

Legibility and Readability in Textbooks Used in Teaching Turkish to Foreign Students

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Abstract

This study aims to examine the readability and legibility levels of two digital textbooks used in teaching Turkish to foreigners from a typographic perspective. Using the document analysis method in a qualitative research design, visual elements such as character structure and size, font choice, alignment, row-column layout, spacing ratios, hierarchy, and contrast are evaluated. The findings show that typographic choices appropriate for age groups positively affect reading speed and comprehension levels. Simple fonts, balanced line lengths, and high-contrast color combinations increase learning motivation. On the other hand, certain design flaws—weak contrast, long lines, insufficient visual hierarchy—can negatively affect the learning experience. The limitations of the study include the lack of a structured checklist and the examination of only two book sets. Nevertheless, the findings emphasize the pedagogical value of typography and offer innovative suggestions for digital course material design, such as AI-supported analysis, culturally appropriate visual models, and dynamic typography systems. In conclusion, the study contributes to the field in an interdisciplinary manner by positioning typography as a tool that guides cognitive interaction in language teaching.

Keywords: *Legibility, readability, digital resource, auxiliary resource, teaching Turkish to foreigners*

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Yabancı Öğrencilere Türkçe Öğretiminde Kullanılan Dijital Ders Kitaplarında Okunurluk ve Okunabilirlik

Öz

Bu çalışma, yabancılara Türkçe öğretiminde kullanılan iki dijital ders kitabının okunabilirlik ve okunurluk düzeylerini tipografik açıdan incelemeyi amaçlamaktadır. Nitel araştırma deseninde doküman analizi yöntemi kullanılarak, karakter yapısı ve boyutu, yazı tipi tercihi, hizalama, satır-sütun düzeni, boşluk oranları, hiyerarşi ve kontrast gibi görsel unsurlar değerlendirilmektedir. Bulgular, yaş gruplarına uygun tipografi tercihinin okuma hızını ve anlama düzeyini olumlu yönde etkilediğini göstermektedir. Özellikle sade yazı tipleri, dengeli satır uzunlukları ve yüksek kontrastlı renk kombinasyonları, öğrenme motivasyonunu artırmaktadır. Öte yandan, tasarımdaki bazı eksiklikler—zayıf kontrast, uzun satırlar, yetersiz görsel hiyerarşi—öğrenme deneyimini olumsuz etkileyebilmektedir. Araştırmanın sınırlılığı, yapılandırılmış bir kontrol listesinden yararlanılmaması ve sadece iki kitap setinin incelenmesidir. Buna rağmen, elde edilen bulgular tipografinin pedagojik değerini vurgulamakta; dijital ders materyali tasarımında yapay zekâ destekli analizler, kültürel uyumlu görsel modeller ve dinamik tipografi sistemleri gibi yenilikçi öneriler sunmaktadır. Sonuç olarak, çalışma tipografiyi dil öğretiminde bilişsel etkileşimi yönlendiren bir araç olarak konumlandırarak alana disiplinlerarası katkı sağlamaktadır.

Anahtar kelimeler: *Okunabilirlik, okunurluk, dijital kaynak, yardımcı kaynak, yabancılara Türkçe öğretimi.*

Introduction

The development of information and communication technologies (ICT) has significantly transformed text production and reading in electronic society (Bachfischer et al., 2007). The comprehension of written materials can be defined as a process of simultaneous extraction and creation of meaning through a dynamic interaction between the reader, the content, and the purpose of reading. In light of technological developments, it is essential to effectively optimize the readability and legibility of texts read on digital device screens. Digital texts differ from printed texts in terms of typographic elements, requiring effective management of font, typeface, background color, line spacing, and sentence length in design (Čerepinko et al., 2017). For example, it has been noted that the Gotham font is more readable than Minion Pro on an iPad but reading becomes more difficult in two-column layouts. Having 79 characters per line is also among the recommended criteria. Additionally, reading involves not only understanding the meaning of the word but also perceiving the typeface (Li et al., 2015). Readability is of vital importance in many areas. Pouessel et al. (2017) noted that readability should be improved in the presentation of allergens on unpackaged foods sold in school cafeterias in France. Neto et al. (2010) found that modifying the design of informational texts about computed tomography and MRI increased readability and comprehensibility by 38% and 35%, respectively. Denzen et al. (2012) presented their recommendations for the design of informed consent forms used in bone marrow and peripheral blood stem cell transplants in Table 1. This table includes important criteria for improving the effectiveness of patient communication in terms of text layout, organization, typography, and language use.

Table 1. *Legibility in informed consent form design*

Layout	
Utilize a Two-Column Layout	Use line lengths between 30 and 50 characters, and do not exceed this
Limit text to a maximum of 5 inches running horizontally across the page.	Achieve a balance between white space, text, and graphics.
Position text headings close to the text	Leave the right margins uneven.
Left margins justified on both sides.	Body text line spacing should be set to 120% of the font size.

Organization

The order of information should reflect the mindset of the reader, focused on process and concerns.	The important parts of the text should be placed in the introduction of the document.
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Use simple headings for text that needs to be divided

Typography

Use serif fonts in the text.	Write headings in sans serif fonts.
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Use font sizes between 11-13 points, as text size may vary between different fonts even when the same point size is applied.

Language usage

Paragraphs are short; 1 idea per paragraph.	Sentences should be short, simple, and direct.
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Divide lengthy sentences into bulleted lists.	Verbs are in active voice.
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Utilize a language that is familiar to the reader.	Keep terminology and vocabulary consistent throughout the document.
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Refrain from

Large printing blocks	Underline or italicize blocks of text
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Avoid using initials in text, and make sure they are not all uppercase.	Steer clear of professional jargon.
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Abbreviations, symbols, and acronyms

Criteria such as usability, attractiveness, and effectiveness in the design of health information brochures should be considered in terms of readability (Steele et al., 2011). In this context, the positive and negative opinions of the participants are summarized in Table 2. Positive aspects such as clean, simple, and modern design, vivid colors, and bullet points; negative aspects such as excessive length, outdated visuals, and difficult-to-understand language have been noted.

Table 2. *Positive and negative aspects of information designs*

Positive Opinions	Negative Opinions
Clean, straightforward, and contemporary design.	Excessive word count.
Vibrant and attention-grabbing colors.	Outdated images.
Use of dot points.	Incomprehensible use of language
Graphics	Unattractive design
Organize information into sections.	Overly long design.
Formatting in question, and answer format.	Missing and dull colors
Take a playful approach.	
Make sure images are relevant and limited in number	
Appropriate size (not excessively large).	
Uniqueness.	

Cortez and Vielma (2021) revealed the low readability of Mexican genetic testing consent forms, while Rajpurohit et al. (2023) and Sekhar et al. (2017) demonstrated that pictogram-supported and well-designed brochures significantly enhance patient comprehension. Borges and Silva (2015) emphasized that effective hospital wayfinding reduces stress and improves safety. Koornneef and Kraal (2022) found that BeeLine Reader improved focus among younger students, though comprehension varied by age. Hasegawa et al. (2009) and Grozdanovic et al. (2017) further showed that readability is shaped by age, screen mode, and color contrast.

