spelling is the result of generating constructions spontaneously in the minds of children. In the development of spelling, children adopt and abandon different hypotheses about written language until they fully grasp the alphabetic principle, which refers to idea that letters stand for the sounds of the spoken language (Byrne, 1998). At first, although they can be good at discriminating writing from drawing, they are inclined to relate words with their semantic features. For instance, they tend to use longer spellings for bigger objects. As children learn and gain more experience with print, they understand that letters stand for smaller sounds than syllables, namely, phonemes. That is, they learn about the alphabetic principle at the end (Pollo et al., 2008).

A second perspective in the study of spelling development is the statistical-learning approach, which is defined as implicit learning from statistical- frequent-regularities and using what children learn on spelling words. This approach emphasizes that children's spelling mirrors the characteristics of the input they have gained by exposure to environmental print such as material on street signs, in books or magazines. In other words, children can take advantage of statistical regularities of printed words in their early language development. They can learn from these regularities about graphical and phonological patterns of the language and reflect them even in their early spellings. (Pollo et al., 2008). Thus, frequency of the input has an important role in spelling development. The statistical-learning perspective is compatible with the constructivist approach that children's spellings are not randomly produced strings of letters. Instead, they are the results of formulated and tested hypotheses until they understand that letters represent phonemes. However, this approach does not support the constructivist view in that spelling is the result of spontaneous emergence of constructions with the help of child's mental operations. Rather, statistical learning approach proposes that these hypotheses depend on the frequent appearance of letters in the child's surroundings. Another proposal by the statistical-learning perspective is that the same mechanism is in control throughout the spelling development, which contrasts with the phonological approach that children move through different stages with different operating principles (Pollo et al., 2008).

As the third approach, the phonological perspective depicts the development of spelling in terms of children's increasingly advanced ability, the alphabetic principle, which shows that what children do is more than memorizing spellings (Deacon & Sparks, 2015). It holds that the key in learning to spell is to learn the

alphabetic principle. If children have not grasped the alphabetic principle yet, their spellings are randomly produced strings of letters. Therefore, this approach describes the development of children's spelling ability in stages relying on encoding skill, which is the ability to map sounds to phonetically proper letters. Starting from a stage in which their spellings are non-phonological, children reach at a final stage, where the spellings are phonologically sufficient (Pollo et al., 2008). While going through different stages, children make use of different types of knowledge: first they use their knowledge of letter names and phonology to spell words. During later stages, additional information like knowledge of orthography and morphology comes into play (Treiman & Bourassa, 2000).

2.1.2 Understanding spelling development through the phonological perspective: Stage theories

Learning the spelling ability thoroughly is a developmental task for children as they should learn the correspondence between phonemes and graphemes as well as the orthography and morphology of the language. Understanding spelling development from a phonological perspective is mostly based on the analysis of children's spelling errors as these errors provide evidence for the way children master the sound and spelling system of their languages (Varnhagen, McCallum, & Burstow, 1997).

Error analysis is a method used to figure out the knowledge and strategies that children use in their spellings. As it gives descriptive information about the errors, this approach makes it possible to learn about not only children's phonological, orthographic and morphological knowledge of the language but also how children use this information in encoding phonemes to graphemes (Varnhagen et al., 1997; Stage & Wagner, 1992).

Similarities in misspelled words and common spelling errors gave rise to the idea among researchers that spelling development has a stage-like manner which is similar to the earlier stages of language development (Frith, 1980; Gentry, 1982). The study by Read (1971) paved the way for research on developmental stages of spelling. Read (1971) investigated preschool children's knowledge of English by examining their invented spellings and found that the children came up with common and systematic spellings for unknown words. Since then, many researchers have studied the spelling patterns in the handwritings of children in English from a phonological perspective. As a result, the phonological perspective has been advanced in stage-based theories of spelling development (e.g., Ehri, 1987; Frith, 1985; Gentry, 1982; Henderson, 1985). Despite their slightly different accounts regarding spelling development, researchers adopting phonological approach, like Ehri (1987), Frith (1985), and Gentry (1982), have established common ground on considerably similar series of phases (Deacon & Sparks, 2015).

This stage-based-approach characterizes the knowledge of the language that children have at different times and the different strategies children use at various stages of their cognitive development. Based on many studies on error analysis, specific stages of spelling development were identified. Although the names and numbers of stages are formulated differently by the researchers, as shown in Figure

1, all the proposed stages follow a developmental sequence. That is to say, ordering principles of English are followed in these stages: first comes the alphabet and letter-sound knowledge, then learning patterns and orders of the letters, followed by understanding the relationships between words in terms of meaning (Young, 2007).

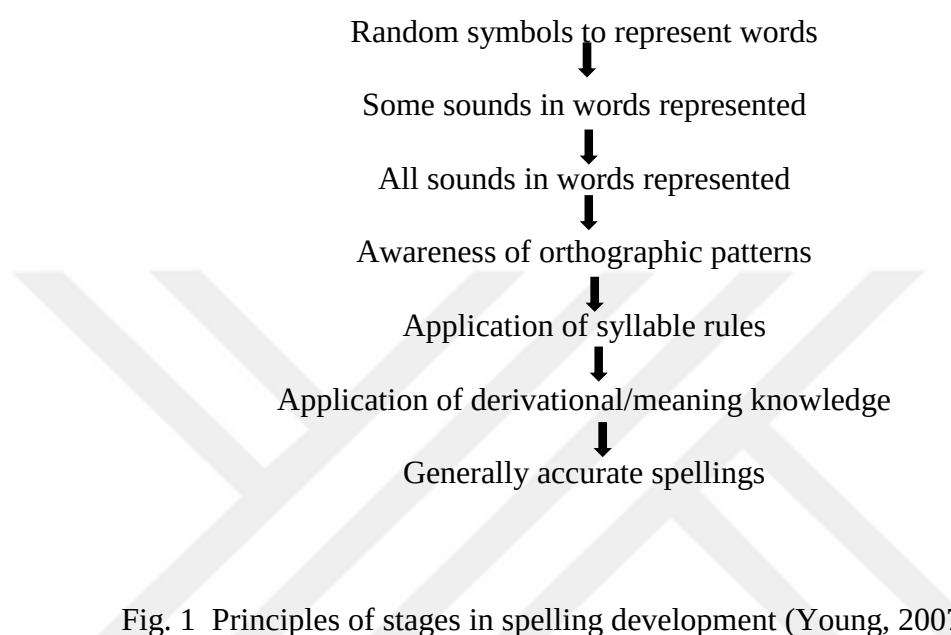


Fig. 1 Principles of stages in spelling development (Young, 2007, p.205)

A number of researchers in this area came up with theories, defining various stages of spelling development, mostly in English. Table 1 presents an overview of these stages in spelling development proposed by various theorists (Gentry, 1981; Perfetti, 1997; Young, 2007).

Table 1. Developmental Stages in Spelling

Stages	GENTRY	EHRI	FRITH
1	Precommunicative	Precommunicative / Prephonetic	Logographic
2	Semiphonetic	Semiphonetic	Alphabetic
3	Phonetic	Phonetic	Orthographic
4	Transitional	Morphemic / Within-word Pattern	
5	Correct		

As can be seen in Table 1, despite the different naming for the stages, these models are all based on the phonological perspectives and they seek to explain how spelling abilities progress from the earliest attempts to fully competent spellings. At the beginning, children produce non-phonological or logographic spellings because they spell familiar words as random strings of letters. Basically, these spellings are considered to lack a precise connection to the sounds of the words. They continue to produce spellings based on phonology, first with limited and then full phonological representations. In the final stages, it is predicted that children master spelling regularities including morphological and orthographic patterns beyond phonology. Thus, they are able to spell complex words successfully (Deacon & Sparks, 2015).

Among the developmental models discussed in the spelling literature, Gentry's model has received more attention than the others due to its wide scope (Varnhagen et al. , 1997). Therefore, this section presents characteristics of Gentry's model in detailed terms. In his spelling theory, Gentry (1981, 1982) came up with five stages to explain how children learn to spell: precommunicative, semiphonetic, phonetic, transitional and correct.

Precommunicative stage is identified as the first level of spelling development and this stage is characterized by symbols which stand for words. Children in this stage usually use symbols or letter-symbols from the alphabet haphazardly to represent words, which is the first primitive attempt of children to write with an alphabetic system (Gentry, 1981). Called as “babbling stage” by Gentry (1981), spellings in this early stage often appear in kindergarten children who have exposure to print.

For Gentry (1982), a child is in the precommunicative stage, if her/his spelling has the following characteristics:

- a. having some knowledge of the alphabet, which is revealed by writing letters to present a message (attempting to write their names, for instance);
 - b. having no knowledge of letter-sound correspondence, randomly putting string of letters together;
 - c. having almost no knowledge of directionality, which is left-to-right in English and Turkish like languages;
 - d. including number symbols as a part of his/her spelling of a word;
 - e. not being able discriminate between uppercase and lowercase letters
- (Gentry, 1982, p. 193).

In the semiphonetic stage, unlike precommunicative stage, spellings represent spellers' first access to an alphabetic orthography as they show the knowledge of letter-sound correspondence for the first time. Also, children start to form the concept of alphabetic principle (Gentry, 1982). The characteristics of this stage are listed as below:

- a. beginning to learn that letters are used to represent sounds in words;
- b. using one, two or three letters to represent the whole word because of partial mapping of phonetic representation;
- c. using letter-name strategy: using letters to represent words, sounds or syllables instead of using vowels and consonants (R-are, U-you);
- d. beginning to learn left-right directionality (Gentry, 1982, p. 194).

In the phonetic stage, the main characteristic is systematic development in letter-sound correspondence which is common among first graders (Gentry, 1981). In this stage, children can spell 80 phonotypes (sounds of a language), although some of them do not have all the details of phonetic forms. Spellers in this stage can represent the phonetic knowledge in the word regardless of English orthography. Spellings in this stage fulfill the following conditions:

- a. a complete mapping of letter-sound correspondence for the first time;
- b. systematic developments of specific spellings for some forms like tense vowels, affricates, and lax vowels;
- c. usually having the knowledge of word segmentation;
- d. writing letters based on sounds, regardless of English orthography (Gentry, 1982, p. 195).

The next stage is the transitional stage which is characterized by the expanding knowledge of English orthography. Moreover, spellers begin to understand how morphology has an effect on spelling. According to the case study conducted by Bissex (1980) (as cited in Gentry, 1982, p. 196), transitional stage can last during most of the first and second grade. It indicates a major progress toward standard English orthography. During this stage, spellers go through a transition from relying on phonology to represent words to a greater dependence on morphological representations. Also, reading and spelling instruction during this stage helps to reach spelling competence (Gentry, 1982). Transitional spellers have the following characteristics:

- a. meeting the conventions of English orthography;
- b. moving from phonological to morphological spelling;
- c. including all letters but reversing the order of some letters;
- d. being aware of alternative spellings for the same sound (Gentry, 1982, p. 196).

In the last stage, namely the correct stage, Gentry (1982) classifies the children who have fully learned the phonological, morphological and orthographic knowledge as being in the correct stage. From an educational point of view, a second grader is regarded as a correct speller after s/he masters a certain amount of second-grade level words. Correct spellings match the following features:

- a. a firm establishment of orthography and its major rules;
- b. reflecting an extensive knowledge of word structure like correct spellings of prefixes, suffixes, and contractions;
- c. showing a growth of accuracy in doubling consonants properly (Gentry, 1982, p. 198).

As is the case for Gentry's stage theory (1981, 1982), all stage theories suppose that spellers undergo a transition from reliance on phonological knowledge to rely on orthographic and morphological rules. What is similar in all stage theories is the fact that development in stages is characterized by one single strategy, used consistently, to solve the spelling problem. Thus, transitions from one stage to another are specified by instant strategy changes and different word spellings in the successive stages. Therefore, according to stage theories, spelling development should be conceptualized as a discontinuous and multidimensional process that

reflects developmental changes in strategy use instantly (Keuning & Verhoeven, 2008). In other words, development of the spelling ability is multidimensional, which means that in order to progress into different stages, children must acquire many different strategies, and it is discontinuous, that is the strategies used in each stage are disconnected with each other, as one strategy in a stage does not operate in concert with other strategies used in other stages (Keuning, 2008).

However, there is contrastive evidence for regular orthographies. As most of previous research within the phonological perspective has focused on the English language, the generalizability of phonological approaches to learning to spell in other languages is questioned. Keuning and Verhoeven (2008) conducted a pseudo-longitudinal study to explore spelling development throughout the elementary grades in the Dutch language with an emphasis on dimensional structure over time. More than 1300 children from Grade 2 through Grade 6 took part in the study and their responses to five different sets of spelling items were analyzed. The results showed that the development of the spelling ability can be conceived as a one-dimensional and continuous learning process across elementary grades. That is, the strategies used in each stage are mastered consecutively in an overlapping way. Also, these strategies do not differ according to stages, but they display gradual improvements in the knowledge and ability of children in each stage. Therefore, it means that the results do not support a stage conceptualization of spelling development in Dutch (Keuning, 2008).

Similarly, Varnhagen et al. (1997) studied 272 native English speaking elementary school students from first through sixth grade with the goal of examining the stage-like nature of children's spelling development. Spelling samples were the stories written by students in 1st through 6th grade. It was found that children's

spellings did not follow a developmental pattern of qualitatively distinct stages from semiphonetic to phonetic to transitional to correct spelling across the elementary school grades. Instead, the errors represented a progression from the phonetic stage directly to correct spelling. In other words, the results showed that there was little evidence for qualitative differences in stage classifications as well as in stage constancy across grades. It is concluded that developmental stages do not adequately outline the spelling development in the elementary school period.

Another study in Dutch was done by Notenboom and Reitsma (2003) in order to find out whether or not the theories of spelling development, mainly based on data from English, are applicable to other languages, namely Dutch. In 22 elementary schools in the Netherlands, 3,657 students from Grades 1 to 6 took part in the study. The results revealed that the spelling ability from Grade 2 to 6 can be conceptualized as unidimensional; however, it was two-dimensional for the first graders. These results implied that there is a transition in spelling strategies children use and this occurs between the second half of the first grade and the first half of the second grade. In other words, in the onset of spelling development, first graders implement phonological and orthographic patterns, whereas second graders use only orthographic patterns as they mastered the alphabetic principle and spelled all phonologically transparent words correctly (Notenboom & Reitsma, 2003).

In their research Wimmer and Hummer (1990) found that children learning to read and spell in German, which is a more regular writing system compared to English, skip the earliest phases and move straight into the full alphabetic phase. They studied children having only a 6-month reading and spelling instruction. The results revealed that almost all the children could read pseudowords relying on the

full alphabetic strategy. In other words, by phonological recoding, the children could read non-existent words in their language.

In short, the findings of the research on stage theories led to several conclusions: 1) the spelling errors children make while writing are not arbitrary; 2) as children become more proficient in spelling, phases of orthographic awareness can be identified and lastly; 3) the rate of progress through these stages varies among children (Young, 2007). However, as the stage theories are primarily developed depending on English orthography, the fact that whether they can be applicable to transparent languages as well as opaque ones has been questioned in a number of studies. Therefore, it seems less clear that these theories are valid for transparent languages, as well.

2.1.3 Spelling development in transparent orthographies

As can be seen in our discussion up to this point, development of the spelling ability is a process that children go through as they learn how to spell. In alphabetic orthographies, much more is learned about the development of spelling skill, especially in English, than in other languages. However, the extent to which spelling development process in English can be generalized to other alphabetic orthographies is likely to be of interest because differences in the transparency of orthographies might affect the spelling development across alphabetic writing systems (Caravolas, 2004).

Orthographies, writing systems, can be seen as the set of rules and norms for writing words of the language (Perfetti, 1997; Sebba, 2007). They can vary in the degree to which they encode the phonology of the language with respect to its

morphology (Perfetti, 1997). That is, each letter stands for only one phoneme, and each phoneme is denoted by only one letter. Thus, alphabetic orthographies can be classified based on the transparency of their letter to phonology correspondence, which is referred to as "orthographic depth". When orthography represents its phonology in an unequivocal manner, it is considered shallow. On the other hand, in a deep orthography, the relation of orthography to phonology is opaque (Frost, 1989).

A shallow orthography is defined as having one-to-one or close to one-to-one correspondences between letters and sounds (graphemes/phonemes) in the writing system (Davis, 2005). In other words, there is a reliable mapping between orthography and phonology of the language in shallow orthographies so spelling of the words reflects their pronunciation consistently. Finnish, Italian, Spanish and Turkish are examples of shallow or transparent orthographies. In Turkish, one-to-one mapping between phonemes and their spellings are constant, and this makes some literacy skills, decoding and spelling, relatively easy (Durgunoğlu, 2006).

On the other hand, deep orthographies do not have one-to-one correspondence between letters and sounds in the language. There is not a consistent mapping between phonology and orthography. Some European orthographies like English and French are regarded as deep orthographies as they contain inconsistent correspondences (Seymour, Aro, & Erskine, 2003). That is, they do not have one-to-one phoneme-to-grapheme mapping, which makes spelling in English difficult (Fletcher-Flinn, Shankweiler, & Frost, 2004).

Based on the fact that there are differences among alphabetic orthographies in terms of orthographic depth due to differences in phonology and morphology of the languages, it is proposed that the differences in orthographic depth generate processing differences for naming and lexical decision, which is referred to as the orthographic depth hypothesis (ODH) (Katz & Frost, 1992). According to ODH, in shallow orthographies, it is easier to be able to support a word recognition process involving the language's phonology while in deep orthographies the reader is likely to process printed words by referring to their morphology by means of the visual-orthographic structure of the printed words (Katz & Frost, 1992).

Orthographic depth hypothesis also tries to give answers to the questions of whether these different writing systems affect the ways in which children learn to read and spell or how orthographic consistency affects spelling and reading acquisition (Ellis, Natsume, Stavropoulou, Hoxhallari, Van Daal, Polyzoe, Tsipa, & Petalas, 2004). With respect to these questions, ODH proposes that in consistent orthographies, as there are reliable correspondences between graphemes and phonemes, children are highly likely to learn the letter-sound correspondences of their language more quickly than in inconsistent orthographies. Thus, it is expected to enhance the ability to assemble phonemes during decoding in reading and to break the words into phonemes in spelling (Caravolas, 2004).

In line with these assumptions, it is reported in many cross-linguistic studies that children learning consistent orthographies of Czech (Caravolas & Bruck, 1993), Turkish (Öney & Goldman, 1984), German (Wimmer & Goswami, 1994), and Spanish (Goswami, Gombert, & Barrera, 1998) showed better phoneme awareness, word recognition, and reading skills by the first or second year of schooling than their English speaking peers.

Caravolas and Bruck (1993) explored the impact of language input on phonological awareness among 100 Czech and 101 English-speaking Canadian children. They found that Czech children have higher levels of awareness and more advanced spelling skills than English-Canadian children by the end of Grade 1. Findings suggest that the nature of the orthography has an impact on the development of phonological awareness and literacy skills.

In another research by Öney and Goldman (1984), Turkish and American students in Grade 1 and 3 were assessed on their decoding and comprehension skills and Turkish students were found to be faster and more accurate on the decoding task than Americans at Grade 1 and faster at Grade 3. Results suggest that languages with more transparent letter–sound correspondences accelerate the acquisition of decoding skills.

In their cross-linguistic study, Goswami, Gombert and Barrera (1998) conducted experiments to compare the development of orthographic representations in children learning to read in languages with different orthographic depth: English, French, and Spanish. Results showed that orthography has a significant facilitatory effect in reading skill.

In line with previous studies, Wimmer and Goswami (1994) conducted research among 7-, 8- and 9-year old English and German children to compare their word and non-word reading skills. Results showed a marked difference on non-word reading skills of all three age groups in reading German. They read more accurately and faster than English children. It was concluded that German readers acquire decoding ability more easily than their English peers because of the orthographic depth of the German language.

