What are the characteristics of bilingual students of primary school in written production?

Abstract

Bilingualism in relation to the degree of Readability in the first grades of primary school was the starting point of this research to highlight variables that influence the production of written production. Out of a total of 150 samples, 39 samples were randomly collected from a bilingual student of a German public school. The mother tongue is Greek while the samples come from the 2^{nd} – 5^{th} grade of primary school. This was followed by the precise digitization of the texts in Word format and the investigation of the variables continued with the Readability formulas Flesch-Kincaid and Gunning Fog. The results were transferred to an Excel spreadsheet. Using Tableau through statistical analysis, it was found that words associated with History, Biology, Geography or Religious Studies, multisyllabic words and appropriate vocabulary display high Readability grades and also high marks during evaluation. The relationship between all these important factors is inversely proportional. In other words, when one variable increases, the other also increases. For example, when the evaluation decreases, the difficulty grade of the text also decreases, and vice versa. The purpose of the research is to find the characteristics by which the degree of difficulty of texts produced by bilingual primary school students can be determined. In this way, a database can be created for even more reliable assessment of bilingual students, but also for the construction of digital tools and educational material adapted for bilingual students.

Keywords: Bilingualism, Readability, Assessment, Public school, Validity

Introduction

The discovery of important characteristics that influence the Readability grade in written production regarding bilingual students is the base of the present study (Kapeta, 2020).

The relationship between Readability and bilingualism is an important area in language education (Kapeta, 2025), cognitive psychology, and communication design. Here's an overview that unpacks both terms and how they interact. On one side, Readability refers to how easily a text can be read and understood. It depends on factors such as (Kapeta, 2020):

- Vocabulary (complexity, frequency of words)
- Syntax (sentence length and structure)
- Text structure (organization, coherence)
- Visual layout (font size, spacing, formatting)

On the other side, Readability is often measured using formulas like:

- Flesch Reading Ease (Eleyan et al., 2020)
- Flesch-Kincaid Grade Level (Tanprasert & Kauchak, 2021)
- SMOG Index (Pedrini, 2024)
- Gunning Fog (Isnaeni, 2017)

Bilingualism is the ability to understand and/or use two languages. Types of bilinguals include (Moradi, 2014):

I. Simultaneous bilinguals (learn both languages from birth)

II. Sequential bilinguals (learn a second language after the first is established)
III. Balanced bilinguals (equal proficiency in both languages)
IV. Dominant bilinguals (stronger in one language)

How Do Readability and Bilingualism Interact (Bartosiewicz, 2022) ?

a. Reading in a Second Language (L2) (Mikulecky, 2008)

- ✓ Lower Readability = greater difficulty for bilinguals, especially if the second language (L2) is less dominant, in the present samples we refer to the Greek language which is spoken only at home.
- ✓ Bilingual readers often rely more on context, cognates, and visual cues.
- ✓ Simplified texts (high Readability) help in language acquisition and comprehension.

b. Code-Switching and Readability (Myslín & Levy, 2015)

- ✓ Some bilingual texts use code-switching (alternating between languages).
- ✓ This can affect Readability positively (more authentic communication) or negatively (cognitive load), depending on the reader's proficiency.

c. Designing for Bilingual Readers (Dalton et al., 2011)

When creating materials (e.g., public health, education, signage), Readability must be high in both languages.

Translations must match complexity, tone, and context to preserve Readability.

In classrooms with bilingual students:

- ✓ Materials must be tailored to their language proficiency level.
- ✓ Reading comprehension improves when texts are in a student's dominant or heritage language.

Cognitive Note: Bilinguals often develop stronger metalinguistic awareness (Bialystok & Barac, 2012), which can aid in understanding complex texts. However, cognitive load increases when processing low-Readability L2 texts, especially under time pressure. Educators often scaffold L2 texts to support understanding (e.g., glossaries, visuals, dual-language books).

The last decades, researchers focus on possible difficulties in integrating immigrant children into the school environment as they appear to simultaneously face difficulties in their oral interaction with their classmates, since in some cases serious deficiencies in vocabulary are observed (Blanchet-Cohen & Reilly, 2016).

The purpose of this study is to find the main characteristics by which the degree of difficulty of texts produced by bilingual students can be distinguished (Kapeta, 2025).

Finding these variables would perhaps contribute to the construction of more contemporary educational material for elementary school students, so that there is a possibility of improvement and performance in language lessons, but also in facilitating test comprehension (Leung, 2005).

Therefore, an even more reliable evaluation of texts produced by bilingual students would be possible if digital tools for measuring texts and tests were created through a common database (Admiraal et al., 2006).

Materials and Methods

For the above reasons, 39 samples were randomly collected from a total of 150. These are concluded tests of written production between the 2nd and 5th grades of primary

school. The student is of Greek origin and attends a public German school where the spoken language is German.

It should be noted that the bilingual student also attends Greek school 4 hours per week from the 2nd grade of the German elementary school, a fact that may make it even more difficult for the student to confuse these two languages. The stages of the research methodology are detailed below, as shown in Table 1.

The two most difficult stage was the second part, i.e., the digitization of the samples in a very careful and manual manner from the original writing in Word format. While the fourth stage of transferring the analysis data to an Excel table from which the statistical analysis of the data would result was an equally time-consuming process, which required thorough re-checking of data entry in order for the research to be reliable. With the help of the Tableau tool, the final results and the final product of this study were obtained, i.e. the conclusions which will be reported at the end of this article.