Handwritten prescriptions pose legibility risks, prompting calls for IT-based systems (Hartel et al., 2011). Jacobs et al. (2014), Fuchs et al. (2017), and Adibe et al. (2015) highlighted the importance of font and layout in health communication, while Pires et al. (2015a, 2015b) noted that excessive complexity and poor visual design undermine drug leaflet usability. Lee et al. (2019), Mackey and Metz (2009), and Rocha et al. (2021) stressed that color, spacing, and font size critically affect readability across domains. Shoshin and Shvets (2021) added that lens flare impairs contrast and legibility.

Collectively, these studies affirm that readability and legibility are multi-dimensional and context-dependent, demanding careful attention in digital textbook design for teaching Turkish to foreign learners. Language

instruction is inherently multimodal, involving visual, auditory, and contextual meaning-making. Typography, as a semiotic and pedagogical tool, facilitates cognitive engagement and interpretive depth (Drucker, 1984; Serafini & Clausen, 2012).

Walker (2001) advocates collaboration between typographers and linguists to optimize instructional materials. Font, weight, and hierarchy foster learner-text connections (Serafini & Clausen, 2012), while Drucker (1984) and Lau & Chu (2015) show that non-linear and visually guided typography enhances comprehension, especially in children. Pantaleo (2012) and Watzman (1992) position typography as central to multimodal literacy, with kinetic forms supporting vocabulary acquisition. Kemp and Towers (2014) emphasize consistent typographic design in distance learning.

In sum, typography transcends mere textual arrangement, serving as a cognitive and communicative scaffold. Integrating typographic expertise into pedagogical design, raising awareness of visual language, and applying multimodal principles can significantly enrich language education (Walker, 2000; Drucker, 1984; Pantaleo, 2012).

Typography

In educational institutions, the act of reading is the main source of information for trainees and students. The typographic elements used in textbooks are of two importance. Firstly, typographic elements should not prevent the trainee from understanding the created material. While this requirement is important for children and adult trainees, it is especially essential in the context of children who are new learners. Secondly, readers' reactions to the visual appearance of the text affect their motivation to read it (Tarasov et al., 2015). 60% of people understand messages more easily when designed visually pleasingly (Gribas et al., 1996). Someric (2000) supports this assertion, stating that no document should be unpleasant and difficult to read. Typography, which is the process of creating printed material, has become a process in which people with little or no knowledge of the subject, in other words non-professionals, are involved with the digitalization of type (Griffiee & Casey, 1988). According to Myung (2003), the most favored factors in typography are line spacing, fonts, and character sizes. Payne et al. (2000) found that 40% of the brochures distributed by patient care units to patients and their relatives were understood by patients and their families due to the use of contrast, letter size, and missing illustration elements. In other words, typographic elements are effective here.

Legibility

Legibility encompasses factors such as typeface size, column width, number of paragraph lines, line spacing, and carriage returns, and includes how quickly, easily, and accurately a character can be recognized and distinguished. Essentially, readability is influenced by the visibility and quality of the typeface as well as the overall layout practice (Al-Harkan and Ramadan, 2005). Defined as the ease with which characters can be recognized, legibility is a crucial factor in determining readability (Kilpeläinen & Häkkinen, 2023). Blodsworth (1993) argues that the physical appearance of materials is legibility and that font style and font size are effective. Bradley (2011) characterizes legibility as micro typography and argues that it provides easy text reading under normal conditions by associating it with the font. Lynch and Horton (1999) state that typography is also needed in the digital environment with the developing technology, and Smith (1979) argues that character size and style affect screen legibility more intensely.

Character structure, preference and size

Font characters significantly influence legibility (Voshi et al., 2014). Öz (2006) defines fonts as sequences of typographic characters —letters, numbers, punctuation, symbols—whose elements shape readability. Typeface identity, as argued by Pektaş (2001), affects message transmission; this is exemplified by a summer school poster whose child-oriented font, size, illustrations, and colors aligned with its audience. Perea et al. (2017) found lowercase text more readable than uppercase. Addressing low vision, Galiano et al. (2023) showed Luciole font was preferred over Arial, OpenDyslexic, Verdana, Eido, and Frutiger by visually impaired readers. Pusnik et al. (2016) identified Calibri as the fastest-recognized typeface among Georgia, Swiss 721, Verdana, and Trebuchet. Rello and Baeza-Yates (2016) recommended Helvetica, Courier, Arial, and Verdana for dyslexic readers, noting monospaced, sans serif, and roman fonts enhance readability, while italics hinder it. These preferences also benefit non-dyslexic users. Huang (2019) found 10-point text more readable than 14-point on 5.5-inch screens. Bernard et al. (2003) reported slower reading with 10-point Arial, though 12-point Arial was generally preferred.

Omori et al. (2009) concluded that Japanese characters with height 1.5–2× width offered optimal visibility on mobile screens. Cai et al. (2022) found Poppins and Merriweather favored by MTurk readers, with Georgia and Arial slightly outperforming others. Voshi et al. (2014) noted Arial and

Sans Serif had similar legibility in print, while Tahoma was least readable; online, Lucida Sans was most legible. Hou et al. (2022) identified horizontal orientation, large screens, and 12-point font as ideal; Hou and Hu (2023) confirmed font size impacts readability and visual search.

Ukonu et al. (2021) recommended Calibri over Times New Roman for print and screen, supported by its default use in PowerPoint and Excel. Sheedy et al. (2005) found Verdana and Arial most readable on screens, while Times New Roman and Franklin were less effective. Kerning also affects readability depending on font. Bix et al. (2003) criticized the 6-point font mandated for U.S. OTC drug labels as insufficient. van Beusekom et al. (2016) emphasized that short, structured text with visuals mitigates misinterpretation among low-literacy patients. Kupferschmid (2015) praised Univers for public signage legibility, contrasting it with the less readable Fraktur typeface.



Figure 1. Examples of successful and unsuccessful legibility

Spacing is another critical factor. Wang et al. (2008) recommended line spacing of 6–8 pixels and character spacing of 2–4 pixels for 8-point mobile text, which improved readability, reduced fatigue, and increased user satisfaction. Leira-Feijoo et al. (2015) reported that English-language e-health information on dental implants was difficult for average patients to read. For older adults, Cardenas et al. (2021) found that Verdana 14-point was the most legible in augmented reality displays for medication labels. Similarly, Chan and Lee (2005) showed that traditional Chinese characters in 14-point Ming with double line spacing yielded faster reading than 10-point Li-style with single spacing.



Figure 2. Summer school poster for children

In the poster design prepared for the target audience of primary school students with the theme of "Healthy Living" within the scope of the Green Crescent Türkiye Anti-addiction Education Program, the use of fonts and visuals suitable for the target audience is noteworthy in order to effectively convey the message to the target audience.