Similarly, studies have shown that children learning transparent orthographies have faster progress in their reading and spelling development regardless of the beginning age and the method of the formal instruction (Aro & Wimmer, 2003; Seymour, Aro, & Erskine, 2003). In their research, Seymour and colleagues found that achieving more than 90% level of accuracy in English took nearly two and a half years while it was achieved within the first year of formal instruction in transparent orthographies such as Italian, Finnish, and Greek (Seymour, Aro, & Erskine, 2003).

In another cross-linguistic study by Ellis and Hooper (2001), similar results were found. The rate of literacy acquisition in orthographically transparent Welsh and English was compared using reading tests and they found that Welsh children were able to read aloud accurately significantly more of their language than were English children.

Regarding Turkish, due to its transparent orthography, it was found that phonological awareness develops rapidly in Turkish across grades. Several studies demonstrated that phonological awareness in Turkish reaches high levels or ceiling levels in early elementary years, especially in Grade 1 and Grade 2 (Babayiğit & Stainthorp, 2007; Durgunoğlu & Öney, 1999; Öney & Durgunoğlu, 1997) although the study by Bektaş (2017) reported contradictory results with regard to the rapid development of phonological awareness in Turkish.

In conclusion, these findings have shown that the orthographic transparency of a language can affect the rate of literacy acquisition to a great extent. Especially in transparent languages, it is found that orthographic transparency can facilitate basic skills necessary for literacy development like phonological awareness when compared to English.

After discussing the effects of orthographic depth on spelling and reading development, the next section will be focusing on how reading and spelling development are linked with each other in different orthographies.

2.2 The relationship between reading and spelling skills

Research in different languages has shown that despite many similarities, reading and spelling development differ largely across languages (Joshi & Aaron, 2006).

Reading and spelling skills are two abilities that constitute literacy and there are different views about the relationship between these two skills. Many researchers proposed that at the beginning of literacy acquisition process, reading and spelling are quite different abilities, which is called as discrepancy hypothesis (Bradley & Bryant, 1980; Frith, 1980; Goswami & Bryant, 1990). According to this hypothesis, reading and spelling skills initially make use of different strategies and then they become closely related. At the beginning of the acquisition process, children are likely to read visually (holistically) while they tend to spell segmentally (phonologically). That is, they break down words into individual sounds while spelling. At later stages, the two skills are claimed to become linked. The hypothesis claims that spellings of the beginners show phonemically segmented word representations, which means they are able to divide up the words into its individual sounds. However, unlike spelling, their reading mainly depends on overall shapes of words. In other words, while learners can use phonological awareness effectively for spelling, they are not able to use it for reading (Fletcher-Flinn, Shankweiler, & Frost, 2004).

The model proposed by Frith (1985) provides a theoretical framework with an interaction between reading and spelling skills, which as a result, increases the learner's proficiency in each skill. According to Frith (1985), reading development has three phases which are identified with three strategies. The first stage is called logographic, and the strategy used in this stage is the instant recognition of familiar words. In other words, children recognize the word as a whole and then pronounce it with the help of important visual cues, like salient graphic features. They mostly ignore letter order and phonological components have a secondary role. Despite being able to recognize familiar words, they are almost unable to write more than a few words from memory since full cues are required for spelling (Eme & Golder, 2005).

The second stage, the alphabetic stage, has the strategy to know and use individual phonemes and graphemes and their correspondences. It involves decoding grapheme by grapheme. Unlike logographic stage, letter order and phonological components play an important role in this stage (Frith, 1985). Starting to spell by building up correspondences between sounds (phonemes) and letters (graphemes) shows the entry to the alphabetic stage. Children then apply this skill-awareness of the relationships between sounds and letters- to reading and gradually become competent to use phonological decoding for new and nonsense words (Eme & Golder, 2005).

In the third stage, children move into the orthographic phase in which they can instantly analyze words into orthographic units without phonological conversion. By the recombination of these units, children can create an unlimited number of words. As a result, reading and spelling become independent of phonological strategies (Frith, 1985).

Based on this three-phase literacy development model, Frith (1985) came up with a new one: six-step model. She redesigned the basic model considering two presumptions: literacy skills are mainly divided into reading and spelling and the development of these skills are likely to continue with a different pace. Table 2 shows the substages of the model in detail.

Table 2. Frith's six-step model of reading and spelling development (Frith, 1985)

Step	Reading	Spelling
1a	Logographic	(Symbolic)
1b	Logographic	Logographic
2a	Logographic	Alphabetic
2b	Alphabetic	Alphabetic
3a	Orthographic	Alphabetic
3b	Orthographic	Orthographic

Source: Frith (1985, p. 311)

In the model, each stage is divided into two substages for reading and spelling skills and in each substage, reading or spelling becomes the pacemaker of the strategy used in that substage. When logographic skill reaches an advanced level, it becomes ready to be used for spelling. When the alphabetic (phonological) strategy is first adopted for spelling, the logographic strategy is still in use for reading. As soon as the alphabetic (phonological) strategy reaches an advanced level, it will be adopted for reading. As one of the principles of the model, with the help of the practice at spelling skill, children perceive the alphabetic code explicitly, which leads to a change from a logographic strategy in reading to alphabetic one. That is, alphabetic strategy becomes the pacemaker of the use of alphabetic strategy in reading. This is also parallel to the fact that phonological awareness, which forms the basis for alphabetic strategy, is much more related to spelling than reading (Ellis, 1994).

According to the model, the reading skill moves from phonological stage to orthographic stage earlier than spelling skill as spelling uses alphabetic strategy longer than reading. This makes spelling skill phonologically oriented for a longer time compared to reading. In the last stage, while reading skills primarily use orthographic strategies, alphabetic (phonological) strategies are utilized by spelling skills for a longer time (Frith, 1985). It is assumed that in the last stage, extensive reading practice using alphabetic strategy strengthens the analysis of letter series in words. As a result, this helps the reader develop orthographic representations letter by letter. Then, these representations are transferred to the spelling skill. Thus, reading becomes the pacemaker of orthographic spelling (Ellis, 1994).

As can be seen from the discussion up to this point, Frith (1985) offers a model in which reading and spelling make progress through the stages. Also, it is important as it offers a theoretical framework in which both spelling and reading skills have an interaction with each other in order to help the learner gain proficiency in each skill. The major point of the model is likely to be that strategy used in one domain may be the pacemaker for the development of that strategy in the other domain (Ellis, 1994).

As can be seen, Frith's stage model provides a broad framework for describing the link between reading and spelling skills in an opaque language, English. However, it is not known for certain whether this model can explain the development of literacy skills in more transparent languages (Lehtonen, 2006). Therefore, conducting literacy research in different languages, especially in transparent ones is likely to be significant as it will give the opportunity to compare and contrast the literacy development processes in alphabetic languages.

While Frith's model outlines the relationship between reading and spelling, there are other factors that play a role in the literacy development. One such factor is phonological awareness, which will be discussed in detail in the next section.

2.2.1 The role of phonological awareness (PA) in reading and spelling development

Phonological awareness (PA) can be defined as one's awareness of and access to the sound structure of the language (Gillon, 2007). In other words, it refers to the ability to notice, think about, or manipulate the individual sounds or phonemes in words (Torgesen et al., 1997).

In a number of studies conducted in many alphabetic writing systems, phonological awareness is found to be a core component of literacy development, which is equally important for learners of consistent and inconsistent orthographies (Bradley & Bryant 1983; Caravolas, Volin & Hulme, 2005; Gillon, 2007; Nikolopoulos, Goulandris, Hulme & Snowling, 2006; Öney & Durgunoglu, 1997; Wagner, et al., 1997). Likewise, Anthony and Francis (2005) stated that “phonological awareness is the phonological processing ability most strongly related to literacy” (p.255). Gillon (2007) argued that the ability to recognize individual words in print and the ability to spell words are vital to understanding and writing a text. She also states that “it is within this context of word recognition and spelling development that the importance of phonological awareness to reading and spelling is recognized” (p.1) (Gillon, 2007). Moreover, Durgunoğlu and Öney (1999) proposed that the acquisition of reading and spelling is firmly associated with children's awareness of phonological units, especially phonemes, as graphemes map onto phonemes.

Furthermore, some studies revealed that PA follows a developmental route in literacy development (e.g., Anthony & Francis, 2005; Ziegler & Goswami, 2005). That is, children's awareness in phonological units moves from larger linguistic units (i.e., words, syllables) to smaller ones (i.e., onset, rimes and phonemes). In other words, as children grow older, they enhance their ability to deal with smaller parts in words. Therefore, they are able to recognize or manipulate syllables preceding onsets and rimes.

Numerous studies have demonstrated phonological awareness as one of the most powerful predictors of reading ability. However, there seems to be two views about the nature of the relationship between phonological skills and reading acquisition because some researchers suggested that phonological awareness is a prerequisite for learning to read (Bradley & Bryant 1983; Liberman, Shankweiler & Liberman 1989), while others argued that phonological awareness is a result of learning to read in an alphabetic orthography (Durgunoğlu & Öney, 1999; Wagner & Torgesen, 1987).

On the other hand, the relationship between phonological awareness and the reading ability has been extensively tested in English and phonological awareness is turned out to be one of the most powerful predictors of reading development in English (e.g., Kirby, Parrila, & Pfeiffer, 2003; Muter, Hulme, Snowling, & Stevenson, 2004; Snowling, & de Jong, 2004; Torgesen et al., 1997).

However, there has been contradictory research evidence from consistent orthographies. The majority of studies conducted in orthographically consistent languages have revealed that PA either may not be an important predictor of reading (e.g., Aarnoutse, van Leeuwe, & Verhoeven, 2005; Babayiğit & Stainthorp, 2007), or

may be important but only during the first grades (e.g., de Jong & van der Leij, 2002; Furnes & Samuelsson, 2010; Landerl & Wimmer, 2000; Wimmer, Mayringer, & Landerl, 2000).

Regarding Turkish, Bektaş (2017) investigated the role of phonological awareness, RAN, morphological awareness and phonological memory in real word and non-word reading ability of Turkish-speaking children. A total of 87 students from Grade 2 and 4 took part in the study. The results indicated that RAN was a strong predictor of the word reading ability at both grades. Also, phonological awareness contributed significantly to word reading ability at Grade 2. However, it did not account for significant amounts of variance in word reading at Grade 4. As for non-word reading, neither RAN nor PA accounted for significant variance at Grade 2 whereas RAN was the only significant predictor at Grade 4.

Despite the mixed findings across languages, it appears that the relationship between PA and reading is more distinct in opaque orthographies (e.g., English, French) than many transparent ones (e.g., Turkish, Finnish). The reason for this may be the time needed to establish reliable grapheme-phoneme recording procedures in different languages (Goswami, Ziegler, & Richardson, 2005; Seymour, Aro, & Erskine, 2003).

During reading development in transparent orthographies, it is likely to be an almost effortless challenge as one letter or a letter cluster is normally pronounced in the same way. However, in less transparent or opaque orthographies such as English, letters can have multiple pronunciations and this fact places heavier demands on PA (Furnes & Samuelsson, 2011).

Unlike reading, spelling is a more sensitive index of phonological processing skills than reading (Perfetti, 1997). Much evidence is presented in support of the relationship between spelling and phonological awareness across languages. Based on data from 60 normally developing Greek children (age range: 5-6-7), Aidinis and Nunes (2001), for instance, investigated whether syllable and phoneme awareness make independent contributions to reading and spelling in Greek. The three groups of children were in Kindergarten, Grade 1, and Grade 2. The results showed that different levels of PA (syllable and phoneme awareness) make significant contributions to learning written Greek on their performance from Kindergarten to Grade 2. Although syllable awareness as well as phoneme awareness was found to be significant predictors of the reading skill, syllable awareness was the only unique predictor of spelling skills of Greek.

In another study, Caravolas and her colleagues (2005) compared phoneme awareness in the development of reading and spelling in languages with consistent and inconsistent orthographies among children learning Czech and English. Normally developing 107 Czech children in grades 2 to 5 and 71 English children in grades 2 to 7 were assessed on batteries of phonological awareness tasks. They found that phoneme awareness plays the same important role in predicting reading and spelling skills in both Czech and English among primary school children regardless of the orthographic transparency of the language (Caravolas et al., 2005).

Plaza and Cohen (2003) investigated a group of 267 French-speaking children from the first-grade classrooms of six schools in order to assess their ability on phonological awareness, syntactic awareness, and naming speed in reading and spelling development. It was found that phonological awareness, syntactic awareness, and naming speed contributed significantly to the reading and spelling

ability in French at the end of Grade 1. Phonological awareness, in particular, accounted for significant unique variance for reading and spelling performance.

Several studies conducted in consistent writing systems such as Turkish, Dutch, and German have concluded that phonological awareness skills play a more central role in children's early spelling development than reading development (Babayigit & Stainthorp, 2007; Landerl & Wimmer, 2008; van Bon & van Leeuwe, 2003; Wimmer & Mayringer, 2002). For example, in a series of studies by Wimmer and colleagues, phonological skills were found to be predictive of spelling but not reading, and conversely, rapid automatized naming was found to be the most powerful predictor of reading but not spelling (Landerl & Wimmer, 2008; Wimmer & Mayringer, 2002).

In line with these studies on transparent languages, Babayigit and Stainthorp (2011) conducted a longitudinal study to examine the central components of reading and spelling skills in Turkish with the testing battery of tasks including phonological awareness and rapid automatized naming. The study also sought to understand the role of orthographic consistency in literacy development. 103 Turkish Cypriot children from 2nd and 4th grades were followed for a year into 3rd and 5th grades respectively to monitor the roles of PA and RAN in reading and spelling among older age groups. They found that phonological awareness was the strongest predictor of spelling, even among older children, whereas RAN was a powerful predictor of reading skill. Independent of PA skills, it was also found that there was a reliable relationship between RAN and spelling in a highly consistent writing system.

In another study by Sönmez (2015), 77 Turkish-speaking children in Grade 3 and 4 were assessed in order to find out the role of phonological encoding skills and

rapid automatized naming in predicting reading and spelling achievement. The results showed that RAN was a strong predictor of reading skill while phonological awareness was a significant predictor of spelling skill in Turkish. However, independent of phonological awareness skills, RAN was also found to make a significant contribution to spelling achievement at both grade levels. That is, as the grade level increased, the role of phonological skills tended to decrease while RAN started to play a more significant role both in reading and spelling performance.

In summary, previous research showed that phonological awareness, the ability to translate graphemes or grapheme strings into a phonological code, is one of the most powerful predictors of reading development mostly in opaque languages, namely in English. In contrast, in transparent orthographies, especially in Turkish, the relationship between phonological awareness and reading is found to be less informative. However, regarding spelling, in transparent orthographies, phonological awareness skills are found to have a significant role in spelling development. At this point, whether PA makes any significant contributions to spelling performance in the early stages of literacy development, namely in Grade 1 and Grade 2, becomes one of the goals of the current study.

2.2.2 The role of rapid automatized naming (RAN) in reading and spelling development

Rapid automatized naming is defined as the ability to verbalize the accurate name of visually presented stimuli, such as digits, letters, colors, and objects, as quickly and correctly as possible (Denckla & Rudel, 1976a, 1976b). Denckla and Rudel (1974, 1976a, 1976b) designed a series of studies in order to measure the speed of naming

familiar items and they used sequential naming tasks to investigate children's ability to name familiar visual stimuli (e.g., letters, digits, colors and simple objects). Based on these studies, they developed the hypothesis that in reading, the attachment of verbal labels to visual stimuli is required. Thus, rapid naming tasks require children to name a series of 30 to 50 familiar items (digits, colors, letters, or objects) printed on a page as rapidly and correctly as possible and assess the rate of access to phonological information in long-term memory (Torgesen et al.,1997).

However, there is little disagreement concerning the position of RAN. Although RAN tasks are fundamental instruments in assessing automatization in literacy skills, some researchers consider rapid naming speed under phonological processes as RAN is thought to be a skill revealing the speed or automaticity of phonological access (Wagner & Torgesen, 1987; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993). Among these researchers, Wagner and Torgesen (1987) suggest that "phonological processing skills" plays an important role in the development of reading. In their review, phonological processing skills include phonological awareness, phonological recoding in lexical access and phonetic recoding in working memory. They define phonological recoding in lexical access as "getting from a written word to its lexical referent by recoding the written symbols into a sound-based representational system" (p.192). To this end, rapid naming of familiar and visual stimuli are stated to be used commonly to assess this phonological skill as RAN tasks seem to involve retrieving phonological codes of the visual stimuli. In a consistent orthography, according to Goswami (2002), if the readers decode by using grapheme-phoneme conversion rules, RAN and reading are likely to be more strongly related because phonological retrieval of each grapheme should be quick for an effective phonological recoding.

On the other hand, Bowers and Wolf (Bowers & Wolf, 1993; Wolf & Bowers, 1999) emphasized the visual and speed components of these tasks as they are against considering rapid naming tasks as mainly phonological in nature. They proposed that rapid naming tasks may assess the functioning of a "precise timing mechanism" that is significant in the complex interactive processes and these processes are required to combine phonological and visual representations in order to form orthographic codes for words while reading. They hypothesized that slow letter or digit naming speed may indicate an interruption in the automatic processes that support utilization of orthographic patterns, which in turn generates quick word recognition (Bowers & Wolf, 1993). They have proposed that naming speed is considered to be an independent contributor of reading in addition to phonological awareness (Wolf & Bowers, 1999). In other words, in contrast to Wagner and Torgesen (1987), Wolf and Bowers (1999) see phonological awareness and rapid naming as two separate processes of reading and propose that these variables have a unique contribution to different aspects of reading skill. Based on an integrative view, they propose the double-deficit hypothesis in which deficits in phonological and rapid naming processes are separate sources of reading impairment.

Accordingly, it is hypothesized that if the two are likely to be independent subskills, then there would be two disassociated, single deficit subgroups and one combined deficit subgroup. The results of another study by Wolf and her colleagues (2002) were taken to provide evidence for supporting the hypothesis. In this study, they investigated the performances of 144 severely-impaired readers in Grades 2 and 3 in order to find out the hypothesized independence of phonological awareness and naming-speed variables in reading. They found that while the phonological measures contributed the most variance to the aspects of reading involving decoding or word

attack skills, rapid naming contributed more to skills in word identification. The results also showed that 19% of the sample had single phonological deficits, 15% had single rapid naming deficits. 60% of the sample was classified as double-deficits, and 6% could not be classified. Consequently, instead of describing RAN as a measure of a single ability, it can be concluded that RAN is a skill that has multi-components (Heikkila, 2015).

Moreover, the different types of RAN tasks were used in studies to explore the connection between RAN and literacy skills. If the tasks include numbers and letters as stimuli, they are called alphanumeric tasks while colors and objects are considered as non-alphanumeric stimuli. It was found that while non-alphanumeric stimuli (colors, objects) are likely to be named faster than alphanumeric stimuli (letters, numbers) before school age, alphanumeric stimuli are named faster than non-alphanumeric ones after schooling starts. This is possibly because of increased exposure and developing automaticity across grades (Wolf, Bally & Morris, 1986). Alphanumeric stimuli in RAN tasks are found to be more closely related to decoding than non-alphanumeric stimuli in school-aged children. Instead, non-alphanumeric stimuli are suggested to relate more to general processing speed and reading comprehension (Badian, 1993; Wolf, Bally, & Morris, 1986).

Starting with the research by Denckla and Rudel (1974, 1976a, 1976b), a considerable amount of cross-linguistic research has suggested that RAN is strongly associated with reading ability (e.g., Babayiğit & Stainthorp, 2010; Badian, 1993; Bowers & Swanson, 1991; Cornwall, 1992; Norton & Wolf, 2012; Wimmer & Mayringer, 2002).

Denckla and Rudel (1974, 1976a, 1976b) found that the length of time to name the stimuli differed with age and reading ability. While older children were able to name the letters, colors, numbers, and objects quicker than younger children, good readers were quicker than children with lower reading ability.

Badian (1993) studied whether the skills like the phonemic awareness and rapid naming have an independent contribution to reading in a sample of 170 students with adequate or poor reading abilities aged 6-10. With IQ and reading experience controlled, it was found that letter naming speed made the largest independent contribution to word recognition.