Figure 3. Healthy living poster designed by the green crescent

Gyöngi (1997) states that fonts are used in three basic styles and are called serif, sans serif and script fonts.



Figure 4. Comparison of script, serif and sans serif fonts

Serif fonts are characterized by the small protrusions at the ends of the characters, whereas Sans Serif fonts, deriving from the French word "Sans," meaning "without," lack these extensions. Script fonts, due to their decorative nature, are generally not recommended for functional designs; if used, the characters must be enlarged to enhance readability. According to Yang and Sun (2011), Times and Arial are the most commonly used fonts in web browsers, while fonts such as Times New Roman, Georgia, Arial, and Verdana are widely employed on computer-based devices. Josephson (2008) reports that, among serif and sans serif fonts, sans serif typefaces are more legible on computer screens. During reading, the eyes do not move in a continuous straight line but instead make rapid saccades, quickly recognizing letters, integrating them into words, and translating them into meaningful units. Words written entirely in uppercase form a rectangular, uniform shape, which can hinder this recognition process. By contrast, lowercase letters, such as "y" and "k," as well as dotted letters like "i," "ü," and "ö," extend above and below the baseline, creating distinctive word shapes that facilitate visual recognition and comprehension (Güneş, 2012). Arditi and Cho (2007) similarly argue that words set entirely in capital letters produce a "retarding effect" on legibility.

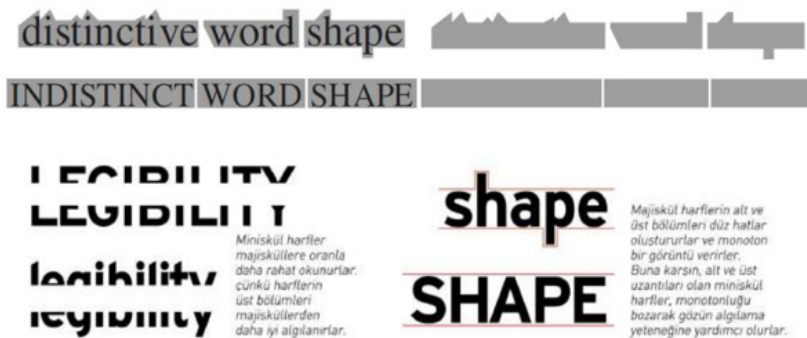


Figure 5. Eyes' visualization of uppercase and lowercase words

The size of a typeface is usually determined by its x-height, which refers to the height of the lowercase letters, especially the lowercase 'x'. For example, Arial, which has a larger x-height than Times, is usually set to a smaller text size (such as 10-point), while Times is usually displayed at 12-point. This sizing setting makes both typefaces appear to have a similar x-height and overall visual height (Mills and Weldon, 1987). Bertolus et al. (2017) emphasize that character size is a critical design element that significantly affects readability. Fonts that are too large or too small make reading difficult. Small letters reduce word definition, and large letters reduce legibility as they force the reader to perceive a certain part rather than the whole. According to İgit (2022), the characteristics of typefaces are expressed in words borrowed from human anatomy and are explained in the following figure and table.

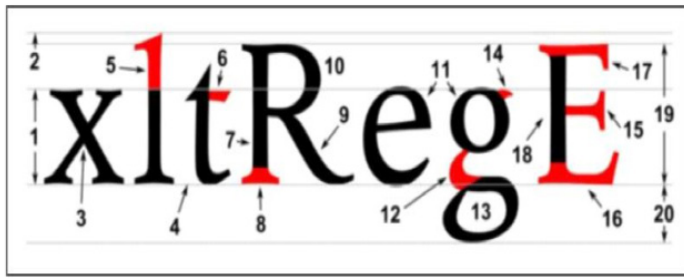


Figure 6. Anatomical structure of typefaces

Table 3. The features expressed by the numbers on the typeface in Figure 6

Positive Opinions	Negative Opinions
1. Lowercase length/height (x-height)	11. Inner space (counter)
2. Upper line	12. Collar
3. Apex	13. Loop
4. Baseline	14. Ear
5. Upper extension	15. Connection (tie)
6. Horizontal emphasis	16. Horizontal bar
7. Main emphasis	17. Arm
8. Quotation (serif)	18. Vertical bar
9. Leg	19. Capitalization height (cap height)
10. Curved accent (bowl)	20. Descender line

Text alignments and special effects

According to Lupton (2010), text alignments try to fit as many words as possible on each line and do so by hyphenating the space between letters and words. In addition to affecting legibility, text alignments give the text an elegant appearance. According to Ambrose and Harris (2006), blocking is the position of text in design and is used in two different ways: vertical and horizontal blocking. Horizontal blocking is used right, left, center, and justified, while vertical blocking is positioned in three different ways: down, up, and center. Pektaş (2010) argues that blocking texts to the left will ensure smooth letter spacing and prevent the formation of white rivers in the text and argues that texts blocked to the right or in the middle will cause tracking problems and thus prevent legibility.

Lupton (2010)'a göre metin hizalamaları her satıra olabildiği kadar kelime sığdırmaya çalışırken bunu harfler ve kelimeler arasında oluşan boşluğu tireleyerek yapmaktadır. Metin hizalamaları okunurluğu etkilemesinin yanı sıra metne zarif bir görüntü vermektedir. Ambrose ve Harris (2006)'e göre bloklamalar metinlerin tasarımındaki pozisyonudur ve dikey ve yatay bloklama olmak üzere iki farklı şekilde kullanılmaktadır. Yatay bloklama sağ, sol, orta ve iki yana yaslı olarak kullanılmaktayken dikey bloklama ise aşağı, yukarı ve ortaya olmak üzere üç farklı şekilde konumlanmaktadır. Pektaş (2010) metinlerin sola bloklanmasının harf aralarının düzgün olmasını sağlayacağını ve metinde beyaz nehir oluşumunu engelleyeceğini savunarak sağa ya da ortaya bloklanmış metinlerin takip sorununa neden olacağını dolayısıyla okunurluğu engelleyeceğini savunmuştur.

Lupton (2010)'a göre metin hizalamaları her satıra olabildiği kadar kelime sığdırmaya çalışırken bunu harfler ve kelimeler arasında oluşan boşluğu tireleyerek yapmaktadır. Metin hizalamaları okunurluğu etkilemesinin yanı sıra metne zarif bir görüntü vermektedir. Ambrose ve Harris (2006)'e göre bloklamalar metinlerin tasarımındaki pozisyonudur ve dikey ve yatay bloklama olmak üzere iki farklı şekilde kullanılmaktadır. Yatay bloklama sağ, sol, orta ve iki yana yaslı olarak kullanılmaktayken dikey bloklama ise aşağı, yukarı ve ortaya olmak üzere üç farklı şekilde konumlanmaktadır. Pektaş (2010) metinlerin sola bloklanmasının harf aralarının düzgün olmasını sağlayacağını ve metinde beyaz nehir oluşumunu engelleyeceğini savunarak sağa ya da ortaya bloklanmış metinlerin takip sorununa neden olacağını dolayısıyla okunurluğu engelleyeceğini savunmuştur.