In their research, Bowers and Swanson (1991) investigated whether disabled readers have a speed deficit restricted to the identification of printed words, or a more general speed deficit in retrieving names of even single digits. Assessing 43 poor and good readers in Grade 2 on letter and digit naming speed, they found that RAN numbers are correlated with both reading regular and irregular words in English.

Working with 54 elementary school Caucasian children with severe reading disabilities, Cornwall (1992) concluded that rapid letter naming was significantly related to word recognition and after controlling for IQ, socioeconomic status (SES), age, and behavior problems.

In another study in German, Wimmer and Mayringer (2002) followed children from kindergarten to Grade 3. The results showed that RAN was the most reliable predictor of reading fluency skills.

In contrast to abundant amount of research on the relationship between reading and RAN, the effect of RAN on spelling was limited. Thus, the relationship between RAN and spelling skills has started to attract attention in the literature in a number of studies. As stated by Bowers and Wolf (1993), orthographic representations, memories of words' spellings, are indexed by RAN, so there should be a relationship between RAN and spelling across languages since spelling depends upon the nature of the orthographic representations. If the RAN performance is slow, it is likely to affect the quality of the orthographic representations and, consequently, spelling. Thus, RAN is assumed to be strongly related to spelling in irregular orthographies more than in regular ones. This can result from the fact that phoneme-grapheme relationship in regular orthographies reinforces the formation of orthographic representations (Georgiou et al., 2012).

A few studies have investigated the relationship between RAN and spelling in opaque languages, English in particular, and found that RAN predicts spelling (Savage, Pillay, & Melidona, 2008; Verhagen, Aarnoutse, & Van Leeuwe, 2010; Furnes & Samuelsson, 2011; Georgiou et al., 2012; Stainthorp, Powell, & Stuart, 2013). Savage, Pillay and Melidona (2008), for instance, investigated whether the spelling ability and RAN are strongly associated. 65 English-speaking children with poor spelling skills were assessed on spelling, reading, and rapid naming tasks. The results revealed that RAN was a strong predictor of spelling acquisition.

In another study by Stainthorp, Powell and Stuart (2013), 146 children from Grade 2 and 3 were examined in order to find out the relationship between performance on rapid naming tasks and word spelling ability. It was found that RAN made a significant unique contribution to spelling performance in English.

In a cross-linguistic study done by Furnes and Samuelsson (2011), 750 American/ Australian children and 230 Scandinavian children were followed longitudinally between kindergarten and 2nd grade to investigate phonological awareness and rapid naming in reading and spelling. Kindergarten RAN was significantly related to spelling in Grade 1 across orthographies. One year later, however, in Grade 1, the contribution of RAN to spelling in Grade 2 was close to zero in both U.S./ Australian and Scandinavian samples.

Similarly, Georgiou et al. (2012) conducted a cross-linguistic study to examine the longitudinal predictors of nonword decoding, reading fluency, and spelling in three languages with different orthographic depths: Finnish, Greek, and English. They followed 82 English-speaking, 70 Greek, and 88 Finnish children from the age of 5.5 years old until Grade 2. Along with letter knowledge, RAN was found to predict spelling significantly in English and in Greek but not in Finnish in typically developing children. However, in Finnish, it was only letter knowledge which predicted spelling significantly, probably because of consistent grapheme-to-phoneme mapping in Finnish.

Verhagen, Aarnoutse and Van Leeuwe (2010) investigated the influences of early phonological awareness and naming speed on 226 Dutch children's later word spelling in a longitudinal study. Phonological awareness and RAN were significant predictors of spelling in early Grade 1, later Grade 1, and later Grade 2 although phonological awareness predominated over RAN for the prediction of early Grade 1 spelling. However, by Grade 2, phonemic awareness and RAN made equally strong and unique contributions to word spelling.

It should be noted, however, that some recent findings from studies on languages with regular orthographies showed that RAN was not predictive of spelling (Babayigit & Stainthorp, 2010; Landerl & Wimmer, 2008; Nikolopoulos et al., 2006; Wimmer & Mayringer, 2002). In a longitudinal study, Landerl and Wimmer (2008) investigated the development of word reading fluency and spelling of 115 students in the phonologically transparent German orthography. The students were assessed at the beginning of Grade 1 and at the end of Grade 8. The results showed that RAN was the strongest predictor for reading fluency while phonological awareness was found to predict spelling in the regular orthography of German.

In another longitudinal study by Nikolopoulos and his colleagues (2006), 131 children from Grade 2 and Grade 4 were assessed on a large battery of tests to investigate the role of phonological skills, including phoneme awareness and rapid naming, in reading and spelling development in the regular Greek orthography. All children were native speakers of the Greek language and a follow-up was carried out when they were in Grade 3 and Grade 5. It was found that phonological awareness and RAN were quite strong predictors of reading skills whereas phonological awareness was a strong predictor of the spelling ability at both points in time. There was no association found between RAN and spelling skills of the children (Nikolopoulos et al., 2006).

In another study in German by Wimmer and Mayringer (2002) reviewed above, children were followed from kindergarten to Grade 3 to investigate their reading and spelling abilities. The results showed that although RAN was the most reliable predictor of reading, there was no association between RAN and spelling.

On similar grounds, Babayiğit and Stainthorp (2010) followed 57 Turkish speaking children from Grade 1 to Grade 2 in order to investigate the role of rapid automatized naming (RAN) skills in reading and spelling development in the transparent orthography of Turkish. They found that RAN was a powerful and consistent predictor of reading skill, but not spelling.

To sum up, although RAN was found to be a strong predictor of reading ability regardless of the transparency of the language, its relationship with spelling is not unidirectional. That is, research revealed that in transparent languages such as Turkish and German, RAN did not have a predictive role on spelling while it was strongly associated with spelling in opaque languages like English.

2.3 Spelling practice in the Turkish educational system

Learning how to read and write is necessary for individuals to lead their life. It comprises the basic part of literacy education at schools. This education process starts at primary schools and first grade has an important role in education systems because children learn how to read and write during this period.

However, the method to be used in teaching how to read and write is a controversial issue. In Turkish National Education System, so far, several methods have been used starting with phoneme-word-letter methods (Aktürk, 2009). In 2005, the policy for reading and writing instruction was changed and the “Phoneme Based Sentence Method” has been implemented (Bay & Hartman, 2014).

Similarly, in the school where the data was collected, the participants received Turkish literacy education based on the phoneme based sentence approach with a combination of visual and auditory materials. In this method, students in

Grade 1 are first introduced with the phonemes. After learning a few phonemes that can create meaningful wholes, the sounds are blended into syllables, syllables into words and words into sentences. Reading and writing are taught simultaneously. That is, after reading each item, it is written and/or after writing each item, it is read by the students. This approach was adopted by Ministry of National Education (MEB) in 2005 after being piloted in 120 schools as it was assumed to help students become literate in a short time, increase their attention span and level of understanding, and learn the correct spelling of words. Moreover, it makes it easier for students to shift from spoken language to written language (MEB, 2009).

Along with the introduction of the phoneme based sentence approach in Turkish Teaching Program, MEB considered the use of cursive handwriting necessary in teaching spelling as it is believed to have contribution to the intellectual development of students and improve their attention (MEB, 2009).

In the Turkish Teaching Program, the sounds of the letters are not taught according to the order in the Turkish alphabet but they are grouped in a different order based on the ease of writing letters, the efficiency of forming meaningful syllables and words. The order of the letters is organized in a way that students can form sentences in a short time (MEB, 2009).

The participants of the current study had 10 hours of classes in a week in which they were taught the phonemes/letters of the Turkish alphabet according to the phoneme based sentence approach. Phonemes were taught in six groups in an order determined by the Ministry of National Education:

Group 1: “Ee, Ll, Aa, Tt”

Group 2: “İi, Nn, Oo, Rr, Mm”

Group 3: “Uu, Kk, Iı, Yy, Ss, Dd”

Group 4: “Öö, Bb, Üü, Şş, Zz, Çç”

Group 5: “Gg, Cc, Pp, Hh”

Group 6: “Ğğ, Vv, Ff, Jj”

Firstly, the students were taught the phonemes / letters in the first group with exercises aimed at increasing the students’ awareness on phonemes and letters. After learning the second group of letters, students can come up with approximately 500 words and 100 short sentences (e.g., e, l, a, al, ala, el, al, Ela, ele). With the introduction of the third group of letters, it was more focused on forming sentences. Starting with the fourth group of letters, teachers focused on forming texts (MEB, 2009; Akıncı, Bektaş, Gülle, Kurt & Kurt, 2016). However, by a new regulation introduced in 2017, the number of the groups and the order of the letters was changed as follows: Group 1 “Ee, Ll, Aa, Kk, İi, Nn”, Group 2 “Oo, Mm, Uu, Tt, Üü, Yy”, Group 3 “Öö, Rr, Iı, Dd, Ss, Bb”, Group 4 “Zz, Çç, Gg, Şş, Cc, Pp” and Group 5 “Hh, Vv, Ğğ, Ff, Jj” (MEB, 2018).

According to the phoneme based sentence approach, literacy training is carried out in different periods. As the students can start primary school when they are 66 months old, the first 12 weeks of school in 1st grades are considered as an adaptation period to schooling. In this period, the programme is mainly composed of games which develop phonological awareness of students like rhyming, blending, syllable deletion and activities based on drawing lines and coloring. After this period, the teaching of sound groups starts. First, the sound itself is introduced in isolation without the name of its letter counterpart by paying attention to its articulation. Then, its lowercase and uppercase forms are taught on board and students do some

exercises about them on their notebooks. Next, the sound is taught singly, and then in syllables. Finally, syllables and words including the sound are formed respectively. Students do practice by reading and writing related syllables and words. It takes one week-10 hours of classes- to teach each sound (MEB, 2009).

According to the first grade curriculum approved by the Ministry of National Education, after 12-week adaptation period finishes, it is planned to start teaching sounds at the beginning of January and teach how to read and write at the end of June. However, in the school where the data was collected, the first graders had already started to learn the sounds of Turkish during the adaptation period along with the activities and games. Thus, almost all the students had become literate by the time the researcher started to collect the data in April.

In Grade 2, after learning how to read and write, Turkish classes mainly focus on understanding what the students read, write and listen to in 10 hours of Turkish classes. As all the students have become literate by the end of first grade, in second grade, Turkish classes are mainly about reading different genres in literature such as stories and poems and doing some exercises related to vocabulary and comprehension of the texts. Moreover, reading fluency starts to be an important component. For this reason, Turkish classes include some timed reading exercises to measure and develop reading rate of students.

After an overview of literacy practices in first grades in Turkish National Education System, the next chapter will present findings of numerous studies on spelling errors made by Turkish speaking children.

2.4 Studies on spelling errors in Turkish

There are several properties of Turkish which are likely to affect spelling development positively or negatively. As Turkish language has a transparent orthography, there is one-to-one mapping from spelling-to-sound and from sound-to-spelling. Despite its regularity, there are some other properties which can make the process difficult for children. The silent letter /ğ/ and rounding of sounds in different dialects and fast speech (gidiyorum pronounced as gidiyom) are likely to be challenging and so they can lead to spelling errors (Durgunoğlu, 2017).

Several researchers have studied Turkish spelling errors apparent in the handwritings of students in elementary schools. One of them is the study conducted by Erden, Kurdoğlu and Uslu (2002), who investigated the reading speed and spelling errors of 2572 Turkish speaking elementary school students from Grade 1 to Grade 5. The study aimed to find the characteristics of the spelling errors as well as their frequencies at each grade. However, based on the characteristics of spelling errors found at each grade, the study did not draw any conclusions about developmental stages of spelling in Turkish. Regarding the spelling performance, the researchers asked students to complete a dictation task by writing 3 sentences.

Next, based on a spelling rubric, common spelling errors were categorized in each level. The results showed that the most common error is punctuation error as 30% of the participants made at least one punctuation error. Although 43% of the students completed the task without any error, other common spelling error types are grapheme substitution (25%), word addition (19%), and word omission (15%). For instance, regarding grapheme substitution error, the participants wrote demek instead of demet (bunch). The ones who made word addition error wrote the sentence-

“Elinde bir demet maydanoz vardı.” (S/he had a bunch of parsley in his/her hand.) as “Elinde bir maydanoz vardı.” (S/he had parsley in his/her hand.) with one missing word.

Similarly, in a study by Kasapoğlu (2010), spelling performances of 39 first grade students were investigated with an assignment including tasks like recognition of block letters, basic grammar rules such as writing cursive uppercase letters, and finding in-text grammar errors. The results showed that almost half of the students had difficulty writing some letters like b, e, f, h, j, k and l. Also, 61% of them had word addition error by adding extra words to the given text. They tended to add their own words that are not associated with the given text. Moreover, 18% of the participants made grapheme substitution error while spelling the letter “ğ” (soft g). They had difficulty writing the word “diğer” (other) and substituted “ğ” with “y”.

In another study by Yıldız and Ateş (2010), the nature of spelling errors of 792 third graders who had different literacy education (phonic based sentence method vs. sentence analysis method) were compared. Students were asked to write a 5-sentence-dictated text taken from their school books. According to the results, instruction type did not lead to a meaningful difference on the total number of misspelled words for both groups. However, the students in sentence analysis group had more spelling errors of word omission/addition and syllable omission/addition while the ones in phonic based sentence method group had errors of syllable separation at the end of the line more. Overall, however, the findings revealed that both groups had difficulty in using proper punctuation marks.

Similarly, Memiş and Harmankaya (2012) analyzed spelling errors of 185 first grade students who were taught to write in the cursive style. Turkish lesson

notebooks of the participants were collected and errors on letter, word and punctuation were categorized based on a rubric. The results suggested that participants had the most difficulty in using punctuation marks properly. With regard to word related errors, grapheme omission was found to be the most common error type with a percentage of 97. Moreover, the findings revealed that because of cursive writing, the students had difficulty connecting some capital letters (e.g., F, N, P and T).

In the light of the studies mentioned above, it can be said that although Turkish has a transparent orthography, spelling errors still occur in the writings of students in Turkish during elementary grades. Previous research showed that students in elementary grades had difficulty in using proper punctuation marks. Regarding spelling errors, the most frequent error types seem to be grapheme substitution /omission errors as well as errors related to soft g /ğ/. Moreover, although these studies investigated spelling errors in elementary grades, they did not have an attempt to describe Turkish spelling in developmental phases depending on the nature of spelling errors.

In this chapter, a profound review of the development of spelling and reading skills and their relationship with phonological awareness and rapid naming are presented. Also, previous studies are reviewed. Before proceeding with the design of the study, a brief discussion on the phonological structures of Turkish will be presented.

CHAPTER 3

PHONOLOGICAL CHARACTERISTICS OF THE TURKISH LANGUAGE

This chapter focuses on the Turkish alphabet, Turkish phonology and syllable structure. Firstly, the characteristics of the letters in the Turkish alphabet are presented. Then, phonological characteristics of Turkish consonants and vowels are discussed. Finally, features of syllable structures in Turkish will be explained in detail.

3.1 The Turkish alphabet

The Turkish alphabet has 29 letters which consist of 21 for consonants and 8 for vowels. In addition to these consonants in Turkish alphabet, there is a phonemic consonantal segment, “ğ” (soft g), represented by /ɣ/. Although it is a letter in Turkish orthography, it is not pronounced as a consonant in the standard language (Kornfilt, 1997), so it is a silent letter. However, it lengthens the vowel preceding it (Durgunouğlu, 2017).

Table 3 represents the letters and pronunciation of the Turkish alphabet according to the speech habits of native speakers of British English.

3.2 Turkish phonology

Phonology studies how the sounds of a language are combined to form a meaningful utterance. Thus, it is concerned with how sounds come together and patterns are formed (Balpınar, 2000).

Table 3. The Turkish Alphabet

Letter	Pronunciation in English
A, a	a as u in ‘cup’
B, b	b as in ‘bit’
C, c	j as in ‘jam’
Ç, ç	ch as in ‘chip’
D, d	d as in ‘deep’
E, e	e as in ‘ten’
F, f	f as in ‘fit’ or ‘full’
G, g	g as in ‘get’ or ‘gull’
Ğ, ğ	silent between two vowels/lengthens the sound of preceding vowel
H, h	h as in ‘hope’, sometimes silent between two vowels
İ, ı	a as in ‘among’ or ‘alone’
Î, i	a shorter form of ee as in ‘beet’ or i as in ‘bit’
J, j	s as in ‘leisure’
K, k	k as in ‘kept’, ‘cure’ and ‘calf’
L, l	l as in ‘lamp’, ‘bull’ or ‘lurid’
M, m	m as in ‘milk’
N, n	n as in ‘no’
O, o	o as in ‘off’
Ö, ö	e as in ‘bet’ when it is pronounced with the lips rounded
P, p	p as in ‘pin’
R, r	produced with the tip of the tongue touching the alveolar ridge
S, s	s as in ‘hiss’
Ş, ş	sh as in ‘sheep’
T, t	t as in ‘time’
U, u	u as in ‘cute’ or ‘put’
Ü, ü	i as in ‘bit’ when it is pronounced with the lips rounded
V, v	v as in ‘very’
Y, y	y as in ‘you’
Z, z	z as in ‘zigzag’

Note. Adapted from the work of Göksel and Kerslake (2005, p. xxii).

In Turkish phonology, there are 8 vowels and 23 consonants. To represent this phonological structure of the language, a very systematic and transparent writing system was implemented with the help of the language reform in 1928. As a result,

there is a consistent one-to-one mapping between phonemes and their spellings, which makes both reading and spelling rather easy (Durgunoğlu, 2006).

3.2.1 Turkish consonants

Consonants are sounds produced by blocking the air partially or completely in the vocal tract, the air passage above the larynx (Balpınar, 2000). As a result, their description consists of three features of articulatory phonetics: place of articulation, manner of articulation and voicing (Yorgancı, 2000).

In Turkish, there are twenty-three phonemically distinctive consonants (Özsoy, 2004). In terms of place of articulation, Turkish consonants can be categorized in eight groups as bilabial, labio-dental, dental, alveolar, alveo-palatal, palatal, velar and glottal. According to manner of articulation, Turkish consonants can be divided into seven groups: plosives, affricates, and fricatives, which form obstruents and nasals, taps, laterals and glides, forming sonorants. The Turkish consonant inventory is given in Table 4 in detail (Özsoy, 2004, p. 33).

Another classification can be made in two groups with respect to whether consonants are voiced or voiceless. If there is a vibration while producing consonants, they are called voiced consonants. If there is no vibration, they are called voiceless consonants (Yorgancı, 2000). Table 5 shows the voiced and voiceless consonants of Turkish (Göksel & Kerslake, 2005, p. 3).

Table 4. Turkish Consonants

	Bilabial	Labio-dental	Dental	Alveolar	Alveo-palatal	Palatal	Velar	Glottal
Plosives	p b		t d			c ɟ	k g	
Affricates					tʃ dʒ			
Fricatives		f v	s z		ʃ ʒ		ɣ	h
Nasals	m		n					
Tap				r				
Lateral			ɭ		l			
Glide						j		

Source: Özsoy (2004, p. 33)

Table 5. Voiced and Voiceless Consonants in Turkish

Voiceless consonants	Voiced consonants
/p/ /t/ /k/ /c/(k) /tʃ/(ç) /f/ /s/	/b/ /d/ /g/ /ɟ/(g) /dʒ/(c) /v/ /z/ /ʒ/(j)
/ʃ/(ş) /h/	/m/ /n/ /ɭ/(l) /l/ /r/ /j/(y)

Source: Göksel & Kerslake (2005, p. 3)

Taking the classification based on place of articulation into account, Turkish consonants fall into the following classes:

Bilabials

Bilabial sounds (b, p, m) are produced by bringing upper and lower lips together.

Examples of bilabials in Turkish can be seen in the initial sounds of the words bu (this), pil (battery), and martı (seagull).

Labiodentals

Labiodentals are the sounds produced by raising the lower lip against the upper teeth.

The labiodentals in Turkish (f, v) are exemplified in the initial sounds of firm (oven) and vazo (vase).

Dentals

The sounds t, d, s, z, n, l are dentals in Turkish which are produced when the tip of the tongue is raised to contact the back of the upper teeth. The initial consonants of the words toka (hairpin), dere (stream), sal (raft), zar (dice), nine (grandmother) and leylek (stork) are the dental consonants in Turkish.

Alveolars

To produce alveolar sounds, the tip of the tongue is raised against the alveolar ridge behind the upper teeth. The tap alveolar sound r can be given as an example in the final sound of the words tür (type), peynir (cheese) and defter (notebook).

Alveopalatals

Sounds which are produced by raising the front part of the tongue to the back part of the alveolar ridge are called alveopalatals. The alveopalatals in Turkish are the sounds ʃ (ş), ʒ (j), tʃ (ç), dʒ (c), and l (l) as in the words şiir (poem), jilet (razor blade), çöp (rubbish), cuma (Friday) and gül (rose).

Palatals

The front part of the tongue is raised to touch the hard plate to produce palatals.

Turkish has three palatal sounds ɟ (g), c (k), and j(y) as in the words göç (migration), eksi (minus) and yer (place).

Velars

The back of the tongue is raised towards the velum in the production of velars. The initial sounds k and g in the words kar (snow) and gar (station) are the velars of Turkish. These consonants are articulated as velars when they are together with back

vowels while they become palatalized when they occur with front vowels such as /e/, /i/, /ö/, /ü/ as in the words kere (times), ege (Aegean).

Glottals

Glottal sounds are produced in the larynx when the glottis is closed during the air flow. The sound h as in the word ‘hayır (no)’ is the only glottal in Turkish.

Aside from their place of articulation, Turkish consonants are categorized into two main groups according to manner of articulation (Yorgancı, 2000):

Obstruents

Obstruents are the major class of sounds and produced when the airstream is totally or almost fully obstructed (Fromkin & Rodman, 1993). Plosives, affricates and fricatives form obstruent sounds: p, b, t, d, g, k, tʃ (ç), dʒ (c), f, v, s, z, ʃ (ş), ʒ (j), ɣ (ğ) and h.

Stops

Stop sounds are produced when the blocked air in the vocal tract is suddenly released. These sounds can be classified into two as oral and nasal stops. The oral stops are called plosives when they are produced with an aggressive pulmonic air-stream mechanism. According to place of articulation, the sounds b, p, m are the bilabial stops, the sounds t, d, n are dental stops and the sounds k, g are the velar stops in Turkish. According to voicing feature, the Turkish stops are composed of three pairs: /p, b/, /t, d/, /k, g/. Voiced oral stops b, c, d, g do not appear in the word final position in Turkish words. Instead, their voiceless pairs appear in the final position as in the words kitap (book), kanat (wing) and ahenk (harmony).

Affricates

Affricates are the sounds produced when the completely obstructed air flow in the local tract is released gradually with a friction. There are two affricate sounds in Turkish language: tʃ (ç) and dʒ (c) as in the words çam (pine) and cam (glass).

Fricatives

In the production of fricatives, the air flow is restricted but not stopped completely so that the air can escape and produce some friction. Turkish has labiodental (f, v), dental (s, z), alveopalatal (ʃ(ş), ʒ(j)), and glottal (h) fricatives as in different positions of the words zafer (victory), tava (pan), süt (milk), taze (fresh), şeker (sugar), ajan (spy), and hava (air) respectively.

All obstruents in Turkish but /h/ have a voiced and voiceless pair: /f, v/, /s, z/, /ʃ(ş), ʒ(j)/, /p, b/, /t, d/, /k, g/.

Sonorants

Sounds which are not obstruents form sonorant sounds. In the production of sonorants, the flow of air is obstructed much less than obstruents, so the air can resonate (Fromkin & Rodman, 1993). Sonorants /l/, /r/, /m/, /n/, /j(y)/ can be divided into two classes as in the following: nasals and approximants.

Approximants

Liquids and glides are grouped as approximants in Turkish. While the sound l is a lateral approximant, r is a non-lateral liquid. The lateral l becomes a velarized dental sound (ɫ) when it appears with a tautosyllabic back vowel as in the word halı (carpet), it is palatalized when it appears with a tautosyllabic front vowel as in the example bekle (wait).

Glides are referred as semi-vowels as they are articulated in a similar way to vowels although they do not produce separate syllables. The sound j in the word oyun (game) is a palatal semi-vowel in Turkish.

Nasals

Nasal consonants in Turkish are m and n. the sound m is a bilabial nasal and the sound n is an alveolar nasal. The sounds are exemplified in word-final positions in the words çam (pine) and çan (bell).

In addition to these, “ğ” (soft g), the phonemic consonantal segment, does not fall into any of the classes. Despite being a letter in Turkish alphabet, it does not have a pronunciation as a consonant in the standard language. It can never be in word-initial position (Kornfilt, 1997). Depending on the phonemic context, soft g /ɣ/ can serve to lengthen the preceding vowel or can sound as weak /v/ or /j/ (Demircan, 2001). When it is the final consonant in a syllable, it makes the preceding vowel lengthen as in the word ‘sığ (shallow)’ or it can be pronounced as a palatal glide when it is preceded by a vowel like ‘eğlen (have fun)’ (Göksel & Kerslake, 2005).

There are also some restrictions on word final and word initial consonants. Plosives or affricates cannot occur in word final position because of the phonological rule which makes the syllable final plosives and affricates devoiced. In addition, in words of Native Turkish, the following consonants are likely not to appear in word initial position: /dʒ /, /f/, / ʒ /, /l/, /m/, /n/, /r/ and /z/ (Kornfilt, 1997).

3.2.1.1 Consonant Clusters

Consonant clusters, sequences of two different consonants, are permitted in Turkish depending on their position, as word final and word initial, and their composition. However, it is impossible to find a consonant cluster with more than 2 consonants within one syllable (Kornfilt, 1997).

Word Initial Consonant Clusters

This type of consonant clusters occurs only in loan words (Göksel & Kerslake, 2011). Generally, word initial consonant clusters are not permitted in Turkish pronunciation. Added to the beginning of the word, a high vowel usually breaks them up, and makes the word undergo vowel harmony. Plan (plan), kral (king), spor (sport) are some examples of consonant clusters in word initial position. In written forms of these borrowed words with this type of cluster, the epenthesis- a high vowel- is not expressed. However, it is expressed in the pronunciation (Kornfilt, 1997). For instance, as in the case of the word tren (train), the word initial cluster is broken with a vowel and pronounced as /tiren/ (Durgunoğlu, 2006).

Word Medial Consonant Clusters

This type of consonant clusters can occur as long as each member of the cluster belongs to a different syllable (Kornfilt, 1997).

Word Final Consonant Clusters

In word final position, the following combinations of consonant clusters can be seen frequently:

- a. Sonorant + obstruent as in the words ‘kırk (forty)’ and ‘kazanç (income)’
- b. Voiceless fricative + oral plosive as in the words ‘çift (pair)’ and ‘aşk (love)’
- c. k+s as in the words ‘lüks (luxury)’ and ‘faks (fax)’ (Kornfilt, 1997).

3.2.2. Turkish vowels

Vowels are produced without an obstruction in the vocal tract. As there is no constraint involved in vowel production, they are described in a different way than consonants (Balpınar, 2000).

The vowel inventory of Turkish contains eight phonemically distinctive vowels and they are classified according to three features: height of the tongue (high / mid / low), position of the tongue (back / front) and the position of the lips (rounded / unrounded) (Göksel & Kerslake, 2005). Table 6 shows Turkish vowel inventory.

Table 6. Turkish Vowels

Front		Back		
Unrounded	Rounded	Unrounded	Rounded	
i	ü	I	u	High
e	ö		o	Mid
		a		Low

Vowels in Turkish can be found at the beginning and end of the words as well as between two consonants. In words of native Turkish, /o/ and /ö/ can only occur in the first syllable (Göksel & Kerslake, 2005). In addition, vowel clusters can occur in Turkish, especially in borrowed words such as ‘dua (pray)’ and ‘saat (clock)’ (Kornfilt, 1997).

3.2.2.1 Vowel harmony in Turkish

Vowel harmony, which is a left-right process along syllables, is one important characteristic of Turkish phonology (Durgunoğlu, 2006). It is a phonological process and it determines what vowel will come in all other syllables after the first syllable of a word according to its front/back characteristics (Göksel & Kerslake, 2005; Durgunoğlu, 2017). Any of the eight Turkish vowels can appear in the first syllable of a word, but each following vowel is determined by the vowel preceding it in line with the rules below:

- Fronting Harmony: As this is the assimilation of a vowel with preceding vowel in terms of frontness, front vowels (e, i, ö, ü) can only be followed by front vowels, and back vowels (a, ı, o, u) can only be followed by back vowels.
- A following high vowel assimilates to the preceding vowel in terms of rounding, which is called ‘Rounding Harmony’. Hence, high vowels (ı, i, u, ü) are rounded after a rounded vowel (o, ö, u, ü) and unrounded after an unrounded vowel (a, e, ı, i) (Göksel & Kerslake, 2005; Underhill, 1976).

Majority of Turkish native roots display fronting and rounding harmony. If roots have more than one syllable, the second vowel harmonizes with the first one as in the examples ‘kabak (squash), etek (skirt), ipek (silk).’ according to the rules above.

Moreover, vowel harmony takes place in all suffixes. When a suffix is attached to a stem, it is in harmony with the properties of the vowel in the preceding syllable, regardless of being attached to native or loan words (Göksel & Kerslake, 2005). For instance, the inflection –lar or –ler is used to make a noun plural. While the word

‘top (ball)’ is pluralized as *toplar*, the word ‘tip (type)’ is pluralized as ‘*tipler*’ due to the vowel harmony.

On the other hand, there are some exceptions to vowel harmony. A few native roots such as ‘*anne* (mother), *elma* (apple)’ are examples of non-harmonic words. Also, loan words do not obey the rules of vowel harmony as the example shows: *lobi* (lobby), *otobüs* (bus), *penaltı* (penalty). However, suffixes added to these loan words are harmonized with the last vowel of the stem. For example, in the word ‘*kitap* (book)’, the vowel harmony is violated as it is a loan word. However, although the two syllables of the word violates the vowel harmony, the suffixes added to make the word plural match the last vowel, so the plural form of the word ‘*kitap* (book)’ is *kitaplar* and not *kitapler* (Durgunoğlu, 2017). In addition, there are some non-harmonic suffixes such as the verbal progressive suffix –*Iyor*. Although *I* in the first syllable is harmonic, *O* in the second syllable is invariable as in the examples ‘*geliyor* (s/he is coming), *açıyor* (s/he is opening)’ (Underhill, 1976).

3.3 Syllable structure in Turkish

Syllable is the basic unit of speech or pronunciation, which makes syllables the salient unit in Turkish phonology (Durgunoğlu, 2017). It is composed of a vowel or vowels and consonants. In transparent orthographies like Turkish, syllable structures are likely to be simple and mainly CV-type (Seymour, Aro, & Erskine, 2003). However, opaque orthographies have complex syllable structures, generally composed of a string of consonant clusters such as *CCVCCC* (Babayiğit, 2009).

In Turkish, consonants cannot be a syllable on their own, so they are always pronounced with a vowel. On the other hand, vowels can be a syllable by themselves

and with a consonant they form a syllable, too (Benzer, 2010). According to Özsoy (2005), there are six different syllable patterns in Turkish:

- Vowel (V): ‘o’
- Vowel + Consonant (VC): ‘at’ (horse)
- Consonant + Vowel (CV): ‘bu’ (this)
- Consonant + Vowel + Consonant (CVC): ‘tok’ (full)
- Vowel + Consonant + Consonant (VCC): ‘ilk’ (first)
- Consonant + Vowel + Consonant + Consonant (CVCC): ‘dört’ (four)

The first four syllable types in Turkish (V, VC, CV, and CVC) constitute ninety-eight percent of all Turkish syllables (Durgunoğlu & Öney, 1999) and by far, the most frequent syllable form is the CV as more than 50% of all Turkish syllables have that syllable form (Durgunoğlu, 2006).

Moreover, syllabic boundaries in Turkish words are very clear; so long words can be divided into syllables easily. Thanks to these characteristics of Turkish syllable structure, children who learn Turkish are likely to improve awareness of syllables more readily than children learning English, which has a complicated syllable structure including many consonant clusters (Durgunoğlu & Öney, 1999). Moreover, simple syllable structure is found to be a common feature of transparent systems and it can facilitate the development of phonological awareness and literacy skills (Durgunoğlu & Öney, 1999).

As a result, due to some properties of Turkish language such as vowel harmony and suffixation, children are likely to be aware of the phonological features from an early stage, which makes the development of phonological awareness rapid. Moreover, the alphabet has a highly systematic one-to-one sound mapping, making

the orthography transparent. Therefore, transparent orthography and rapidly developing phonological awareness facilitates literacy development within the early years of schooling (Durgunoğlu, 2017).

In this chapter, phonological characteristics of Turkish were summarized by touching upon its distinct properties such as consonants, vowels and syllable structure.



CHAPTER 4

METHODOLOGY

The primary purpose of this study is two-fold: (i) to examine the underlying factors that affect the spelling ability of the first and second grade monolingual Turkish-speaking children. It specifically investigates the role of phonological encoding, RAN and reading on 1st and 2nd graders' spelling skills; (ii) to analyze the spelling errors of the participants in the 1st and 2nd grade in terms of spelling patterns in order to understand the spelling development in Turkish.

The organization of this chapter is as follows: research questions, participants, instruments, and procedure and data analysis. It, first, introduces the research questions of the present study. Then, detailed descriptions of participants and data collection instruments are given. Next, the data collection procedure is presented. Finally, data analysis and the discussion of the data are presented, which is followed by a conclusion section at the end.

4.1 Research questions and hypotheses

In the light of what has been discussed in the former chapters, the current study attempts to answer the following research questions:

1. Is there a significant difference between 1st and 2nd graders performances on phonological encoding, RAN, word reading and word spelling skills?
2. What are the intercorrelations among phonological encoding, RAN, word reading and word spelling? Does the relationship differ in the 1st and 2nd grade?

3. Do phonological encoding skills and RAN contribute significantly to the spelling ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?
4. Do phonological encoding skills and RAN contribute significantly to reading ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?
5. What are the characteristics of spelling errors in Grade 1 and 2? What types of spelling errors are found in each grade?

Based on these research questions, the following predictions are hypothesized:

1. It is hypothesized that there would be no statistically significant difference between Grade 1 and Grade 2 in terms of phonological encoding skills and spelling. However, in terms of rapid naming tasks and reading, it is expected that second graders would have better performances than the first graders.
2. It is anticipated that phonological encoding skills would have strong correlations with the spelling ability while RAN would strongly correlate with reading regardless of the grade level.
3. It is hypothesized that phonological encoding would account for a significant variance in spelling development in Grade 1 and 2 when compared to RAN.
4. It is expected that RAN would contribute significantly to the reading ability of first and second graders. However, it is anticipated that PE skills would also contribute to reading ability in Grade 1 and 2, until the participants master automatization skills in retrieving orthographic units.

5. As the grade level increases, it is hypothesized that the total number of errors would decrease in Grade 2 when compared to the ones in Grade 1. According to task modality, there would be fewer types of errors regarding copying since it is a simpler task than dictation. Based on the previous research, it is expected that participants would have omission errors, especially grapheme and syllable omission, more in Grade 1 than Grade 2 because they would have difficulty spelling long words. Moreover, due to the use of cursive handwriting¹, it is expected that participants would have diacritic omission errors as well as punctuation errors.

4.2 Participants

The students participated in this study were chosen from a state school in the district of Sarıyer, İstanbul to answer the research questions formulated above in the 2013-2014 academic year. The students in the school came from a low socio-economic status (SES) background.

The participants who were accessible were chosen for the study. Although there were a total of 93 chosen students (47 first graders and 36 second graders) at the beginning of data collection, some students could not complete the tests due to several reasons such as moving to another area or unwillingness to complete all of the tests. Moreover, among the participants in the first grade, there were some who could not learn how to read and write at the time of data collection, as informed by their teachers. Thus, these students were excluded from the study. As a result, a total of 71 students were left. 36 students from the first grade (20 girls, 16 boys) and 35

¹ During the data collection period, participants were using cursive writing in primary schools. However, by a new regulation introduced in 2017, cursive writing was abolished by the Ministry of National Education

students from the second grade (18 girls, 17 boys) took part in the study. The mean age of first graders was 6.9 years, and the mean age of students in grade two was 7.10 years. Demographic information of the participants can be seen in Table 7.

Table 7. Demographics of Participants

Grade	Gender	N	Age
1	Male	16	6 years 9 months
	Female	20	
	Total	36	
2	Male	17	7 years 10 months
	Female	18	
	Total	35	

Table 8. Parental Educational Background

Educational Level	Overall		1 st Grade		2 nd Grade	
	Mother N = 69	Father N = 68	Mother N = 34	Father N = 34	Mother N = 35	Father N = 34
	%	%	%	%	%	%
Illiterate	7.3	0	5.9	0	8.8	0
Primary school	46.4	41.2	44.1	35.2	48.5	47
Secondary school	13	13.2	14.7	11.8	11.4	14.7
High school	29	35.3	32.4	38.2	25.7	32.4
College	1.4	4.4	0	8.9	2.8	0
University	2.9	5.9	2.9	5.9	2.8	5.9

Regarding the educational background of students' parents, out of 71 students, parental information of 69 students was available. As demonstrated in Table 8, while 7.3% of the mothers are illiterate, all the fathers know how to read and write. Almost half of the parents had only primary education with a percent of 46.4 and 41.2 for the mothers and the fathers respectively.

4.3 Data collection instruments

4.3.1 Data collection instruments for quantitative analysis

Four main tests were conducted in order to collect the quantitative data for the study. They include word reading, phonological encoding, Rapid Automatized Naming tasks developed for Turkish (HOTI: Hızlı Otomatik İsimlendirme, Bakır & Babür, 2009, 2018), and a word spelling test developed for the purposes of this study.

4.3.1.1 Word reading test

This subtest measures reading decoding ability of the participants which is closely related to the alphabetic principle, the ability to associate sounds with letters. The test includes 7 items to identify letters and 64 isolated words to read fluently. In the test, isolated words are arranged from easy to difficult ones (see Appendix A for the sample items). While the difficulty of the items increases, the number of phonemes increases, too. The test was administered individually in a quiet room. When the participants had difficulty reading the words, they were advised to read the word silently first and then read it aloud. This instruction was delivered only once throughout the test administration. They got 1 point for each correct answer and 0 point for incorrect answers. When the participants hesitated in reading a word or misread the word, he or she got 0. The test was discontinued after 6 consecutive errors. The score of the participants was calculated by the total number of words read correctly and fluently. The internal reliability measure of the test was found to be .96.

4.3.1.2 Test of phonological encoding skills

This test was used to measure the knowledge of participants on phonological patterns of word forms, especially the ability to write the sounds with the help of the phonological encoding skills. The test includes 39 items, starting with 7 sounds and 32 nonwords which are arranged from easy to difficult. In addition to their difficulty level, the number of syllables they include increases, too (see Appendix A for the sample items). The participants were asked to write the sounds and nonwords after dictated two times by the researcher. Before starting the test, participants got familiarized by practice items for both writing sounds and nonwords. Due to time limitations, the test was conducted in pairs, and the participants were supervised to ensure that they worked individually.

The students got 1 point for each correct answer and 0 point for incorrect answers. Yet the first seven nonwords were scored from 1 to 3 points based on the accuracy level of spelling. The test was discontinued after 4 consecutive errors. The internal reliability measure of the test was found to be .98.