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Figure 7. Blocking and white river formation

Readability

Readability, as a macro-typographic concept, seeks to enhance the reading experience by integrating aesthetic considerations into design (Bradley, 2011). The readability of textual displays impacts numerous aspects of daily life (Scharff et al., 2000). It refers to the perception and comprehension of the meaning, nature, or significance of written information (Weiss et al., 2018) and enables the target audience to perceive, read, and understand the content of stimulus materials with ease (Fukuzumi et al., 1988). Text and character readability can influence users' reading performance and satisfaction when interacting with mobile devices, as poorly designed layouts can quickly induce fatigue and reduce reading or search speed. Consequently, readability should be considered a critical component of the design process (Huang et al., 2009). It is a subjective assessment of how easily a text can be understood (Buse & Weimer, 2010). Bayrak (2012) conceptualizes legibility as distinct from the necessity of reading for comprehension, arguing that even when graffiti is illegible, the artist's emotions can be inferred through the size of the lines. Similarly, Garcia (1981) asserts that if aesthetically designed text cannot be easily read, it fails to convey meaning to the reader. Someric (2000) emphasizes that no document should be unpleasant or difficult to read.

Line length

Line length constitutes a critical element of readability and should be optimized for efficient reading. Excessively long lines hinder movement to the subsequent line, whereas overly short lines disrupt tracking (Dyson & Heseltrove, 2001; Yılmaz & Topraktaş, 2014). Bringhurst (1997) recommends line lengths between 45 and 75 characters, with 66 characters considered optimal, while Dyson and Kipping (1997) suggest that a line length of approximately 70 characters is most suitable for screen-based text. In educational contexts, the Ministry of National Education (MEB, 2011) prescribes line lengths based on grade level: 10 words for 1st grade, 14 for 2nd grade, 18 for 3rd grade, 20 for 4th and 5th grades, and 22 words for 6th grade and above.

Column width

According to McLean (1992), wide columns slow down reading and cause the eye to tire quickly. Since the eye will frequently move left and right on narrow columns, it negatively affects readability. Boulton (2005) suggests that the optimal column width is 52-78 characters, including character and

word spaces. Sarıkavak (2009) argues that the use of design spaces in two or three sections will help short and easy reading, since single-column texts in digital environments will cause inefficient use of space.

Character space

Bix (2001) argues that the spacing between characters has an impact on readability. Negative and positive spaces between characters are used. Zhang (2006) states that if character spacing is not properly adjusted, some letters may appear as different letters due to their proximity to each other. For example, if the space between the letters "rn" is not well spaced, it will look like the letter "m". Crompton (2014) also argues that letters close to each other are difficult to select because the reading line is lost. Masulli et al. (2018) conducted a study with 30 dyslexic and non-dyslexic students between the ages of 7 and 12. They found that increasing font size and kerning facilitated reading for both dyslexic and non-dyslexic participants, regardless of the status of the participants.

Line and word spacing

Alessi and Trollip (2001) state that line spacing affects readability. Diaz (1995) defines interline spacing as the distance from the baseline of a text to the beginning of the next text and argues that the appropriate interline spacing should be used by adding 2 nk in a text using 10 pt. Dotan and Katzir (2018) investigated the effects of spacing between words in texts on reading with a focus on 1st and 3rd graders, and found that out of two conditions, standard (100%) and increased spacing (150%), all 1st grade students and low-achieving students in 3rd grade preferred the increased spacing condition. Code readability depends on the proper indentation of the code, the use of ENDIF/ENDWHILE instructions to define block boundaries, and line lengths not exceeding 80 characters (Oliveira et al., 2023). Hsiao et al. (2019) found that font size, the number of characters in a line, and the number of menu items affect the reading performance of Chinese characters on a tablet, highlighting that lines with nine to fourteen characters are read more efficiently.

Hierarchy

Cengizhan and Ateş (2006) define hierarchy as the presentation of information in an organization in order of importance. The visual hierarchy used in design is important for information presentation and learning. Smith (1999) suggests an example of a hierarchy as follows:

- Document Title
- Section Headings (First Level)
- Sub-Section Headings (Second Level)
- Paragraph Headings (Third Level)
- General Text (Fourth Level)

Wang (2012) suggests using elements such as size, weight, color, skin, texture, and texture to bring harmony, emphasis, and vibrancy to the forefront when arranging the order in a visual hierarchy from the important to the unimportant.

Contrast

Uçar (2004) classifies colors as warm and cool colors. While yellow, orange, and red colors are warm colors with high wavelengths, they can be perceived more easily in the design, thus creating a close feeling to the addressee. Cold colors with short wavelengths evoke a feeling of distance in the addressee of the message. Keyes (1993) argues that color affects reading. High-value colors such as yellow, red, and orange are less readable than low-value colors such as green, blue, and purple. Skoff (1967) argues that the most readable color combination is black text on white, while red text on green and pink text on blue are the least readable color combinations. According to Karataş (2003), the readability of white text on a blue background and red text on a yellow background is high, while the readability of green text on a yellow background and white text on a pink background is lower. Wilson et al. (1981) argue that 1) white on a green background, 2) white on a blue background, 3) yellow on a black background, 4) yellow on a red background, 5) white on a red background, 6) red on green a background, 7) black on an orange background, 8) white on an orange background, 9) green on a red background, and 10) purple on a black background.

Kırmızı zemin üzerine beyaz metin

Yeşil zemin üzerine kırmızı metin

Siyah metin üzerine mor metin

Figure 8. Color combinations that negatively affect readability

Examining the traffic rules poster for children prepared by the General Directorate of Security Traffic Services Presidency reveals a contrast issue in the first section of the design, where the text is placed on a gray background, negatively affecting readability. The selected typeface and stroke weight further hinder message transmission to the target audience. In contrast, black text on the same background in the second section, supported by illustrations, constitutes a successful example of readability. According to Pektaş (2010), a minimum of 70% tonal difference between text and background is recommended for optimal readability. Similarly, Buchner et al. (2009) highlight that texts with positive polarity—dark letters on a light background—are easier to read on computer screens than texts with negative polarity, i.e., light letters on dark backgrounds. Dobes et al. (2017) confirm that positive polarity combinations facilitate reading, while Humar et al. (2008) note that inappropriate color combinations on websites negatively affect text legibility. Studies also indicate that background tones influence reading from smartphone screens (Na et al., 2016), and color manipulation can affect attention and effectiveness in print materials (Toh et al., 2023). Greco et al. (2008) concluded that dark text on a light background optimizes readability, while Zuffi et al. (2007) found that light-colored text on dark backgrounds reduces legibility, recommending a minimum contrast of approximately 27 units. Consistently, Palmen et al. (2023) reported that dark text on light backgrounds is read faster on mobile devices than light text on dark backgrounds, underscoring the importance of appropriate text-background contrast in design.