4.3.1.3 HOTI

Turkish versions of standardized RAN tasks, Hızlı Otomatik İsimlendirme Testleri (HOTI) in Turkish were developed by Bakır and Babür (2009, 2018) and evidence for the validity and the reliability of the Turkish versions was provided by the researchers. In these tests, the participant perceives visual symbols such as objects, pictures, colors, letters or digits and retrieves the name for the target item as rapidly and correctly as possible. Among these HOTI tasks, both letter naming and digit naming tests were given to the participants. However, digit naming tests were used as

the basic measure of RAN because of the participants' inconsistent responses in letter naming. During the letter naming task, instead of naming the letters, the participants had the tendency to articulate their phonemes or to do both. Although they were given practice items to get familiarized with the test, they were not able to name the letters consistently during the task. Instead, they switched between letter names and phonemes. Thus, the conflict they had had an effect on their performance and impeded their speed in letter naming task. As a result, the researcher proceeded with digit naming task.

4.3.1.3.1 HOTI (Digits)

HOTI (digits) measures performance of participants on naming digits rapidly. In the current study, the participant was asked to name a series of 50 items. The test items included the numbers 2, 4, 6, 7, and 9 and they were situated in 5 rows in a mixed order. Each row had 10 items. The participant was asked to read aloud the rows from left to right as fast and accurately as possible. Before starting to read the test items, the student was given 10 practice items to familiarize them with the test procedures. A stopwatch was used to keep the time it took to read all the items and the test was administered individually in a quiet room. The score of the examinee was calculated by the number of seconds that it took the participant to name all of the numbers on the card. Lower scores the participants got indicated a higher performance on this test.

4.3.1.4 Word spelling test by dictation

This test was developed by the researcher for this study to measure the spelling ability of the participants. It includes 35 isolated words from Turkish books recommended by the Ministry of National Education to be used for Turkish classes in the first and second grades. In order to choose the words in the tests, a mini-corpus was formed based on the frequencies of each word in the books. Word frequencies were analyzed by using two softwares, which ensured the correctness of the results. One of them is a programme developed by the researcher specifically for this study. Another is a Turkish text frequency analyzer programme (Oktay, Kurt, & Kara, 2011). All the texts in Turkish books used in Grade 1 and 2 were analyzed by these programmes and words were grouped according to the number of syllables they have. Among each syllable group- from 1-syllable to 9-syllable- , the most frequent words were determined. Among these words, 35 of them were chosen with ranging difficulty level and syllable number (see Appendix A for the sample items). Both inflected and uninflected words were included in the test in order to display morphological richness of Turkish. Another factor taken into consideration while choosing the words for the spelling tests was the letters k, s, a, b, t, and m which were found to be the frequently used first letters in the words in Turkish (Babür, Haznedar, Erçetin, Özerman, & Erdat Çekerek, 2013). The test started with the word en (the most) and the last item was hatırlamayabilirsiniz (you may not remember).

The word spelling test was carried out as a whole class activity. The students got the blank test sheet and were asked to write the isolated words they heard while the researcher was reading aloud the words twice. To familiarize the students to the procedure and to the test items, two practice items were also presented before giving the test. The scores of the tests were calculated by the number of correct answers

they wrote on the test sheet. They got 1 point for each correct answer and 0 point for any misspellings. The overall internal reliability measure (Cronbach's alpha) of the test was found to be .90.

4.3.2 Data collection instruments for qualitative analysis

Qualitative data analysis of the study is based on a comprehensive error analysis of word and text level spellings of the participants. For this reason, four spelling tests were conducted at word and text level in two different ways. To assess word level spelling, the participants were administered a word spelling test by copying and the word spelling test by dictation which was also used in collecting quantitative data. For text level spelling, text spelling tests by copying and by dictation were used. The tests were administered in two sessions at different times: first, the word and text level spelling tests were conducted by copying. Then, after a 2- week interval, the word and text level spelling tests by dictation were administered. For the error analysis of misspellings, comprehensive error criteria were used.

4.3.2.1 Word level spelling by copying

In this test, the participants were given blank test sheets and asked to copy 35 target words to the blank lines given on the test sheet. It was a whole class activity carried out in the classroom with the help of the class teacher. Before administering the test, two practice items were presented to the participants to make them familiarize to the test.

4.3.2.2 Word level spelling by dictation

As stated previously, the students were asked to write 35 isolated words carefully on their blank test sheet while the researcher was reading out each word twice. To get the students familiarized to the procedure and to the test items, two practice items were also presented before giving the test.

4.3.2.3 Text level spelling by copying

For the text level spelling, the short paragraph used in the study by Erden, Kurdoğlu, and Uslu (2002) was given to the participants (see Appendix A). The text includes 3 sentences and has a total of 21 words like tavşan (rabbit), sepet (basket), demet (bunch) and these words have some sounds which are likely to be easily substituted with similar sounds by the students. Thus, these words were used so that possible grapheme substitution errors can show up in the spellings of the participants. The participants copied the given text to the blank lines on their sheets by paying attention to the punctuation.

4.3.2.4 Text level spelling by dictation

As the researcher read aloud the same text sentence by sentence, the students were asked to write down the sentences. The sentences were read out twice considering the fact that there might be many slow spellers as the participants were first and second grade students.

4.4 Procedure

All tests were administered to the first and second graders in the spring semester of 2013-2014 academic year between April and June during school days. Before implementing the tests, an official permission from the Ministry of National Education was obtained to start data collection at the school (see Appendix B). After getting the official permission, the consent of the school administration, the teachers and the parents was also asked.

All the participants were tested individually in an empty and quiet room except for spelling tests. The spelling tests were carried out as a whole-class activity in the classroom. In the subtest assessing phonological encoding, two participants were tested at the same time because of time constraints. It took nearly eight weeks to administer all the tests to all participants.

Firstly, spelling tests by copying were administered to the first graders and second graders. Two weeks later, spelling tests by dictation were given to the participants in order to avoid participant fatigue. Then, the other tests were administered in the following order: word reading, rapid digit naming, and phonological encoding. It took on average 5 minutes and 3 minutes to complete word reading and rapid digit naming test, respectively. Each spelling test was administered in 40 minutes. Similarly, the test of phonological encoding was conducted in approximately 40 minutes.

For word reading test, the participants were shown word cards, on which test items were listed, and were expected to read word lists. Likewise, the participants were given stimulus cards for rapid digit naming tests and asked to name the test items on the card. However, for the spelling and the phonological encoding tests, the

participants were given answer sheets to complete with a pen. All the participants were ensured to have a pen and an eraser before the administration of the tests.

All testing, scoring, and data entry were carried out by the researcher. Before starting the test administration, the teacher of each class introduced the researcher to the students so as to familiarize them with her. Moreover, each testing day, the researcher informed the class teacher about the order of the students taking the test on that particular day. Each student was taken out of the classroom by the researcher and accompanied back to the classroom after the completion of the tests.

4.5 Data analysis

The first and second grade students were given several tests including spelling, phonological encoding, reading and rapid naming to investigate the underlying components of the spelling ability and classify spelling errors. To evaluate the quantitative data gathered from the participants, it was entered into 20.0 version of SPSS (Statistical Package for Social Sciences) to compute descriptive statistics and statistical analysis. To analyze and categorize the spelling errors, a comprehensive rubric was developed by the researcher (see Table 9).

Before conducting the analyses, the distribution of the scores was examined and some outliers were removed. The normality tests were carried out to see whether the data have a normal distribution. The results of the normality tests, skewness and kurtosis values showed that the scores had a normal distribution. Thus, parametric tests (Pearson product-moment correlation and t-tests) were conducted to analyze the data.

Independent Samples T-tests were conducted to find out whether there is a significant difference between Grade 1 and Grade 2 in terms of phonological encoding, RAN, word reading and word spelling performance. In order to see the intercorrelations between phonological skills, RAN, word reading and word spelling scores, Pearson product-moment correlations were run. Lastly, two-step multiple regressions (hierarchical model) were run in order to examine the effects of phonological encoding and rapid naming on students' word spelling and word reading skills. That is, Multiple Regression was used to determine how much variance the independent variables account for in the dependent variables. Table 9 shows an overview of research questions, instruments and data analysis procedures.

In order to analyze qualitative data, the errors were counted in each grade and categorized according to the rubric. In Table 10, a detailed categorization of the errors can be seen. After that, error frequencies in each category were converted into percentages and by using the percentages, pie charts were formed, which made it easy to find out the most common error types in each grade and different task types (copying and dictation). With the help of the pie charts, the most problematic words in each category which caused frequent spelling errors in the handwritings of the participants were found and the nature of the spelling errors was explained with regard to the characteristics of Turkish language.

Table 9. Overview of Research Questions and Corresponding Procedures

Research Questions	Data Collection Instruments	Data Analysis
1. Is there a significant difference between 1st and 2nd graders performances on phonological encoding, RAN, word reading and word spelling skills?	Word Reading Test Test of Phonological Encoding Skills HOTI (Digits) (Bakır & Babür, 2009) Word Spelling Test	QUAN: Descriptive Statistics Independent Samples T-tests
2. What are the intercorrelations among phonological encoding, RAN, word reading and word spelling? Does the relationship differ in the 1st and 2nd grade?	Word Reading Test Test of Phonological Encoding Skills HOTI (Digits) (Bakır & Babür, 2009) Word Spelling Test	QUAN: Correlation Analysis
3. Do phonological encoding skills and RAN contribute significantly to the spelling ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?	Word Reading Test Test of Phonological Encoding Skills HOTI (Digits) (Bakır & Babür, 2009) Word Spelling Test	QUAN: Hierarchical Regression Analysis
4. Do phonological encoding skills and RAN contribute significantly to reading ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?	Word Reading Test Test of Phonological Encoding Skills HOTI (Digits) (Bakır & Babür, 2009) Word Spelling Test	QUAN: Hierarchical Regression Analysis
5. What are the characteristics of spelling errors in Grade 1 and 2? What types of spelling errors are found in each grade?	Word Spelling Test Text Spelling Test	QUAL: Error Analysis

Table 10. Rubric for Spelling Error Categorization

Error categories	Example
Grapheme omission	Target word: kaplumbağa (turtle) *kaplumbaa
Grapheme addition	*kaplumbağam
Grapheme substitution	*kablumbağa
Grapheme reversal	*kalpumbağa
Syllable omission	*kaplumba
Syllable addition	*kaplumbağası
Syllable reversal	*kaplumğaba
Syllable separation	*kaplum bağa
Diacritic omission	*kaplumbaga
Diacritic addition	Target word: uçurtma (kite) *üçurtma
Word omission	Text level
Word addition	Text level

In this chapter, research questions and information about the participants were presented along with the data collection instruments and the procedures followed in the study. In the next chapter, the results of the study will be presented.

CHAPTER 5

RESULTS

This chapter reports the results of the quantitative and qualitative analyses of the data collected from first and second grade students. In order to answer the research questions, correlational analysis, Pearson product-moment correlations, independent samples t-test analysis, and hierarchical regression analysis were conducted.

For the first and second graders, Table 11 and 12 below present descriptive data including means and standard deviations for the key measures. Moreover, minimum and maximum scores are presented showing the range of scores.

Table 11. Descriptive Statistics for 1st Graders (N = 35)

Tests	Mean	Std. Deviation	Min.	Max.
Word Reading	38.66	7.33	26	53
Word Spelling by Dictation	21.94	7.73	2	35
RAN	40.76	9.43	26.12	66.29
Phonological Encoding	42.00	4.69	29	49

Table 12. Descriptive Statistics for 2nd Graders (N = 32)

Tests	Mean	Std. Deviation	Min.	Max.
Word Reading	56.74	8.76	40	71
Word Spelling by Dictation	25.31	7.68	8	35
RAN	31.79	7.11	21.63	52.34
Phonological Encoding	44.06	4.13	30	49

Table 11 and 12 show the means of tests scores in word spelling, word reading, phonological encoding, and rapid naming respectively. As for the word spelling performances, first graders got the mean scores of 21.94 with a standard deviation of 7.73 while the second graders have a mean of 25.31 ± 7.68 . Moreover, the mean score of first graders in word reading is 38.66 ± 7.33 whereas the students in second grade got 56.74 ± 8.76 as the mean score. Concerning phonological encoding, while the students in first grade have a mean and standard deviation of 42.00 and 4.69, second graders got 44.06 with a standard deviation of 4.13. Finally, regarding RAN, first and second graders have 40.76 ± 9.43 and 31.79 ± 7.11 respectively as the mean score and standard deviation.

Research Question 1: Is there a significant difference between 1st and 2nd graders performances on phonological encoding, RAN, word reading and word spelling skills?

This research question aimed to find out whether there is a significant difference in PE, RAN, word reading and word spelling across grades, so Independent Samples T-tests were run for each variable separately. As for testing homogeneity of variance, Levene's Test of Equal Variances was conducted and the results showed that all the variables met the assumption of variance homogeneity.

The results of the t-tests showed that there was no significant difference between the PE skills of the first graders and the second graders $t(66) = -1.872, p > .05$. However, in the rapid naming task, the performance of second graders was significantly better than the performance of the first graders $t(66) = 4.342, p < .001$. This suggested that the second graders had higher levels of automatization than the first graders in the retrieval of phonological representations. Like the performance in

RAN, the word reading skills of the first graders were significantly different than those of the second graders $t(66) = -9.121, p < 0.001$. This suggested that the second graders performed significantly better than the first graders in reading task probably because they had better automatization skills. Finally, the results revealed that in word spelling, the performance of the first graders did not differ from the performance of the second graders significantly $t(66) = -1.786, p > .05$.

Research Question 2: What are the intercorrelations among phonological encoding, RAN, word reading and word spelling? Does the relationship differ in the 1st and 2nd grade?

This research question aimed to investigate the role of phonological encoding skills and rapid naming on Turkish reading and spelling skills of the students in the first and second grades. In order to answer whether phonological encoding skills and rapid naming correlated to Turkish word reading and spelling skills of 1st and 2nd graders, Pearson product-moment correlation coefficient was computed, using spelling and reading as the dependent measures. Table 13 and 14 demonstrate correlations among scores of phonological encoding, word reading, rapid naming and word spelling for the first and second graders respectively.

As can be seen in Table 13, in the first grade, the highest correlation appeared between phonological encoding and word spelling ($r = .80, p < .01$). However, there was no statistically significant relationship between spelling skills of first graders and word reading ($r = .31, p < .01$). There was no statistically significant correlation between spelling skills and rapid naming, either ($r = -.19, p < .01$).

Regarding reading scores of first graders, unlike spelling, there was a statistically significant negative correlation between word reading skills and rapid naming ($r = -.45, p < .01$), indicating that while one variable increases, the other decreases. Yet, the correlation between word reading ability and phonological encoding was weak ($r = .17, p < .01$).

Table 13. Correlation Matrix for Interrelations among Measures for Grade 1

Variables	1	2	3	4
1. Word spelling	--			
2. Phonological encoding	.805**	--		
3. Word reading	.316	.174	--	
4. RAN-digit	-.192	-.095	-.454**	--

Note. ** $p < .01$

Table 14. Correlation Matrix for Interrelations among Measures for Grade 2

Variables	1	2	3	4
1. Word spelling	--			
2. Phonological encoding	.482**	--		
3. Word reading	.408*	.453*	--	
4. RAN-digit	-.212	-.418*	-.555**	--

Note. * $p < .05$ ** $p < .01$

As Table 14 demonstrates, in contrast to Grade 1, the scores of the second graders showed a statistically significant correlation between word spelling and word reading skills ($r = .40, p < .05$). Moreover, phonological encoding skills of second graders significantly correlated with word reading ability ($r = .45, p < .05$). Although there was a strong relationship between phonological encoding skills and the spelling ability of the first graders with a correlation coefficient of .80, it is seen that phonological encoding and spelling skills of the second graders were moderately

correlated ($r = .48, p < .01$). Similar to first graders, rapid naming and reading ability significantly correlated ($r = .55, p < .01$).

All in all, the results showed that the relationship between the variables were similar across grade levels. The correlational analysis revealed that phonological encoding skills and word spelling were significantly correlated with each other in the first and second grade while word reading and RAN had a strong correlation in each grade. Moreover, in the second grade, word reading substantially correlated with both word spelling and phonological encoding skills. There was a positive correlation between phonological encoding, word spelling and reading. However, RAN had a negative correlation with word reading in each grade, which was to be expected, as the shorter time the task was completed in, the higher levels of performance the students had.

Research Question 3: Do phonological encoding skills and RAN contribute significantly to the spelling ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?

The third question investigates whether phonological encoding skills and rapid naming in Turkish made a significant contribution to word-level spelling skills of the students in the first and second grades. In order to determine the effect, further analyses were performed. Data from the first and second graders were analyzed by running multiple regressions because it is important to find out how much variance can be attributed to phonological encoding skills and RAN in word spelling. It is also important to investigate which independent variable, phonological encoding skills and RAN, are the best predictors of word spelling.

Variables explaining the spelling ability were entered in two steps in the regression model. For the entry sequence of the variables to the word spelling ability model, the correlations among the variables and theoretical rationale were taken into account. That is, on the basis of the previous studies, phonological encoding (PE) was entered in the first step since it was demonstrated as the most influential variable on spelling ability. Then, rapid naming (RAN) was included as Step 2. The results of the hierarchical regression analysis across grade levels can be seen in Table 15 and 16.

Table 15. Summary of Hierarchical Regression Analysis for Word Spelling in Turkish at Grade 1 (N = 34)

Independent variable	B	t	R	R ²	ΔR ²
Step 1			.805	.648	.637
PE	.805	7.680***			
Step 2			.813	.662	.640
PE	.794	7.568***			
RAN	-.117	-1.111			

Note. PE = Phonological Encoding, RAN = Rapid Automatized Naming. B = Standardized Beta, ΔR² = R Squared Change.*p < .05, **p < .01, ***p < .001.

Table 16. Summary of Hierarchical Regression Analysis for Word Spelling in Turkish at Grade 2 (N = 35)

Independent variable	B	t	R	R ²	ΔR ²
Step 1			.482	.232	.206
PE	.482	2.963**			
Step 2			.484	.234	.179
PE	.500	2.747**			
RAN	-.044	-.239			

Note. PE = Phonological Encoding, RAN = Rapid Automatized Naming. B = Standardized Beta, ΔR² = R Squared Change.*p < .05, **p < .01, ***p < .001.

The results of the analysis for word spelling ability at Grade 1 are displayed in Table 15. It can be seen in the table that phonological encoding accounted for 65% of the total variance in spelling achievement ($F(1, 32) = 58.981, p < .001$) in the first grade. When RAN was entered into the model, it only accounted for 1% of the remaining variance. To sum up, this model accounted for 66% of the total variance in the spelling achievement of the first graders.

Table 16 shows the results of the regression analysis for word spelling ability at Grade 2. As stated in the Table 16, PE skills significantly accounted for 23.2% of the total variance in spelling achievement of the second graders ($F(1, 29) = 8.777, p < .01$). When RAN was entered into the model as the second variable, it accounted for 0.2% of the remaining variance beyond the contribution of phonological encoding ability. Therefore, the whole model accounted for 23.4% of the total variance in the spelling performance of the second graders. The findings suggest that like the first graders, the students in Grade 2 also rely on phonological knowledge in word spelling ability. Thus, it can be concluded that phonological knowledge significantly predicted word spelling ability of the first and second graders. However, rapid naming did not have any significant contribution to spelling performance of the students in comparison to phonological encoding skills.

When the results of the regression analysis for the first and second grade were compared, it was seen that phonological encoding skills explained much more variance in Grade 1 (65%) than in Grade 2 (23.2%). Moreover, in both grade levels, RAN did not account for significant amounts of variance in word spelling ability. Thus, it is likely to conclude that when the grade level increased, the influence of phonological knowledge decreased.

Research Question 4: Do phonological encoding skills and RAN contribute significantly to reading ability of 1st and 2nd graders? Does this relationship differ in the 1st and 2nd grade?

This question investigates whether phonological encoding skills and rapid naming in Turkish significantly contributed to word-level reading skills of the students in the first and second grades. By taking word-reading skills as dependent variable, multiple regressions were conducted using data from the first and second graders to find out how much variance can be attributed to each independent variable in the dependent variable, word reading, and which independent variable, phonological encoding and RAN, are the best predictors of the dependent variable.

In the regression model, variables explaining word-reading ability were entered in two steps. The correlations among the variables and theoretical rationale were taken into account for the entry sequence of the variables to the word reading ability model. First, rapid naming (RAN) was entered to the model. Then, phonological encoding (PE) was included as Step 2. Since RAN was found to be the most influential variable on reading ability in the previous studies, it was entered as the first variable to the model. In order to find the difference across grade levels in the regression results, two separate regression analyses were run for the first and second grades. The results of the analyses are shown in Table 17 and 18.

It can be seen in the Table 17 that rapid naming skills accounted for 21% of the total variance in reading achievement ($F_{1, 32} = 8.320, p < .01$) among the first graders. When PE was entered into the model, it only accounted for 1.4% of the remaining variance. To sum up, this model accounted for 22.4% of the total variance in the word-reading achievement of the first graders with significant contribution of RAN

and PE. As can be seen in Table 18, about reading ability of the second graders, it was found that RAN accounted for 29% of the total variance in reading achievement ($F_{1, 28} = 11.332, p < .01$). Phonological encoding skills, which entered next into the model, significantly accounted for an additional 8% of the variance.

Table 17. Summary of Hierarchical Regression Analysis for Word Reading in Turkish at Grade 1 (N = 34)

Independent variable	B	t	R	R ²	ΔR^2
Step 1			.454	.206	.182
RAN	-.454	-2.884**			
Step 2			.473	.224	.174
RAN	-.442	-2.779**			
PE	.132	.832			

Note. PE = Phonological Encoding, RAN = Rapid Automatized Naming. B = Standardized Beta, ΔR^2 = R Squared Change. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 18. Summary of Hierarchical Regression Analysis for Word Reading in Turkish at Grade 2 (N = 34)

Independent variable	B	t	R	R ²	ΔR^2
Step 1			.537	.288	.263
RAN	-.537	-3.366**			
Step 2			.609	.370	.324
RAN	-.432	-2.660*			
PE	.305	1.877			

Note. PE = Phonological Encoding, RAN = Rapid Automatized Naming. B = Standardized Beta, ΔR^2 = R Squared Change. * $p < .05$, ** $p < .01$, *** $p < .001$.

Overall, it can be concluded that the second graders utilized sight word reading more than the first graders because with an increase in the grade level, there was also an increase in the amount of variance RAN performance accounted for in word reading ability (21% at Grade 1.29% at Grade 2). Regarding the role of phonological encoding in reading achievement, PE skills became more influential in predicting reading performance when the grade level of the students increased.

Research Question 5: What are the characteristics of spelling errors in Grade 1 and 2? What types of spelling errors are found in each grade?

This question tries to find out whether there is a difference in the nature of error types when the grade of the participants and task modality change. In order to figure it out, an error analysis was conducted. After counting each spelling error, a frequency record of errors was kept according to error categories in the rubric (see Table 10 for the rubric) by the researcher. Then, the total number of error occurrences in each category was calculated to find percentages out of frequencies, and the results were converted into pie charts, showing the distribution of error types. The results from different task modalities were compared in order to see whether error types differ depending on copying and dictation tasks at word and text levels in the 1st and 2nd grades.

Word level spelling by copying

For the word spelling by copying, detailed error analysis is shown in Figure 2 below. As Figure 2 shows, regarding all the errors in word-level spelling by copying, it was found that the most common error types were diacritic omission, grapheme omission and syllable omission with percentages of 31, 26 and 24 respectively.

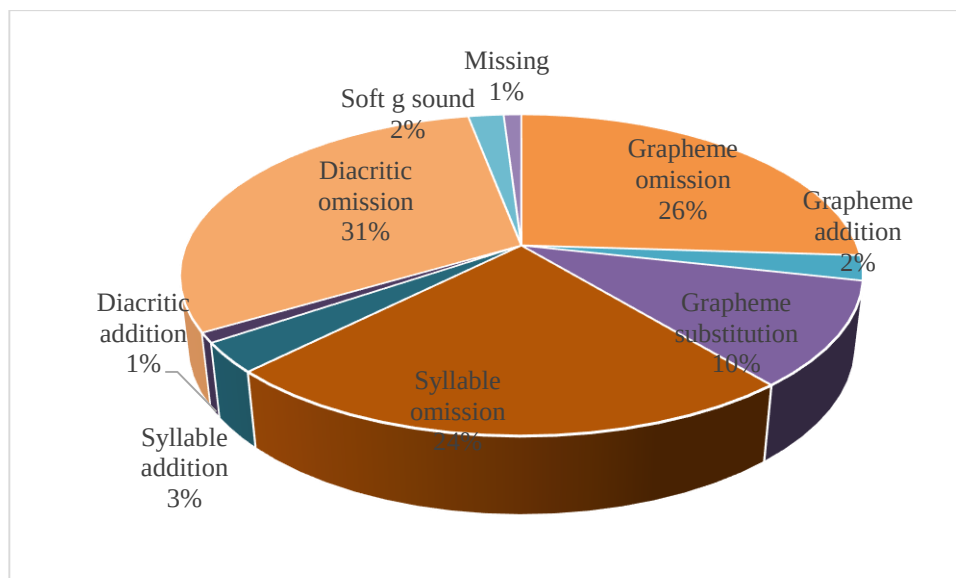


Fig. 2 Word-level spelling by copying

With the help of the error analysis method, the nature of spelling errors made by the first and second graders was identified in detail. As can be seen in Figure 3, the qualitative analysis of errors in word spelling by copying task showed that diacritic omission in the 1st grade and grapheme omission in the 2nd grade appeared to cover the biggest proportion of errors (36%, 30%, respectively).

Figure 3 shows the percentages of error types based on the analysis of word spelling by copying by the first graders. Of all types of errors, diacritic omission constitutes 36% of total errors, which is probably the result of cursive handwriting. As the students were taught to write the words at once in cursive handwriting, they were likely not to go back to the letters and complete the missing diacritics. Beyond diacritic omission errors, the most common error types are found to be syllable omission, grapheme omission and grapheme substitution with percentages of 20, 19 and 12 respectively. Covering the smallest proportion of errors, syllable addition, grapheme addition, soft g /ğ/ sound and diacritic addition make up 5%, 4%, 2% and 1%, respectively.

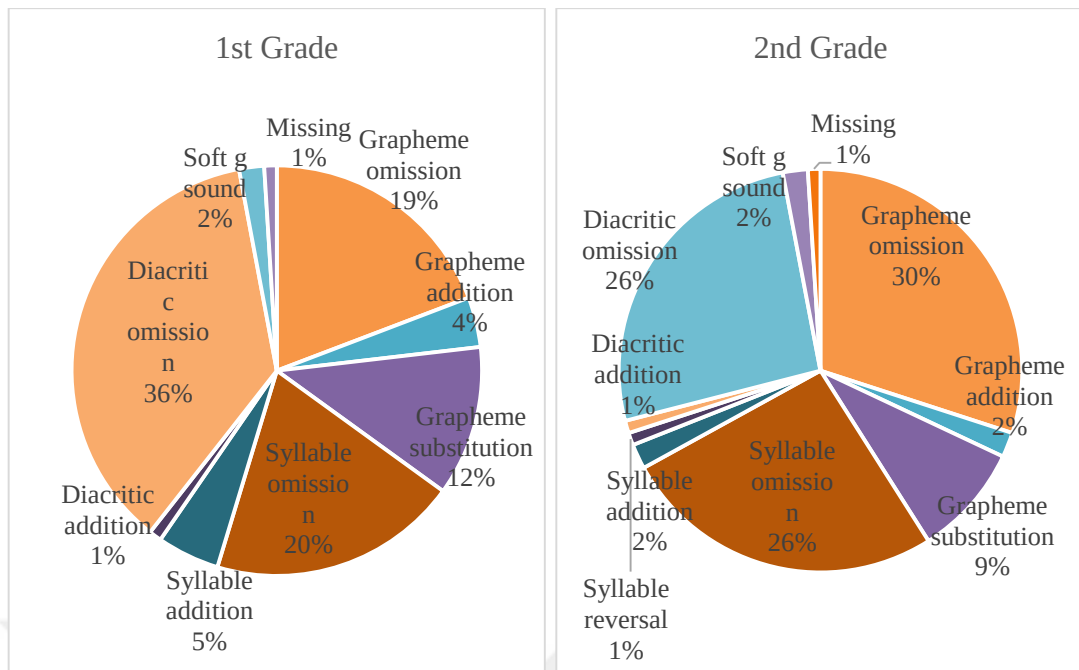


Fig. 3 Error patterns in word-spelling by copying across grade levels

On the other hand, unlike error types made by the students in the 1st grade, with a percentage of 30, grapheme omission covers the biggest proportion of errors in 2nd grade. The percentage of syllable omission is 26, which is the same with diacritic omission. While percentages of all the other error types were on the decrease in the second grade, there was an increase in the amount of syllable and grapheme omission errors. The percentage of syllable omission went up from 20% to 26% while grapheme omission increased by 11 percent to 30%. Similar to the first graders, grapheme substitution was one of the most common error types among the second graders, with a percentage of 9. Grapheme and syllable addition, syllable reversal, soft g /ğ/ and diacritic addition make up the smallest proportion of the errors with the percentages of 2, 1, 2, and 1, respectively.

Among the syllable omission errors in the first grade, syllables including ğ were the most problematic ones as they constitute 18% of syllable omission errors. For the grapheme omission errors, it turned out that the most problematic graphemes were i (21%) and ı (18%) for the second grade students as well as the first graders.

In the word level copying test, kullanılabilmektedir (it can be used) was the most problematic word for the first and second graders. 61% of the first graders and 62% of the second graders had difficulty while writing this word. This might stem from the fact that it is a long, multimorphemic word. Among the first graders, students mostly omitted some graphemes and morphemes, especially in the word-final position. On the other hand, students in the second grade had diacritic omission and grapheme omission, mostly in word medial position.

Word level spelling by dictation

Figure 4 below shows the detailed error analysis of word level spelling by dictation.

With the help of the error analysis, the most common error types were found to be syllable omission, grapheme omission and grapheme substitution with percentages of 24, 22 and 18, respectively, which is quite similar to the common error types in word-level spelling by copying.

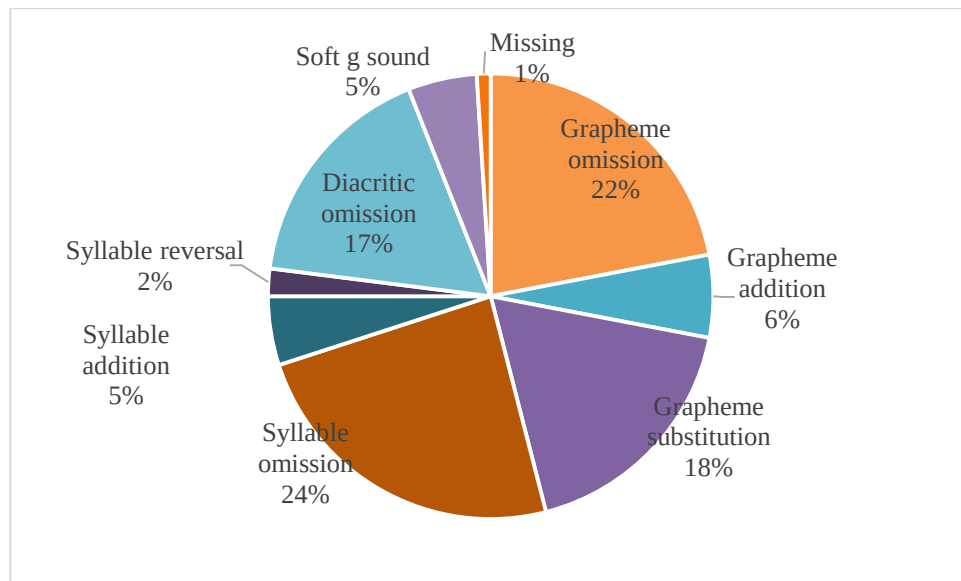


Fig. 4 Word-level spelling by dictation

The error analysis conducted showed the nature of spelling errors of the first and second graders in word-level spelling by dictation in detail. As Figure 5 demonstrates that in word spelling by dictation task, syllable omission (23%) formed the biggest proportion of the errors in the first grade while the most common error types among the second graders were grapheme omission (25%) as well as syllable omission (25%). Although there was a decrease in the percentage of grapheme substitution, grapheme addition and soft g /ğ/ when the first and second grades are compared; diacritic omission, syllable omission and grapheme omission increased slightly in the second grade.

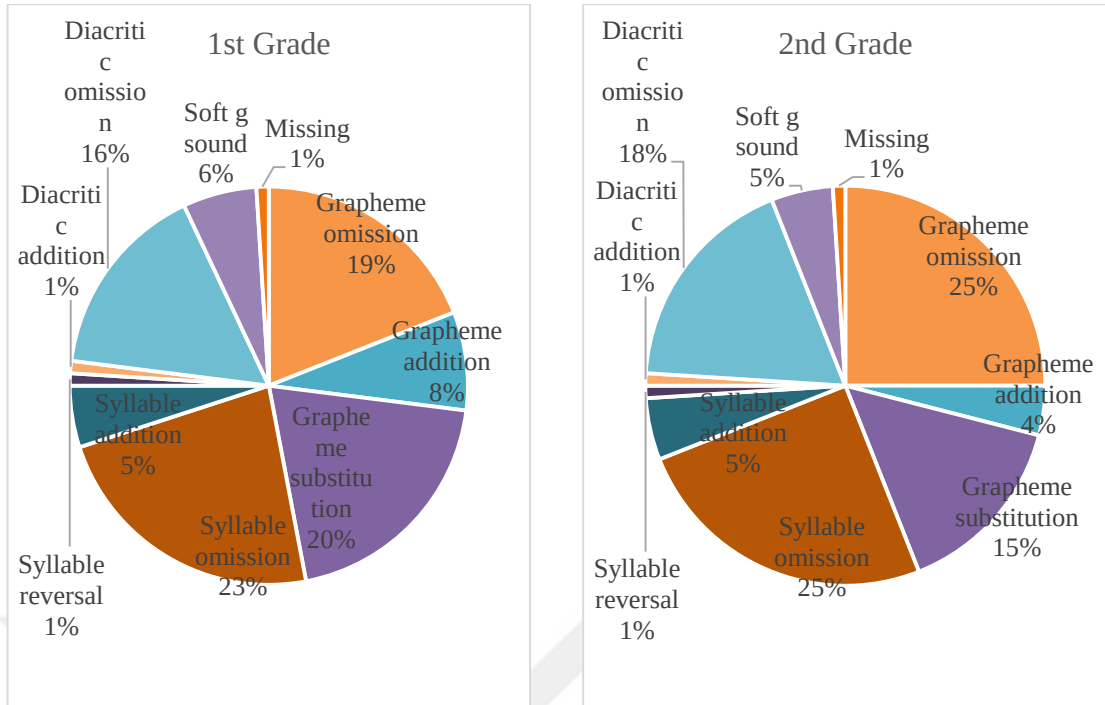


Fig. 5 Error patterns in word-spelling by dictation across grade levels

Among the syllable omission errors, syllables containing the sound soft g /ğ/ such as ğı, ği, ğu, ğü were mostly omitted ones (33%) by the first graders, which is similar to the results of the copying task. Among the grapheme omission errors, the sound l (19%) was the most problematic consonant for the second graders while a (9%) and e (10%) were the most problematic vowels. When it comes to the syllable omission errors, like the first graders, syllables with soft g /ğ/ were found to be omitted with a percentage of 32.

In the word spelling by dictation task, the first graders (80%) had difficulty mostly in writing the word planlıyorsunuz (you are planning) and the word kullanılabilmektedir (it can be used) as was the case with the copying task. As it includes a word initial consonant cluster, most of the students had grapheme addition error while writing the word p(i)lanlıyorsunuz (you are planning) by adding “i”.

The reason for this is the fact that unlike their written forms, consonant clusters are not permitted in Turkish pronunciation and a high vowel usually breaks them up, making the word suitable for vowel harmony.

Text-level spelling by copying

As it can be seen below in Figure 6, for the text-level spelling by copying, detailed error analysis showed that grapheme substitution (31%), diacritic omission (20%) and grapheme omission (13%) were the most common error types, which constituted a large amount of the total number of errors.

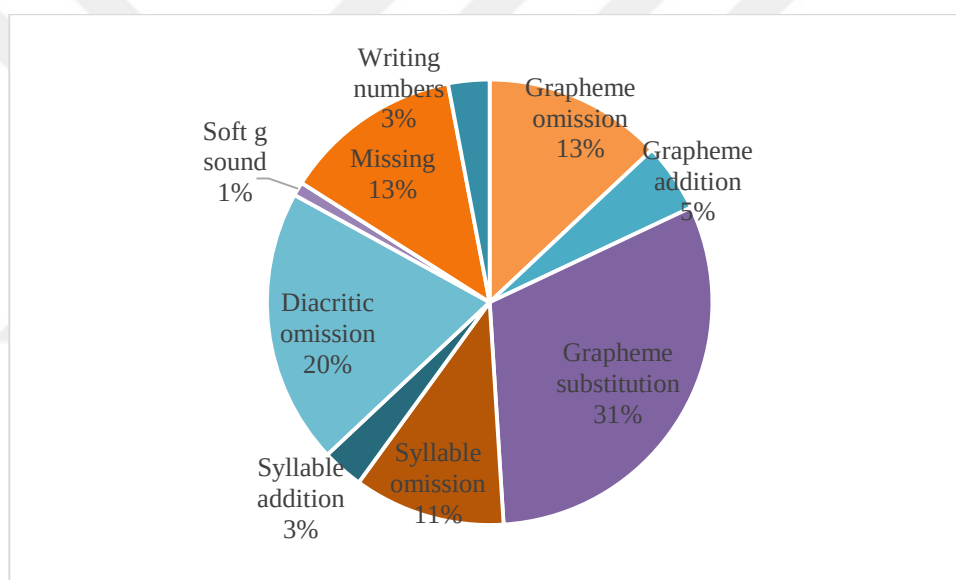


Fig. 6 Text-level spelling by copying

As shown in Figure 7, in the text-level spelling by copying task, grapheme substitution was found to be the most common error type for both the students in the first grade (36%) and second grade (26%). When the percentages of other error types were compared, there seemed to be a decrease in most error types. However, grapheme addition errors slightly increased by 5 percent to 7% in the second grade. Like the first graders, diacritic omission covered 20% of the errors in the second grade, too. With a similar amount, in the first (12%) and second grade (15%), there

were some missing words as some students chose not to complete the text in the task, although it was not a long one. This may stem from the fact that they probably lost attention and interest for the task.

In the comparison of the first and second grade, an interesting finding was that although there was no student in the first grade using numbers instead of their written form, some of the second graders tended to write the word “bir (one)” in numbers as “1”.