Figure 9. Example of a poster prepared in accordance with the contrast element

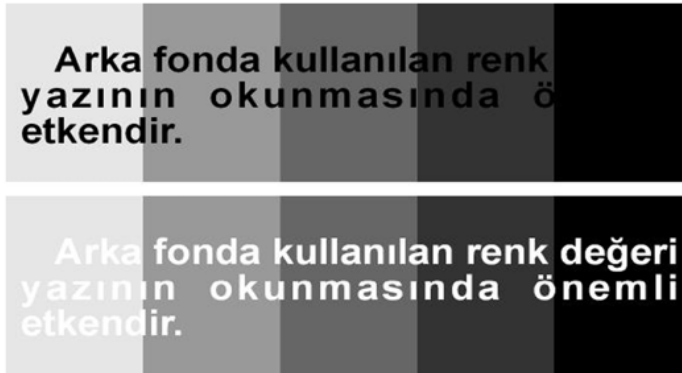


Figure 10. The importance of colors used in the background

Methods

The study employed a qualitative research method, which is a process that utilizes techniques such as observation, interviews, and document analysis to examine events in a realistic and holistic manner (Yıldırım, 1999). Within this framework, the data were analyzed using the document analysis method, one of the widely recognized qualitative approaches. This method involves a systematic and meticulous examination of documents, allowing researchers to extract meaningful insights and develop empirical knowledge within the scope of the study. Document analysis typically includes a variety of sources such as advertisements, invitations, meeting minutes, maps, and newspaper articles (Kıral, 2020).

In the present study, the materials evaluated were the digital textbooks used for teaching Turkish to foreign learners, specifically “Turkish for Children” and “I Learn Turkish,” both published by the Yunus Emre Institute. The “Turkish for Children” set targets A1-level achievements and is designed for learners aged 6–9 who wish to acquire Turkish as a foreign language. The “I Learn Turkish” set covers A1 and A2-level achievements and is aimed at learners aged 10–15. The Yunus Emre Institute, affiliated with the Yunus Emre Foundation, was established under Law No. 5653 on May 5, 2007, to promote Türkiye’s language, history, culture, and arts; provide information and resources internationally; offer educational services abroad in the fields of Turkish language, culture, and arts; enhance Türkiye’s cultural exchange with other countries; and foster international friendship. In addition to teaching Turkish to foreigners through its centers abroad, the Institute conducts cultural and artistic activities to promote Türkiye and supports scientific research.

The textbooks analyzed in this study were obtained in digital format, and all evaluations were conducted on these digital versions, enabling a thorough assessment of readability, legibility, and visual design within a digital learning context.

Importance of the Study

With the rise of the digital age, the use of digital textbooks in education has expanded rapidly. In foreign language instruction in particular, digital content enhances accessibility and fosters interactive learning environments. These developments, however, have highlighted not only the need for technological access but also the pedagogical and visual effectiveness

of digital materials. Within this context, the readability and legibility of digital textbooks emerge as two fundamental factors directly influencing learning outcomes.

Readability concerns the ease with which a text can be comprehended, shaped by style, organization, and syntactic complexity (Kane et al., 2006), whereas legibility refers to the visual clarity of text elements, influenced by features such as font size and contrast (Falk et al., 2021). Recognizing this distinction is essential for optimizing user experience in both digital learning and communication.

In the field of teaching Turkish as a foreign language, which encompasses both linguistic structure and cultural transmission, digital resources are increasingly employed. Yet, the literature reveals a scarcity of systematic studies evaluating digital textbooks in terms of readability and legibility. Existing research remains largely content-oriented, overlooking the interplay between visual presentation and learner interaction. In screen-based learning, however, design and visual quality directly shape motivation, attention, and comprehension.

This study aims to assess the readability and legibility of digital textbooks used in teaching Turkish to foreign learners, thereby contributing to both digital content design and language pedagogy. By adopting a holistic framework that integrates linguistic comprehensibility and visual layout, the study seeks to develop recommendations to enhance pedagogical quality. The focus on two textbooks—*Çocuklar İçin Türkçe* (Turkish for Children) and *Türkçe Öğreniyorum* (I Am Learning Turkish)—is justified by the qualitative depth required and by their status as official Yunus Emre Institute publications, widely used at A1 and A2 levels within Turkish Teaching Methods (TÖYÖ). Their availability in digital format further allows for analysis in authentic screen-based contexts.

Ultimately, this study goes beyond evaluating existing materials by proposing a comprehensive model of analysis situated at the intersection of design, pedagogy, and user experience. In doing so, it establishes both a theoretical and practical foundation for making digital Turkish language teaching resources more accessible, comprehensible, and pedagogically effective.

Limitations

In this study, no specific checklist or structured assessment tool was used to evaluate the readability and legibility levels of digital textbooks. Instead, a thematic analysis of text and visual design elements was conducted in line with qualitative content analysis methods. This approach is considered one of the methodological limitations of the study. Indeed, the Checklist Approach developed by Irwin and Davis (1980), which enables the systematic examination of the readability levels of texts, provides a frequently referenced framework in literature. In addition, there are various checklists aimed at evaluating the effectiveness of textbooks in terms of visuals. The fact that these checklists were not directly referred to in this study has the potential to provide methodological guidance for future research. In this context, the findings of the study were interpreted in light of these limitations. The materials evaluated in the study were selected from digital textbooks prepared by the Yunus Emre Institute, a public institution, for teaching Turkish to foreign students aged 6–9 and 10–15. The reason for choosing only these two books is that these resources are publicly available, appeal to a wide user base, and are highly accessible in the digital environment. In this regard, the selected books were evaluated as current and representative examples of teaching materials used in the teaching of Turkish as a foreign language.

Results and Discussion



Figure 11. Turkish book cover designs for children

The visuals used in the cover design of the book, which is designed as a Turkish teaching material for children aged 6-9, are designed to attract the attention of the target audience. It is understood from the covers consisting of illustrations that the content of the book is formed in a fun way and that the teaching will be game-oriented. This is a positive design to focus the attention of the audience between the ages of 6 and 9, who will start to learn a new language, and not to create prejudice. The fonts used in the cover design and the preferred font size have a positive effect on readability. In addition, the use of uppercase and lowercase letters and spacing (the space between characters) also support legibility. The hierarchical layout is also appropriate. On the other hand, the fact that the title of the book consists entirely of capital letters has a negative effect on legibility. At this point, Arditi and Cho (2007) argue that all-caps words have a "retarding effect" on legibility.



Figure 12. Book interior page designs

The inner pages of the book were designed with black font on a white background, maintaining consistency with the cover page, and employed a playful font appropriate for the target audience. Font size was suitable for readers, and character spacing, line spacing, and word spacing were applied adequately, supporting legibility. Previous studies have emphasized the impact of spacing on readability (Diaz, 1995; Alessi & Trollip, 2001; Bix, 2001), suggesting that the spacing used in the book's interior pages positively contributes to reading ease. While the table of contents was left-aligned, poems were center-aligned, which may negatively affect readability, as left-aligned text prevents the formation of "white rivers" and facilitates reading (Pektaş, 2010). Design issues also emerged in pages presenting one-word actions such as "Open," "Close," and "Write," where the wall thickness of the characters, positioned beneath visuals, was insufficient, making the words difficult to read. Wall thickness, defined as the perceived width of characters, significantly affects readability; excessively thin strokes impair legibility both on-screen and in print. In addition, certain background and text color combinations, such as orange text on a white background or white text on an orange background, created contrast problems that hindered readability. Skoff (1967), Wilson et al. (1981), Keyes (1993), Karataş (2003), and Uçar (2004) emphasize that color choices directly influence readability. Consequently, even when other design elements such as font choice, size, line length, and column width are well-executed, incompatibility between text and background colors can disrupt the effective communication of the intended message, undermining the core principle of design.



Figure 13. Turkish learning book cover designs

When we look at the designs of the book covers of I Learn Turkish, which are designed to teach Turkish to foreign students between the ages of 10-15, it is seen that they are designed in accordance with the audience they address. The visuals used on the book covers convey the message that the learning process will proceed differently from the Turkish for Children book set. In addition, the font used for the book titles and levels on the cover is a font without quotes and positively affects readability. Again, the capitalization of the initial letters of the book titles has a positive effect on legibility. Based on Güneş (2012)'s argument that the eye does not move in a straight line during reading but moves by jumping, we can state that the legibility of texts written entirely in capital letters will be more difficult. In addition, the background colors on which the texts are applied do not create any contrast problems and do not affect readability negatively.

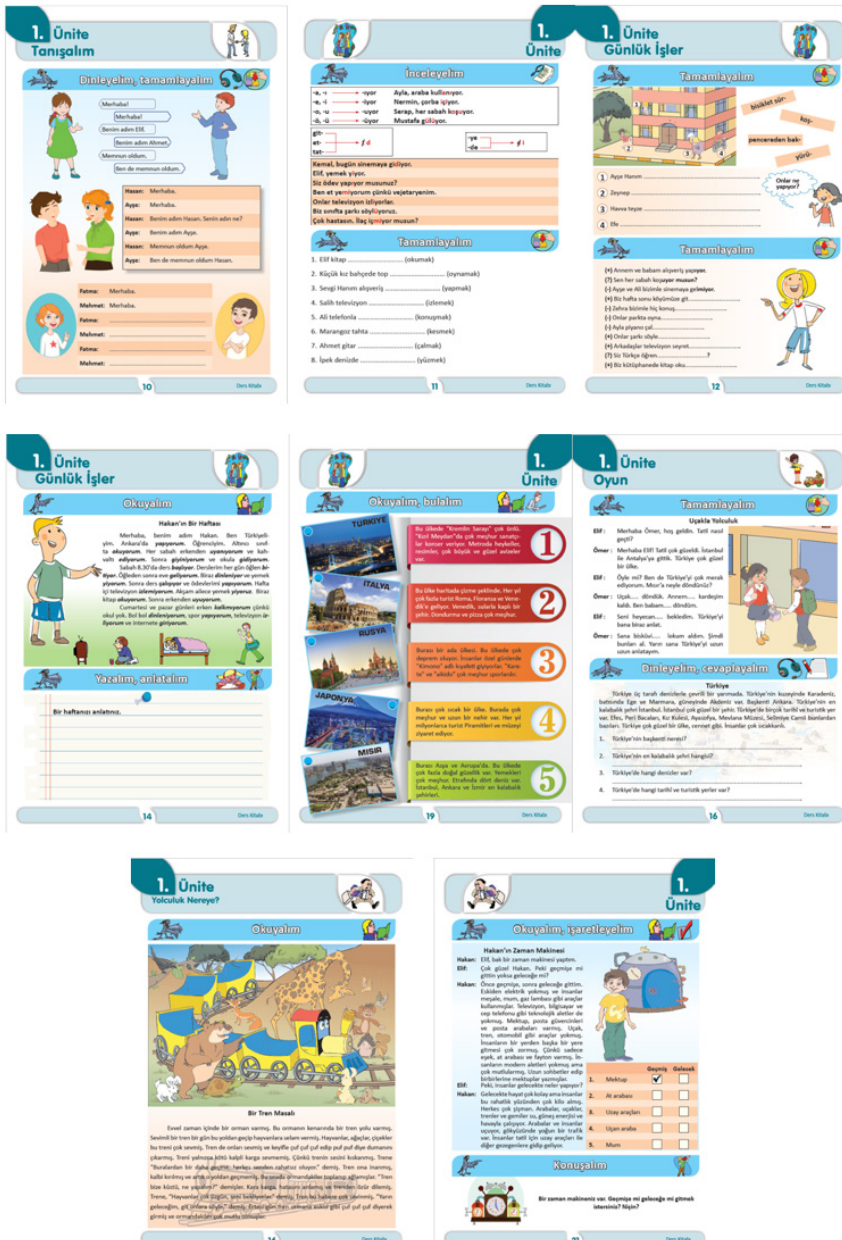


Figure 14. Inner page designs of Turkish learning books

The fonts and sizes employed in the interior page designs of the books are generally appropriate for conveying the intended message to the target audience, with font size positively influencing readability. Line spacing, word spacing, and character spacing are also applied effectively throughout the texts, supporting overall legibility. However, the use of special effects and emphasis on certain pages presents challenges for readability. For instance, in a page designed to illustrate the suffixes -iyor, -iyor, -iyor, -uyor, -üyor, the thickness of character strokes diminished the color intended to highlight the suffixes, while the red emphasis on an orange background created contrast issues that negatively affected legibility. Conversely, in other examples, the selected background color, stroke weight, and clarity of highlighted elements demonstrated optimal use of these design features. Similarly, the application of special effects was appropriate in some cases; however, line length posed problems in certain designs. According to MEB (2011), recommended line lengths are 10 words for first grade, 14 words for second grade, 18 words for third grade, 20 words for fourth and fifth grades, and 22 words for sixth grade and above. In some pages, justification caused excessive spacing between words, particularly in the first line, which disrupted the reading flow. In addition, suboptimal line lengths, as seen in other examples, hindered readability, consistent with Dyson and Haselgrove (2001) and Yılmaz and Topraktaş (2014), who note that overly long lines complicate line transitions while excessively short lines impede tracking. Word spacing that extends across lines can create “white rivers,” further reducing readability. Contrast problems were also observed in instances of white text on red or orange backgrounds. Although some pages, such as those titled “Türkiye” and “A Train Tale,” maintained optimal line lengths, the inclusion of background visuals sometimes suppressed the text and impeded word recognition, highlighting the need to carefully balance visual elements and textual content to ensure effective readability.