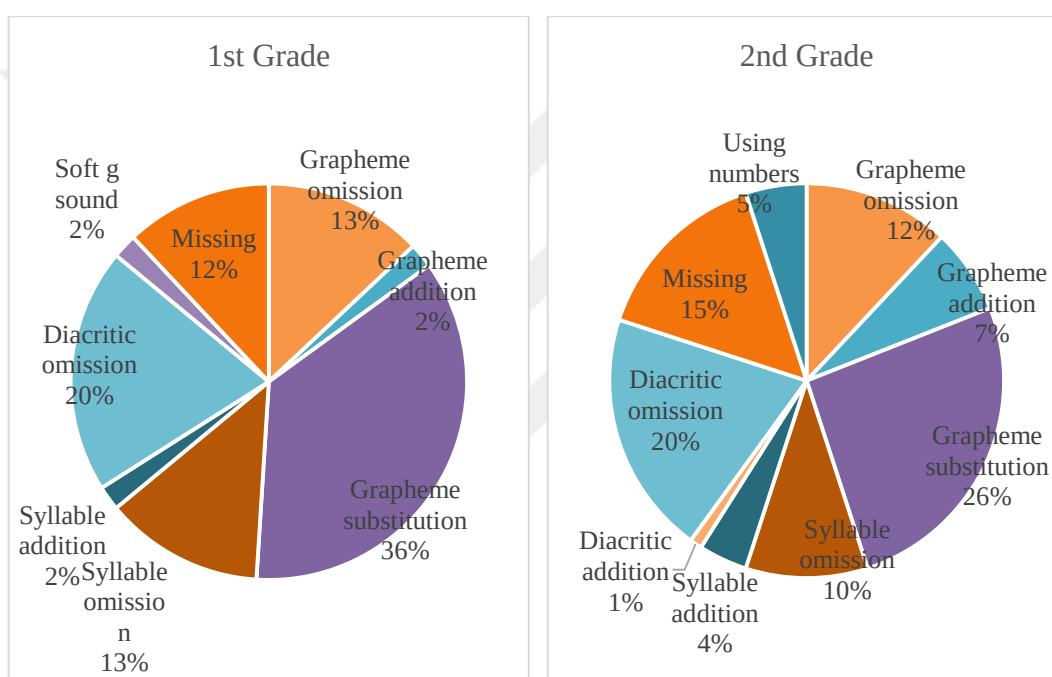


Fig. 7 Error patterns in text-spelling by copying across grade levels

Among grapheme substitution errors, the most problematic pair was a and o both for the first graders (77%) and the second graders (68%) in the word maydanoz (parsley). This error is likely to stem from the fact that the word is frequently mispronounced in spoken Turkish and the students reflected the spoken version to their spellings although they saw the correct spelling of the word while they were copying the text. Concordantly, the word maydanoz (parsley) was found to be the

most problematic word as 51% of the first graders and 45% of the second graders misspelled the word with a grapheme substitution error as “maydonoz”.

Moreover, the analysis demonstrated that 50% of the first graders and 45% of the second graders made at least one punctuation error such as use of capital letters, comma, and full stop while copying the text.

Text-level spelling by dictation

In the text-level spelling by dictation task, the error analysis demonstrated that grapheme substitution, grapheme omission and missing words were the most common error types, comprising large proportions of the total numbers of errors. Figure 8 shows the detailed analysis of error types regarding the total number of errors.

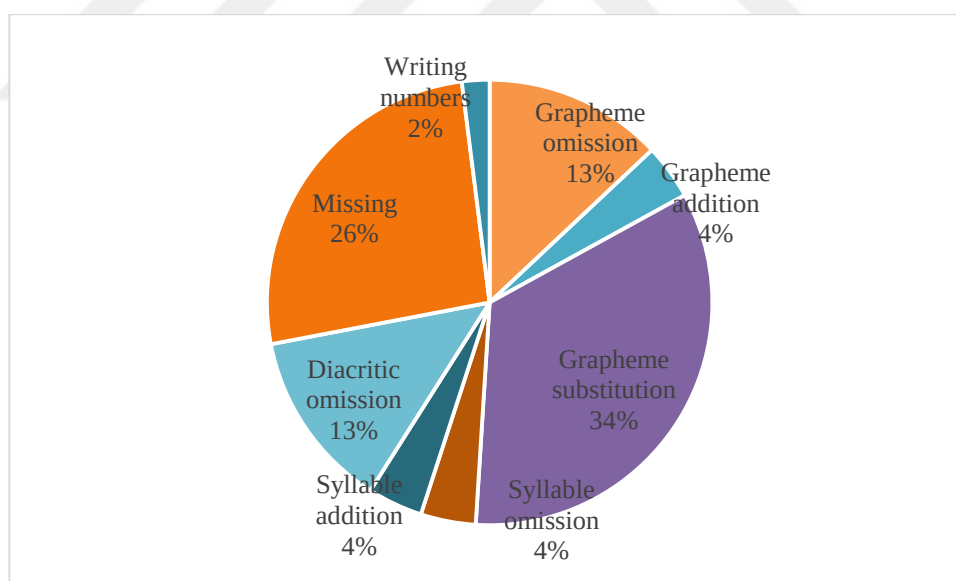


Fig. 8 Text-level spelling by dictation

As it can be seen in Figure 9 below, grapheme substitution covered the biggest proportion both in the first and second grade with a percentage of 33 and 35 respectively. Another common error was diacritic omission among the first graders (12%) and second graders (14%).

As it was the case with the copying task, among the grapheme substitution errors, the problematic pair was found to be a and o for the students in the first and second grade (45%). Again, the word maydanoz (parsley) was the most misspelled one for both grade levels (50% at Grade 1, 75% at Grade 2). When compared to text copying, a high percentage of the students in the first grade (97%) had difficulty in using punctuation marks properly in the text-level spelling by dictation task. However, it decreased to 70% in the second grade.

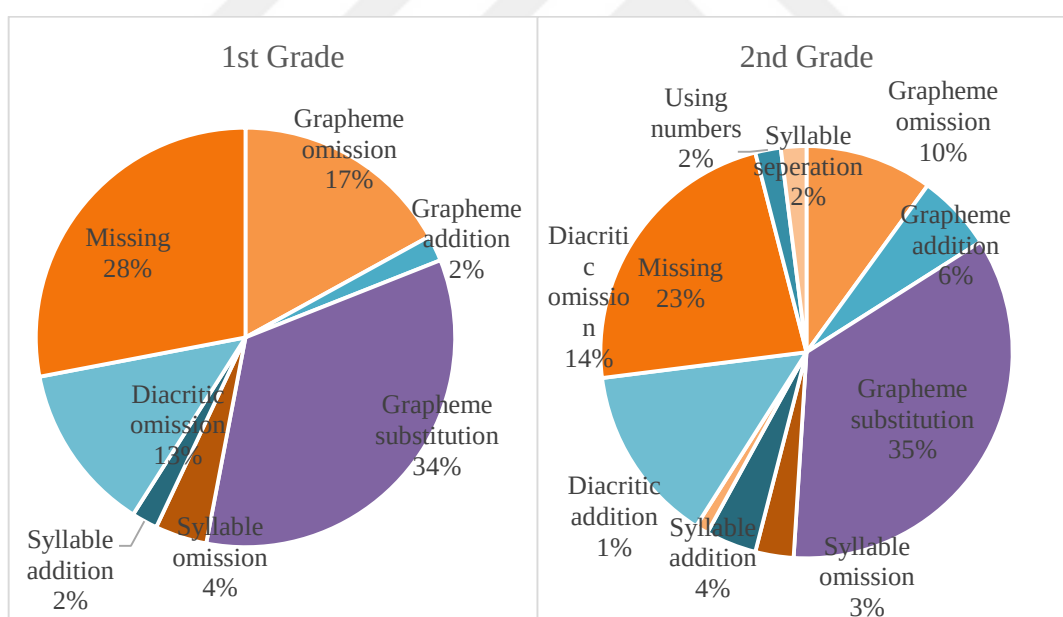


Fig. 9 Error patterns in text-spelling by dictation across grade levels

Moreover, the analysis demonstrated that 97% of the first graders and 70% of the second graders made at least one punctuation error such as use of capital letters, comma, and full stop during dictation task.

Characteristics / Patterns of spelling errors

In order to find whether there are qualitative changes between the spellings of Grade 1 and 2, qualitative analysis was used to give a detailed description of different spelling errors in each grade, which can make it easy to have a deeper understanding of them. Thus, an error analysis was conducted. Each spelling error made by each student was counted and recorded in the corresponding error category in each grade. Then, the total number of error occurrences in each category and grade was calculated.

In Grade 1, the analysis showed that the most common error type is syllable omission by 23%. A detailed analysis of this error type showed that a big proportion of these errors (30%) is related to the syllables including “soft g /ğ/”. Errors in words regarding omission of syllables starting with soft g /ğ/ can be exemplified in Table 19 below:

Table 19. Examples of Syllable Omission Errors Related to Soft g /ğ/ at Grade 1

Correct Form	Misspelled Form
okuduğunuz	okudunuz
olduğunuz	oldunuz
unutamadığınız	unutamadınız
aşağıdaki	aşadaki
kaplumbağa	kaplumba
sevdiğiniz	sevdiniz
öğreneceğinizi	öğrenecenizi
söyleyebileceğinizi	söylenecenizi
dedeciğim	dedecim

56% of first graders made at least 1 omission error while writing these words. In all of these words, the syllable starting with soft g /ğ/ was omitted and it was in the form of CV pattern followed with back vowels /a/, /ı/, /u/ or front vowel /i/. Also, all these poorly written words are long words having at least 4 syllables and more.

The second mostly omitted syllable is the syllables including the consonant /l/. 19.5% of syllable omission errors among first graders include this type of syllable. Poorly written words in this error type can be seen in Table 20 below:

Table 20. Examples of Syllable Omission Errors Related to the Consonant /l/ at Grade 1

Correct Form	Misspelled Form
kullanılmamalıdır	kullanılmadır
söyleyebileceğiniz	söyleneceniz
kavuşabileceklerini	kavuşabileceyini
değerlendirmesi	deyerdirmesi
kavuşabileceklerini	kavuşabilecenizi
işaretleyerek	işaretyerek
hatırlamayabilirsiniz	hatırmayabilir
kullanılabilmektedir	kullanbilmektedir

46% of the students made at least 1 omission error regarding /l/ sound while writing these words. In all of these words, the syllable including /l/ was omitted. The syllable was either in the form of CV pattern followed with back vowels /a/, /ı/ or front vowel /e/, or in the form of CVC pattern in which /l/ sound is in the final position. In addition, all these omission errors were observed in long words having at least 6 syllables and more.

Another error which is the second-most common type among the first graders is grapheme substitution which occurs with a percentage of 20. After analyzing all the grapheme substitution errors, soft g /ğ/ was found to be the most substituted grapheme by 23%. It was mostly substituted by the sounds /y/ and /h/. In 18% of the errors, students substituted /ğ/ with /y/. This is shown in the following examples in Table 21:

Table 21. Examples of Grapheme Substitution Errors Related to Soft g /ğ/ and /y/ at Grade 1

Correct Form	Misspelled Form
dedeciğim	dedeciym
öğreneceğimizi	öğreneceyinizi
söyleyebileceğiniz	söyleyebileceyiniz

Next comes the sound /h/ substituted for /ğ/, with a percentage of 5. Words substituted with this grapheme can be seen in Table 22 below:

Table 22. Examples of Grapheme Substitution Errors Related to Soft g /ğ/ and /h/ at Grade 1

Correct Form	Misspelled Form
sevdiğiniz	sevdihiniz
okuduğunuz	okuduhunuz
olduğunuz	olduhunuz

The second-most substituted grapheme is /m/. 10% of grapheme substitution errors among first graders include this grapheme. In a big proportion of these errors (9%), /m/ was substituted by /n/ while writing the word “kaplumbağa (turtle)” as “kaplunbağa”.

The third-most substituted grapheme among first graders is /t/ by 7 per cent. First graders mostly substituted the grapheme /t/ with /k/. All the substitution errors regarding these graphemes were made while writing the word “ölçütler”.

Thirdly, grapheme omission was found to be the third most common error type among the students in Grade 1, which occurred around 19% of the time. A thorough analysis revealed that the most omitted grapheme was /l/ with a percentage of 37.5. Table 23 below shows some of the examples of this error type:

Table 23. Examples of Grapheme Omission Errors Related to the Consonant /l/ at Grade 1

Correct Form	Misspelled Form
kullanılmamalıdır	Kulanılmamalıdır
kullanarak	kulanarak
kullanılabilmektedir	kullanabilmektedir
kullanılmamalıdır	kullanmamalıdır

The second mostly omitted grapheme was /l/ by 15%. In most of the misspelled words, besides the grapheme /l/, the grapheme /ı/ was also omitted especially in the words “kullanılmamalıdır” and “kullanılabilmektedir” as they are one of the affixes in Turkish. The suffix /-ıl/ is used to turn the active verb stem into passive.

On the other hand, in Grade 2, quantitative analysis showed that the most common error type is syllable omission by 25% as in Grade 1. A detailed analysis of poorly written words regarding this error type showed that a big proportion of these errors (41%) is related to the syllables including “soft g /ğ/”. Table 24 exemplifies errors in words regarding omission of syllables starting with soft g /ğ/:

Table 24. Examples of Syllable Omission Errors Related to Soft g /ğ/ at Grade 2

Correct Form	Misspelled Form
sevdiğiniz	sevdiniz
okuduğunuz	okudunuz
olduğunuz	oldunuzu
kaplumbağa	kaplumba
aşağıdakilerden	aşadakilerden
unutamadığınız	unutamadınız

While writing these words, like first graders, 42% of second graders made at least one syllable omission error, which is omitting the syllable starting with soft g /ğ/. In all of the omitted syllables, which were in the form of CV pattern, the soft g /ğ/ was in the initial position followed with back vowels /a/, /ı/, /u/ or front vowel /i/. Also, all these poorly written words are long words of which syllables range from 4 to 7.

The syllables involving the consonant /l/ were found to be the second-most omitted syllable with a percentage of 19 among the students in the second grade.

Examples of this error type can be seen in Table 25:

Table 25. Examples of Syllable Omission Errors Related to the Consonant /l/ at Grade 2

Correct Form	Misspelled Form
düzenlenmiştir	düzenmiştir
hatırlamayabilirsiniz	hatırmayabilirsiniz
kullanılmamalıdır	kullanılmamadır
söyleyebileceğiniz	söyleyeceğiniz
değerlendirmesi	değermesi
kullanılmamalıdır	kullanılmadır

Regarding the /l/ sound, 42% of the students in the second grade made at least one syllable omission error in which the syllable including /l/ was omitted. The syllable was either in the form of a CV pattern followed by back vowels /a/, /ı/ or front vowel /e/, or in the form of a CVC pattern in which /l/ sound is in the final or initial position. In addition, all these omission errors were observed in long words having at least 5 syllables and more.

Apart from these syllable omission errors including consonants /ğ/ and /l/, there were other syllables omitted, as well. These syllables were found to include the consonants such as /m/, /d/, /b/, /y/, and /t/. However, they were not as common as the other omission errors mentioned above among the students in the second grade. Table 26 shows examples of syllable omission errors including other consonants apart from /ğ/ and /l/:

Table 26. Examples of Syllable Omission Errors Related to the Consonants /m/, /d/, /b/, /y/, and /t/ at Grade 2

Correct Form	Misspelled Form
hatırlamayabilirsiniz	hatırlayabilirsiniz
unutamadığınız	unutadığınız
değerlendirmesi	değerlenmesi
kullanılmamalıdır	kullanılmamalı
büyüyen	büyen

Grapheme omission is the second error type coming after syllable omission among second graders with a percentage of 25. After analyzing all the grapheme omission errors, /l/ was found to be the most omitted grapheme by 19%. It can be exemplified by the words in Table 27 below:

Table 27. Examples of Grapheme Omission Errors Related to the Consonants /m/, /d/, /b/ etc. at Grade 2

Correct Form	Misspelled Form
kullanılabilmektedir	Kullanabilmektedir
kullanılmamalıdır	kulanılmamalıdır
kullanarak	kulanarak
kulanılabilmektedir	kullanılabilmektedir

As can be seen from the examples, almost all the omission errors were done while writing the words including the root ‘kullan (to use)’.

In the second place comes the vowel /e/ with a percentage of 12. Also, among the vowels omitted, it was the mostly omitted one. Examples of this error type can be seen in Table 28 below:

Table 28. Examples of Grapheme Omission Errors Related to the Vowel /e/ at Grade 2

Correct Form	Misspelled Form
kavuşabileceklerini	Kavuşabilceklerini
işaretleyerek	işaretleyrek
dedeciğim	dedciğim
değerlendirmesi	değlendirmesi

Thirdly, grapheme substitution was found to be among the most common error types with a percentage of 15 in Grade 2. After a detailed analysis, it was found that /e/ was the most substituted grapheme by 23%. It was substituted by the vowel /i/ mostly in the words as Table 29 shows:

Table 29. Examples of Grapheme Substitution Errors Related to the Vowel /e/ at Grade 2

Correct Form	Misspelled Form
işaretleyerek	İşaretliyerek
öğreneceğinizi	öğreneciğinizi
dedeciğim	dediciğim

Next comes the grapheme /t/ and /m/ with a percentage of 9.5. To start with, /t/ was substituted by /k/ in all misspelled words. The one and only word which can be an example for this substitution is “ölçütler”. All the substitution errors regarding these graphemes were made while writing this word as “ölçükler”. Out of 33 students, 10 of them misspelled the word “ölçütler” as in the substitution errors of first graders. The next mostly substituted grapheme is /m/. With the same percentage of the grapheme /t/, 9.5% of grapheme substitution errors among second graders include this grapheme. In the whole of these errors, /m/ was substituted by /n/ while writing the word “kaplumbağa (turtle)” as “kaplunbağa” like first graders.

The error analysis has shown that although their rankings differ, the most common error types in Grade 1 and Grade 2 was found to be related to the same sound: /ğ/. In Grade 1 and Grade 2, the most common error type was syllable omission; however, their percentages were different. While it was expected to have a lower percentage regarding syllable omission error type in Grade 2 because of the increase in the level of the students, it did not show a falling tendency. Instead, it was on the rise. With regard to the second (grapheme substitution) and third (grapheme

omission) most common error types, the ones in the first grade were still the most common error types among the second graders only with a difference in their ranking. The second most common error type was grapheme omission whereas the third one was grapheme substitution in Grade 2. Thus, it can be said that there are not qualitative changes among the nature of error types between Grade 1 and Grade 2.

In the light of these findings, when the errors by first graders and second graders are compared, it is likely to conclude that although there are differences in percentages, there is no change in the nature of the error types among the first and second graders. It was found that children's spellings did not follow a developmental pattern of qualitatively distinct stages from phonetic to transitional to correct spelling across the first and second grades. The three error types (syllable omission, grapheme omission, and grapheme substitution) continued to be seen in Grade 2 after Grade 1, which is likely to show the fact that the error types are not specific to grades.

CHAPTER 6

DISCUSSION AND CONCLUSION

In this final chapter, the results of the data analysis are discussed. Moreover, some pedagogical implications are provided for spelling instruction at Turkish primary schools. Lastly, limitations of the current study are presented and some suggestions are provided for further research regarding the field of literacy acquisition in Turkish.

6.1 Discussion

6.1.1 Phonological encoding, rapid automatized naming, word reading and word spelling across grades

Previous research (Öney & Durgunoğlu, 1997; Durgunoğlu & Öney, 1999; Babayiğit & Stainhorp, 2007) showed that phonological skills in transparent orthographies are gained very early in literacy development and they reach ceiling levels in Grade 1 or Grade 2. Based on these findings, it was hypothesized in the present study that there would be no statistical difference between the first graders and the second graders in terms of phonological encoding and spelling skills. As predicted, the results of the t-tests related to children's phonological encoding and spelling skills replicated the findings of previous research. The findings of the current study showed that there was no significant difference between the PE skills of the first graders and the second graders. In other words, the results revealed that phoneme-grapheme conversion skills of Turkish were gained by students very early in the process of literacy acquisition- namely in the first grade thanks to the fact that Turkish has a transparent

orthography. This finding is also in line with orthographic depth hypothesis (ODH). It proposes that the letter-sound correspondences of languages are learned more quickly in language with a shallow orthography than those with a deep one. Thus, the transparent orthography of Turkish helped first graders to gain competence in phonological awareness. Similarly, the performance of the first graders in word spelling did not differ from the performance of the second graders significantly.

On the other hand, in terms of grade level differences regarding rapid naming and word reading, the research by Denckla and Rudel (1974, 1976a, 1976b) showed that the length of time to name the stimuli differed with age. That is, older children were able to name the letters and numbers quicker than younger children. To this end, it was assumed that second graders would probably have better performances than the first graders as the grade level increases. As expected, the analyses demonstrated that the performance of the second graders was significantly better than that of the first graders in the tests of RAN and word reading. This finding is likely to suggest that the second graders had higher levels of automatization than the first graders in the retrieval of phonological representations. That is, while reading a word, second graders have retrieval of orthographic knowledge more rapidly than first graders. In turn, they performed significantly better than the first graders in reading task because of their better automatization skills.

All in all, these results validated the research hypothesis which proposed that phonological encoding and word spelling skills of the first graders will not be statistically different than those of the second graders while rapid naming and word reading skills of the students in Grade 1 and 2 will have statistical difference.