Conclusion and Recommendations

The findings of this study clearly demonstrate that typography plays a pivotal role in enhancing the pedagogical quality of digital educational materials. In particular, the readability and comprehensibility of digital resources used in foreign language teaching were observed to directly affect students’ cognitive load (Bradley, 2011; Kemp & Towers, 2014). Typography, therefore, must be regarded not merely as an aesthetic device but as a cognitive guide (Drucker, 1984; Serafini & Clausen, 2012). The “low-ercase advantage” identified by Perea et al. (2017) was also confirmed in

this study, as uppercase headlines were found to prolong perception time, while lowercase letters facilitated smoother reading flow, underscoring the central role of typographic arrangements in activating visual recognition mechanisms during learning. Similarly, contrast and visual hierarchy proved essential in directing attention; weak text-color contrast was shown to cause reading fatigue, with classic studies recommending at least a 70% tonal difference (Skoff, 1967; Greco et al., 2008). Cases where white text appeared on orange or red backgrounds fell below this threshold, weakening legibility, while inconsistent visual hierarchy failed to emphasize key points. Although font selection was generally adequate in the analyzed textbooks, certain instances employed fonts inaccessible to visually impaired or dyslexic readers, despite the availability of inclusive designs such as Luciole (Galiano et al., 2023) or recommendations for monospaced and sans serif fonts for dyslexic individuals (Rello & Baeza-Yates, 2016). Micro-typographic elements such as line length and alignment were also found to directly affect fluency, particularly among younger learners; excessive word spacing and “white rivers” produced by full justification disrupted text tracking, confirming earlier findings that left-aligned text provides greater visual harmony and ease of reading (Pektaş, 2010; Dyson & Haselgrove, 2001). Another critical factor concerned the harmony between visuals and text: in several cases, visual density overshadowed textual content, making it harder to focus on information, thereby reinforcing the importance of achieving visual-textual balance in digital environments (Lau & Chu, 2015; Zorko et al., 2017). Beyond these technical issues, the study highlighted the pedagogical dimension of typographic design, emphasizing the need to integrate teacher and student feedback into the design process (Watzman, 1992) and to adopt multimodal approaches to material development (Pantaleo, 2012). Overall, the analysis of the two textbooks—*Çocuklar İçin Türkçe* and *Türkçe Öğreniyorum*—revealed strengths in areas such as age-appropriate font selection, text hierarchy, and layout, but also exposed weaknesses in contrast management, alignment, and text-visual balance, which occasionally undermined the learning experience. In a period where digital learning environments are rapidly expanding, these findings reaffirm that instructional materials must be optimized not only in terms of content but also in presentation. Typography should therefore be understood not only as a visual layout tool but also as a pedagogical instrument that directly shapes motivation, comprehension, and overall learning effectiveness.

New Perspectives for Future Research

Future research on typography in digital educational contexts can progress along several innovative directions. Artificial intelligence algorithms may be employed to evaluate typographic layouts, as image processing and text classification techniques can objectively measure text density, hierarchy, contrast, and spacing optimization, enabling the rapid analysis of large volumes of digital material. In addition, digital eye-tracking technologies can reveal which design elements capture or fail to capture attention, providing valuable insights for the development of more user-centered content across different age groups. Adaptive typography systems that dynamically adjust font size, contrast, or spacing according to age, reading habits, or visual limitations represent another promising avenue, particularly for mobile devices. Cross-cultural adaptation also warrants attention, since fonts, colors, and visual themes carry distinct semiotic meanings across cultural contexts; integrating such sensitivity into digital textbooks may enhance motivation and contextual engagement, especially for learners affected by migration. Moreover, as language teaching increasingly incorporates virtual reality, the integration of typographic elements into three-dimensional environments will raise new design challenges, such as how to structure text hierarchy spatially and harmonize visual and auditory channels. The emotional dimension of typography also merits exploration: the effects of font style, color, and even animated text on learners' affective responses and motivation could be systematically investigated using neuropsychological methods. Finally, collaboration models that bring together teachers and designers could ensure that typographic decisions are informed by pedagogical objectives, thereby reinforcing both instructional quality and learning outcomes. Collectively, these perspectives highlight that typography should be approached not only from a visual standpoint but also from functional, accessible, cultural, and pedagogical dimensions, with interdisciplinary inquiry offering pathways to more inclusive and effective digital language learning materials.

Research and Publication Ethics

In this study, all rules specified in the Directive on Scientific Research and Publication Ethics of Higher Education Institutions were followed. None of the actions described under the title of Actions Contrary to Scientific Research and Publication Ethics in the Directive have been carried out.

Ethics Committee Permission

In the study, data were not collected in a way that would require ethics committee permission.

Conflict of Interest

There are no issues that may lead to a conflict of interest in the research.

Author Contribution Rate

Since the study had a single author, the contribution rate was 100%.

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Use of Artificial Intelligence

No artificial intelligence was used in this study.

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Genişletilmiş Özet

Dijital çağın etkisiyle eğitsel materyallerin üretim biçimleri ve öğrenme süreçleri köklü bir dönüşüm geçirmektedir. Bu dönüşüm, özellikle yabancı dil öğretimi alanında, hem içerik sunumu hem de biçimsel özelliklerin öğrenme motivasyonu üzerindeki etkisinin yeniden değerlendirilmesini gerekli kılmaktadır. Bu bağlamda, görsel tasarımın temel bileşenlerinden

biri olan tipografi, dilsel içeriğin erişilebilirliğini ve pedagojik etkinliğini belirleyen merkezi bir faktör hâline gelmiştir. Tipografi yalnızca görselliğe hizmet eden bir estetik unsur değil; aynı zamanda bilişsel yönlendirme, anlam üretimi ve öğrencinin metinle kurduğu etkileşim üzerinde doğrudan etkili olan bir öğrenme aracıdır. Bu çalışma, yabancılara Türkçe öğretiminde kullanılan dijital ders kitaplarının okunabilirlik (readability) ve okunurluk (legibility) düzeylerini tipografik tasarım açısından değerlendirmektedir. Araştırma kapsamında incelenen materyaller, Yunus Emre Enstitüsü tarafından farklı yaş grupları için hazırlanmış iki kitap setinden oluşmaktadır: Çocuklar İçin Türkçe (6–9 yaş) ve Türkçe Öğreniyorum (10–15 yaş). Kitaplar dijital formatta analiz edilmiş ve çeşitli tipografik ölçütlere göre değerlendirilmiştir. Çalışmanın amacı, dijital ders materyallerinin tipografik düzenlemelerinin öğrenci başarısı üzerindeki etkisini ortaya koymak; yaşa uygun tasarım ilkelerinin öğrenme sürecine katkısını analiz etmek ve öneriler sunarak alandaki eksiklikleri gidermeye yönelik akademik bir katkı sağlamaktır. Araştırma nitel araştırma deseni ile yapılandırılmıştır. Veri toplama aracı olarak doküman analizi kullanılmış; seçilen kitaplar içerik ve görsel düzen açısından sistematik biçimde incelenmiştir. Analiz sürecinde mikro tipografi (karakter yapısı, yazı tipi tercihleri, punto boyutu, kelime/harf aralıkları) ve makro tipografi (satır uzunluğu, hizalama, görsel hiyerarşi, renk kontrastı) gibi ölçütler temel alınmıştır. Değerlendirme sürecinde metinlerin öğrencinin yaş grubuna ve dil gelişim seviyesine uygunluğu gözetilmiş; aynı zamanda görsel sunumun bilişsel süreçlerle ilişkisi literatür temelli olarak yorumlanmıştır (Bradley, 2011; Čerepinko et al., 2017; Galiano et al., 2023).

Bulgular, tipografik düzenin pedagojik etkisini açıkça ortaya koymaktadır. Özellikle Çocuklar İçin Türkçe kitabında tercih edilen sade, dikkat çekici fontlar ve geniş puntolar; görsel yoğunluğu dengeli tasarımlar, öğrenme motivasyonunu artırmakta ve metin takibini kolaylaştırmaktadır. Bununla birlikte, beyaz yazının turuncu ve kırmızı arka planlar üzerinde kullanılması gibi düşük kontrastlı uygulamaların metin algısını zorlaştırdığı gözlemlenmiştir. Bu bulgu, Skoff (1967) ve Buchner et al. (2009) gibi çalışmalarda ortaya konan “pozitif polarite avantajı” ile örtüşmektedir. Görsel hiyerarşinin belirgin olmadığı tasarımlarda önemli bilgiler yeterince vurgulanamamakta ve anlam üretimi zayıflamaktadır. Türkçe Öğreniyorum kitabında ise erişilebilir font seçimi ve uygun satır düzeni ile olumlu bir tasarım dili gözlemlenmekle birlikte; tam hizalamalı metinlerin bazı sayfalarda kelime boşluklarını aşırı artırarak “white river” etkisi oluşturduğu

tespit edilmiştir. Bu durum, okuma akışını ve göz takibini zorlaştırmakta; öğrencinin metinle kurduğu etkileşimi sınırlamaktadır (Dyson & Kipping, 1997; Pektaş, 2010). Bazı metinlerin tamamen büyük harflerle yazılması, tanıma süresini uzatmakta ve metni yorumlama sürecini olumsuz etkilemektedir (Arditi & Cho, 2007; Güneş, 2012). Bulgular arasında görsellerin metinle uyumu da dikkat çekmektedir. Metni baskılayan, aşırı büyük görsellerin kullanıldığı sayfalarda bilgiye erişim zorlaşmakta; görsel metinsel denge bozulmaktadır. Öte yandan, görsellerin metni destekleyecek biçimde kullanıldığı sayfalarda anlam üretimi güçlenmekte ve öğrencinin metinle kurduğu bağ derinleşmektedir (Zorko et al., 2017; Lau & Chu, 2015). Erişilebilirlik açısından yapılan analizlerde, disleksik öğrenciler ve düşük görme kapasitesine sahip bireyler için optimize edilmiş yazı tiplerinin kitaplarda yer almadığı tespit edilmiştir. Luciole ve OpenDyslexic gibi erişilebilir fontlar hem estetik hem işlevsel avantajlar sunmakta; aynı zamanda kapsayıcı eğitim ilkesine hizmet etmektedir (Galiano et al., 2023; Rello & Baeza-Yates, 2016).

Çalışmanın sınırlılıkları arasında yapılandırılmış değerlendirme araçlarının (örneğin Irwin & Davis'in Checklist Approach'u) kullanılmaması ve analiz kapsamının sadece iki kitapla sınırlı kalması yer almaktadır. Bu sınırlılık, sonuçların genelleme kapasitesini azaltmakta ve karşılaştırmalı analiz yapılmasını engellemektedir. Gelecek araştırmalarda daha geniş örnekleme farklı dijital platformların ve yayıncıların materyalleri karşılaştırmalı biçimde incelenmelidir.

Araştırmanın özgün değeri, tipografinin dil öğretiminde yalnızca görsel bir süsleme değil; anlamın yapılandırıldığı, bilişsel etkileşimi yönlendiren bir pedagojik araç olduğunu vurgulamasıdır. Çalışma, tasarımcılar ve dil öğretmenleri arasında köprü kuran disiplinlerarası bir öneri sistemi sunmakta; dijital öğrenme materyallerinin daha kapsayıcı, erişilebilir ve işlevsel biçimde geliştirilmesine katkı sağlamaktadır. Sonuçlar doğrultusunda aşağıdaki öneriler geliştirilmiştir:

- Yaş gruplarına uygun, erişilebilir yazı tipleri (sans serif, sade karakterli fontlar) kullanılmalıdır.
- Kontrast oranı en az %70 tonal fark ile düzenlenmelidir.
- Satır uzunluğu MEB (2011) kriterlerine göre optimize edilmelidir (örn. 10–22 kelime).
- Metinler sol hizalı düzenlenmeli; tam hizalama gerektiğinde kelime

boşlukları dikkatle kontrol edilmelidir.

- Görseller metni bastırmamalı; metni destekleyecek biçimde sunulmalıdır.
- Erişilebilirlik açısından disleksik bireyler için uygun font alternatifleri sağlanmalıdır.
- Disleksik ve düşük görme kapasitesine sahip bireyler için uygun tipografik alternatifler sağlanmalıdır.
- Tasarımlar kültürel bağlamla uyumlu olmalı; farklı kökenlerden gelen öğrenciler için semantik uygunluk taşımalıdır.
- Yapay zekâ destekli tipografik analiz sistemleri (göz izleme, ekran testi, metin tarama algoritmaları) geliştirilmeli ve uygulanmalıdır.

Sonuç olarak, tipografi, yabancı dil öğretiminde yalnızca görsel bir süsleme değil, öğrenme sürecinin aktif bir bileşenidir. Bu araştırma, dijital Türkçe öğretim materyallerinin tipografik açıdan tasarlanmasının, öğrencilerin motivasyonu, metinle kurduğu bilişsel bağ ve öğrenme başarısı üzerinde doğrudan etkili olduğunu ortaya koymuştur. Özellikle yaşa uygun tipografi tercihlerinin, bilişsel süreçlerle uyumlu düzenlemelerin ve erişilebilirlik ilkelerinin uygulanması, dijital ders kitaplarının pedagojik değerini artırmaktadır. Dolayısıyla, tipografik tasarım ilkeleri, dijital materyal geliştirme süreçlerinde merkezi bir konuma yerleştirilmeli ve öğretim tasarımcıları ile dil öğretmenleri arasında disiplinlerarası bir iş birliği mekanizması kurulmalıdır.