6.1.2 The relationship between PE, RAN, word reading and word spelling

The present study aimed to examine the relationship among phonological encoding, RAN, word reading and word spelling. Taking the transparent orthography of Turkish into account, it was proposed that phonological encoding skills would have strong correlations with spelling ability while RAN would strongly correlate with reading regardless of the grade level. The findings presented in this study confirm the research hypothesis. The results showed that in each grade, phonological encoding and word spelling were strongly correlated with each other while word reading and RAN were strongly correlated, which is in line with the findings of the previous research (Wimmer & Mayringer, 2002; Landerl & Wimmer, 2008; Babayiğit & Stainthorp, 2010, 2011; Sönmez, 2015). Thus, this result is likely to suggest that students in the first grade mainly use the alphabetic strategy (phoneme-grapheme conversion strategies) while spelling, relying on one-to-one phoneme-to-grapheme mapping. However, the students made use of automatization skills more than phoneme-grapheme conversion abilities while reading when compared to spelling. In other words, while reading, the students retrieve orthographic knowledge of words automatically without making use of phoneme-grapheme conversion skills. On the other hand, while spelling, the students make use of their phonological knowledge. This is consistent with Frith (1985) who argues that reading and spelling skills are closely related although they make use of different strategies at the beginning of acquisition processes. Children are likely to read visually (holistically) while they tend to spell phonologically. In accordance with this, the results showed that phonological awareness assessed in terms of phonological encoding skills correlated more strongly with spelling than reading. However, RAN correlated more strongly with reading than spelling in Grade 1 and Grade 2. In other words, word spelling by

first and second graders mostly depends on phonological skills, which makes spelling phonologically oriented. However, first and second graders mostly read holistically by using orthographic strategies.

On the other hand, taking differences at grade level into consideration, it was found that the strong correlation between phonological encoding skills and spelling weakened as the grade level increased. However, RAN continued to have stronger correlations with reading when compared to Grade 1. Besides, the correlational analyses demonstrated that in Grade 2, phonological encoding and reading are moderately correlated. Also, there is a moderate correlation between word reading and word spelling skills when compared to Grade 1, which is compatible with Frith (1985), too. This means that first graders adopted phonological strategies for spelling, but, in Grade 2, phonological strategy reached an advanced level so second graders started to adopt it also for word reading skills, which made reading and spelling associated with each other. However, as spelling skills use phonological strategies longer than reading, spelling stays phonologically oriented for a longer time compared to reading. Thus, in Grade 2, there is no correlation between RAN and word spelling. This is also in line with the discrepancy hypothesis (Bradley & Bryant, 1980; Frith, 1980; Goswami & Bryant, 1990), which proposes that reading and spelling abilities at first utilize different strategies and then they turn out to be closely related.

In short, these findings indicate that the first graders use different strategies while reading and spelling: they spell phonologically but read holistically. However, the second graders utilize phonological awareness skills (measured in the form of phonological encoding skills) while reading as well as spelling. Thus, the findings

suggest that the discrepancy hypothesis and stage model by Frith (1985) are applicable to a transparent language, Turkish.

6.1.3 The role of PE and RAN in word reading and word spelling

In the current study, it was also aimed to investigate the contribution phonological encoding skills and rapid naming in word-level spelling and reading skills of the first and second graders in Turkish. It was assumed that phonological encoding would have a significant contribution to spelling development in both grades when compared to RAN, while RAN would account for a significant variance for reading performances. As expected, the findings confirm the hypothesis. The results showed that phonological encoding skills accounted for a significant amount of variance in word spelling. However, RAN did not make any significant contribution to spelling performance beyond PE skills as it added little predictive power to word spelling ability. Thus, it can be suggested that in the beginning years of literacy education, spelling words in Turkish was predominantly based on phoneme-grapheme conversion abilities of the students probably because of the transparent nature of Turkish language. This is consistent with Perfetti (1997) who proposes that phonological skills are considered to be a more sensitive indicator of spelling rather than reading (Perfetti, 1997).

In line with the hypothesis, it was also found that RAN made a significant contribution to reading skills in both grades beyond PE skills. To this end, the result replicated the findings of previous research by indicating that RAN is strongly associated with reading ability at both grade levels (Badian, 1993; Bowers &

Swanson, 1991; Cornwall, 1992; Norton & Wolf, 2012; Babayiğit & Stainthorp, 2010; Wimmer & Mayringer, 2002).

Regarding the differences at grade levels, the results also showed that as the grade level increased, the influence of phonological awareness started to weaken although it was still significantly important in predicting the spelling ability. However, there was no influence of RAN on spelling as the grade level increased. Thus, it can be concluded that PE skills had a dramatic contribution to word spelling in Turkish at Grade 1 and Grade 2 while RAN performance had almost no contribution. However, these findings contradict with the results of the study by Verhagen, Aarnoutse and Van Leeuwe (2010), who reported that phonological awareness and RAN were significant predictors of spelling among Dutch speaking children in Grade 1 and Grade 2. While phonological awareness had a predominating influence over RAN for the prediction of spelling in Grade 1, by Grade 2, the influence of PA and RAN was equally strong and unique to word spelling in Dutch.

However, the results are compatible with the ones found by Sönmez (2015) regarding Frith's stage model (1985). In her study, she investigated the PE skills and RAN performance of third and fourth graders. The results showed that rapid naming significantly predicted the spelling ability of the students in the third and fourth grade. Thus, it shows that third and fourth graders utilized automatization more during spelling as automatization skill used while reading reached to an advanced level, so it is adopted for spelling.

About reading skills, the influence of RAN tended to increase as the grade level increased. This result is likely to indicate that RAN becomes more influential in reading ability as automatization makes progress across grades. Regarding the

predictive role of phonological encoding skills in reading performance, it was seen that PE started to make contribution to reading ability beyond RAN when compared to Grade 1 although it is not influential. This finding might indicate that after phonological encoding skills reach a mastery level, they are also started to be utilized by reading ability in addition to spelling as the grade levels increase. Thus, it can show that besides orthographic processes, second graders are about to make use of phonological processes for reading.

To summarize, the findings of the current study showed that phonological encoding have predictive power on spelling performance while RAN is an index of reading skills in Turkish literacy development. As the grade level increases, PE and RAN continue to be the stronger predictors of spelling and reading skills, respectively. However, with the progress in phonological strategies, PE makes small contributions to reading skills at higher grades.

6.1.4 Understanding Turkish spelling development by spelling errors

As discussed previously, another aim of the present study was to understand early Turkish spelling development by analyzing spelling errors of the first and second graders in their early literacy development process.

With regard to types of spelling errors, based on the findings of previous research in the field (Erden et al., 2002; Yıldız & Ateş, 2010; Kasapoğlu, 2010; and Memiş & Harmankaya, 2012), it was hypothesized that the most common error types would be omission errors such as grapheme and syllable omission. As expected, according to the results of the error analysis, it was found that the most common error types were syllable and grapheme omission and grapheme substitution. As can

be seen in Table 30, they constituted 64% of the total number of errors. This is compatible with the findings of the previous research by Erden et al., 2002; Kasapoğlu, 2010; and Memiş and Harmankaya, 2012.

Table 30. Most Common Error Types in Word-Level Spelling by Dictation

Error Types	Percentage
Syllable Omission	24%
Grapheme Omission	22%
Grapheme Substitution	18%

It was also expected that the students would have punctuation errors in text-level spelling because they were taught to use cursive handwriting, which entails writing words at once with continuous hand movements, in their literacy education. The results of the error analysis showed that an extensive number of the students had problems in punctuation. This finding also confirms the research findings presented by Erden et al., 2002; Yıldız and Ateş, 2010; and Memiş and Harmankaya, 2012. Although the errors are in decrease from a percent of 97 in Grade 1 to 70% in Grade 2, it might indicate that the first and second graders do not go back to complete the missing punctuation marks when they finish writing sentences while writing in a cursive style. This can also result from the fact that the students focus more on how to join the letters while writing, so they do not pay enough attention to other features of the sentences like punctuation marks.

Regarding task modalities, the results showed that the students made more diacritic omission errors in copying tasks at word and text level than dictation tasks. The reason for this is likely to be related with cursive handwriting. As the students in Grade 1 and 2 wrote words at once in cursive handwriting, they probably lost interest

and attention to go back and complete the missing diacritics of the letters. Also, copying tasks do not require as much attention as dictation tasks do, so it may be easier for students to lose attention and, as a result, have more diacritic errors.

According to the error analysis of spelling errors at each grade, it was seen that the nature of spelling errors were highly identical, as shown in Table 31. That is, in word-level spelling, syllable omission was found to be the most common error type both in Grade 1 and 2. The characteristics of the errors showed that soft g /ğ/ was the most problematic sound for the first and second graders. The most omitted syllables were the ones including soft g /ğ/ as in the words *oldu(ğ)unuzu*, *kaplumba(ğ)a*. Also, in the words like *sevdi(ğ)i*niz and *okudu(ğ)unuzu*, these omitted syllables caused a meaning change: the misspelled forms have a different meaning than the correct forms. Thus, these findings indicate that for the students at Grade 1 and 2, it was difficult to spell the soft g /ğ/. This may be due to the fact that students were likely to reflect the properties of spoken language while writing this word because soft g /ğ/ is not pronounced as a consonant in spoken language, instead it lengthens the vowel preceding it (Kornfilt, 1997; Durgunouğlu, 2017).

Table 31. Most Common Error Types Regarding Different Levels of Spelling

	Word-Level Spelling	Text-Level Spelling
Grade 1	Syllable Omission (23%) Grapheme Substitution (20%) Grapheme Omission (19%)	Grapheme Substitution (34%)
Grade 2	Syllable Omission (25%) Grapheme Omission (25%) Grapheme Substitution (15%)	Grapheme Substitution (35%)

Similarly, regarding the patterns in grapheme substitution errors in Grade 1, soft g /ğ/ was found to be the most problematic grapheme. It was mostly substituted with the sound /y/ and /h/. On the other hand, in Grade 2, it is found to be the grapheme /e/ which was mostly substituted with the sound /i/ while writing the words like öğreneceğinizi as *öğreneciğinizi. Lastly, both the students in Grade 1 and Grade 2 omitted the grapheme /l/ when it is doubled as in the word kullanarak. The most likely reason for these misspellings may be the difference between the spoken and written forms of these words. Roundings of sounds are mostly observed in spoken language (Durgunoğlu, 2017). That is, the effect of spoken language on conventional spellings led to spelling errors both at Grade 1 and Grade 2.

In text-level spelling, the results showed that grapheme substitution error was the most common error type at both grades as most of the first and second graders had problems in spelling the same word “maydanoz (parsley)” by substituting the vowel /a/ with /o/ as “maydonoz”. Like other spelling errors, the reason for this is likely to be that standard spelling of the word differs from its spoken form and this variation is adopted as the standard by the students.

In conclusion, error patterns in Grade 1 and Grade 2 were not found to be remarkably different. To this end, this finding does not seem to be compatible with Gentry’s spelling model (1981, 1982), according to which spelling development process encompasses different stages characterized with different patterns of spelling errors. As error patterns in Grade 1 and 2 were not qualitatively different from each other, it is likely to indicate that the students at Grade 1 and Grade 2 were not in different stages of spelling development.

As a result, the findings suggest that stage theory in spelling development does not seem to apply in Turkish spelling, which is in line with the results of the studies done in other transparent orthographies like Dutch (Keuning & Verhoeven, 2008; Notenboom & Reitsma, 2003) and German (Wimmer & Hummer, 1990).

6.2 Conclusion

The findings of the current study demonstrated that phonological awareness, which is measured in form of PE skills, were found to be the predictor of spelling ability whereas RAN predicted reading performance significantly in Turkish. This situation indicated that the students at Grade 1 and Grade 2 were at different developmental stages regarding their spelling and reading skills: in spelling, they were at the alphabetic stage, as indexed by their PE skills, on the other hand, in reading, they were at the orthographic stage, as indexed by their performance in rapid naming.

In Grade 1 and Grade 2, the results showed that phonological encoding skills were correlated significantly with the spelling ability, which indicated that spelling at Grade 1 and Grade 2 was phonologically oriented. However, RAN was found to have no significant contribution to the spelling performance of the students. On the other hand, in addition to the significant contribution of rapid naming to reading performance, phonological strategies were also utilized by the second graders in reading. Thus, this may be due to the fact that after reaching an advanced level in spelling ability, in addition to automatization skills, phonological knowledge was also started to be used in reading ability, which is in accord with the stage model by Frith (1985).

Lastly, the error analysis showed that there was not any qualitative difference in the characteristics of errors at Grade 1 and Grade 2. Both the first and second graders mostly had syllable omission, grapheme omission and grapheme substitution errors in spelling Turkish words in similar proportions. A great number of the students also had punctuation and diacritic omission errors in text level spelling. Furthermore, the soft g /ğ/ was found to be the most problematic letter for the first and second graders as the most common error types were made while writing the words including this letter. Another finding was the errors caused by using the spoken forms of the words as conventional spelling because there are slight differences between the standard spellings and spoken forms of the words in Turkish.

6.3 Pedagogical implications of the study

As the results of the current study suggest, spelling and reading are two different skills at the beginning of the literacy development as they utilize different strategies and knowledge. While spelling, students use their phonological knowledge. However, while reading, they apply orthographic knowledge. Thus, educators should be aware of this fact and arrange the curriculum accordingly. In other words, spelling should be taught as a separate skill by keeping in mind that during spelling different strategies are activated than the ones in reading.

Also, the assessment of the spelling ability should be designed accordingly. However, at later stages, when these two skills become linked, the growth in one ability will be reflected on the other according to Frith's stage model (1985). Thus, teachers should be aware of this relationship between reading and spelling. In practice, they might arrange activities promoting this relationship.

Despite the transparency of Turkish orthography, spelling errors were frequent among the students in first and second grade because they tended to use spoken variations of the words instead of applying spelling rules. Thus, in order to decrease the number of spelling errors, an effective spelling instruction focusing on phonological awareness practices should be included in the curriculum. Also, activities focusing on the differences between standard spelling forms and their spoken forms should be included so that students can gain awareness about it. Moreover, reading books can be a good activity for gaining this awareness. Thus, teachers should encourage students to read books or story reading hours can be included in the curriculum.

The results in the current study also showed that soft g /ğ/ is a problematic letter for students at the first and second grade as it caused a great number of mistakes in spelling tasks. Thus, it would be better for teachers to spend more time on this letter during spelling instruction. In this regard, teachers need to give students the chance to practice this letter by supplying them with sufficient activities so that they can reinforce this problematic letter.

As the error analysis revealed, a large number of students had punctuation errors in both grades. That might indicate that punctuation marks are likely to be an area which students have difficulty or an area which has not attracted much attention in the class. Therefore, teachers should give explicit instruction on how to use punctuation marks at text level and much practice should be provided.

A high percentage of diacritic omission errors by the students at Grade 1 and Grade 2 indicated that cursive writing causes some spelling problems. Cursive writing makes the students write and join the letters in a fast and continuous way, so

they had the tendency not to go back for completing the diacritics of the letters. Therefore, regarding this error, teachers should highlight the letters with diacritics when these letters are first introduced. Also, it would be better if they remind the students of completing missing diacritics during spelling tasks. In this sense, they can prepare a checklist for students and students can make use of it after completing each spelling task to monitor their performance in order to decrease the punctuation and diacritic omission errors, which are the two reasons for spelling errors.

Moreover, this study has provided insight into the error patterns that the students at Grade 1 and Grade 2 make in different tasks (copying vs. dictation) at different levels of language (word vs. text). This information can be a useful source for primary school teachers. As it gives an idea about the common error types at elementary grades, it can be used by teachers to observe student progress and determine if any student need to be monitored closely in terms of his / her spelling development.

In conclusion, the findings of this research have relevant practical implications, as they can help teachers for a better spelling education. It is predicted that these implications will add to the design of the curriculum and spelling lesson materials and production of new assessment tools in elementary schools.

6.4 Limitations of the present study

Although the current study has yielded some interesting and important results, it has some limitations. One of the limitations of the present study was using convenience sampling as a method of data collection to reach the participants, which makes it difficult to generalize the results to larger populations. Using a wider sample of participants chosen by random sampling would be better in terms of generalizability of the study.

In addition, due to the time limitations, data in the current study were collected from the participants at a single point in time, making use of cross-sectional research design. A longitudinal study in which the same participants are followed to later grades would be useful in order to examine the relationship of phonological encoding and rapid naming to Turkish spelling and reading development.

Lastly, because of the procedural difficulties with the school management and the time limitations, participants were not tested in terms of their verbal ability or intelligence. They were regarded as normally developing children according to verbal statements of their teachers.

6.5 Recommendations for further research

The current study basically attempted to explore the relationship of phonological encoding and rapid automatized naming to spelling and reading skills in Turkish at the beginning of literacy education. Firstly, it would be better to replicate the study with higher numbers of participants in terms of generalizability. Moreover, longitudinal studies (starting from Grade 1 to Grade 4) are needed to see the developmental stages of spelling and reading abilities in Turkish as the current study

made use of cross-sectional research design. Also, it would be valuable to compare the results of this study with those gathered from 3rd and 4th grades examined in the study by Sönmez (2015) in order to see the big picture at elementary grades. Lastly, it would be better to replicate the study using students with special learning difficulties as participants. In this way, there will be a chance to compare the development of spelling between normally-developing children and children with learning difficulties.



APPENDIX A

SAMPLE ITEMS FROM DATA COLLECTION INSTRUMENTS

Word-Reading Test

ilk, ana, iki, hangi, böyle, şimdi, orman, ekmek, köpek, önce.

Test of PE Skills

ka, le, öş, uk, çe, bü, fır, ken, ors, zurt

Word Spelling Test

çok, en, Türk, dedi, gorse, bitti, ağaç, annesi, renklerle, uçurtma

Text Spelling Test

Dün gece yolda giderken zıplayan bir tavşan gördüm. Elinde bir demet maydanoz, bir sepet yumurta vardı. Hoplaya zıplaya evin yolunu tutmuştu. (Erden et al., 2002)

APPENDIX B

OFFICIAL PERMISSION TAKEN FOR THE STUDY



T.C.
İSTANBUL VALİLİĞİ
İl Millî Eğitim Müdürlüğü

Sayı : 59090411/44/1651096
Konu: Araştırma

24/04/2014

Sayın: Yeliz YILMAZ
Boğaziçi Üniversitesi Sosyal Bilimler Enstitüsü
Sarıyer/İSTANBUL

İlgi: a) 11.04.2014 tarihli dilekçeniz.
b) Valilik Makamının 22.04.2014 tarih ve 1634364 sayılı oluru.

İlgi (a) dilekçeniz ile "*Türkçe'de Yazım Gelişimi ve Yazım Hatalarının Düzeyssel Analizi*" konulu araştırma çalışmanız hakkındaki ilgi (a) dilekçeniz ilgi (b) valilik onayı ile uygun görülmüştür.

Bilgilerinizi ve ilgi (b) Valilik Onayı doğrultusunda gerekli duyurunun araştırmacı tarafından yapılmasını, işlem bittikten sonra 2 (iki) hafta içinde sonuçtan Müdürlüğümüz Strateji Geliştirme Bölümüne rapor halinde bilgi verilmesini rica ederim.

M. Nurettin ARAS
Şube Müdürü

EK:1- Valilik Onayı
2- Ölçekler

Elektronik İmza Aklı	
Sistemiminde Mevcuttur	
Adı Soyadı:	Mualla ÇELEBİ
Önvanı:	Bölüm Şefi
Tarih:	02/05/2014
İmza:	

Bu belge, 5070 sayılı Elektronik İmza Kanununun 5 inci maddesi gereğince güvenli elektronik imza ile imzalanmıştır. Evrak teyidi <http://evraksorgu.meb.gov.tr> adresinden 7bcd-44db-3ecd-86da-c55b kodu ile yapılabilir.

İ Millî Eğitim Müdürlüğü D/Blok Bab-1 Ali Cad. No:13 Cağaloğlu
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