Table 1: Research methodology

1st phase: Sampling source	German school tests from primary school in Salzgitter Thiede-Germany
Chronological range of samples	1987-1991
Number of samples	39 out of 150 by random draw
Primary School classes surveyed	2nd-5th grade
2nd phase: Sample digitization tool	Word 10
3rd phase: Formulas used	Flesh-Kincaid, Gunning Fog Index
4th phase: Database import program	Excel
5th phase: Statistical analysis tool	Tableau
6th phase: Final product	Important factors

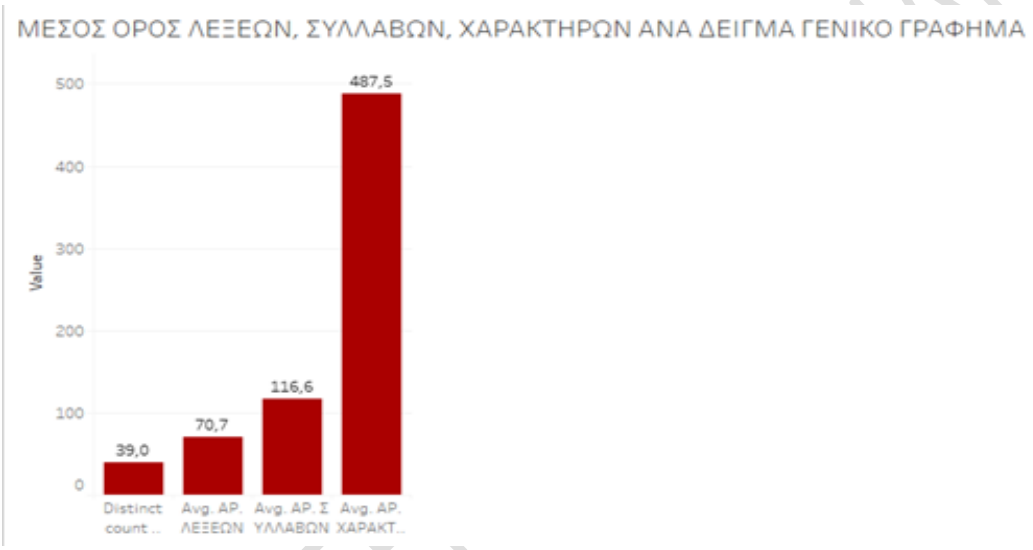
Results and Discussion

In table 2 and figure 1, 39 samples display an average of 116 syllables, an average number of words of 70.7% and an average number of characters of 487.5%. Through these results there is probably a positive sign in the performance of the bilingual student, since it is often difficult to produce sentences or paragraphs even by users of German as a mother tongue at these early ages.

Table 2: Average of words, syllables, characters per sample (General table)

ΜΕΣΟΣ ΟΡΟΣ ΛΕΞΕΩΝ, ΣΥΛΛΑΒΩΝ, ΧΑΡΑΚΤΗΡΩΝ ΑΝΑ ΔΕΙΓΜΑ ΓΕΝΙΚΟΣ ΠΙΝΑΚΑΣ

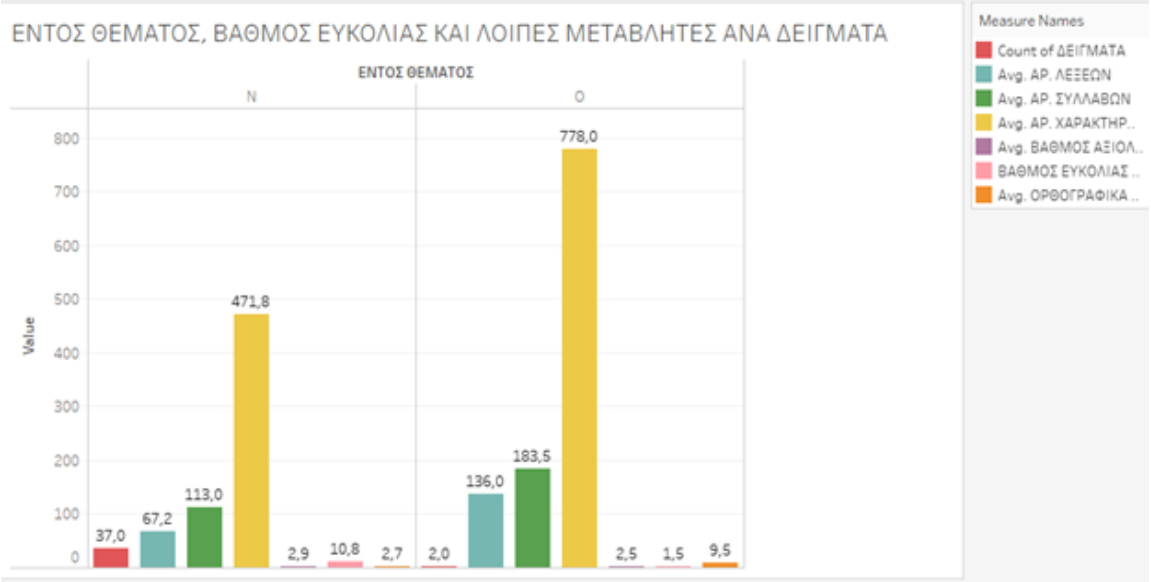
Distinct count of ΔΕΙΓΜΑΤ..	39,0
Avg. AP. ΛΕΞΕΩΝ	70,7
Avg. AP. ΣΥΛΛΑΒΩΝ	116,6
Avg. AP. ΧΑΡΑΚΤΗΡΩΝ	487,5



Graph 1: General Graph Samples (39), average number of words (70.7), avg. number of syllables (116.6), avg. number of characters (487.5)

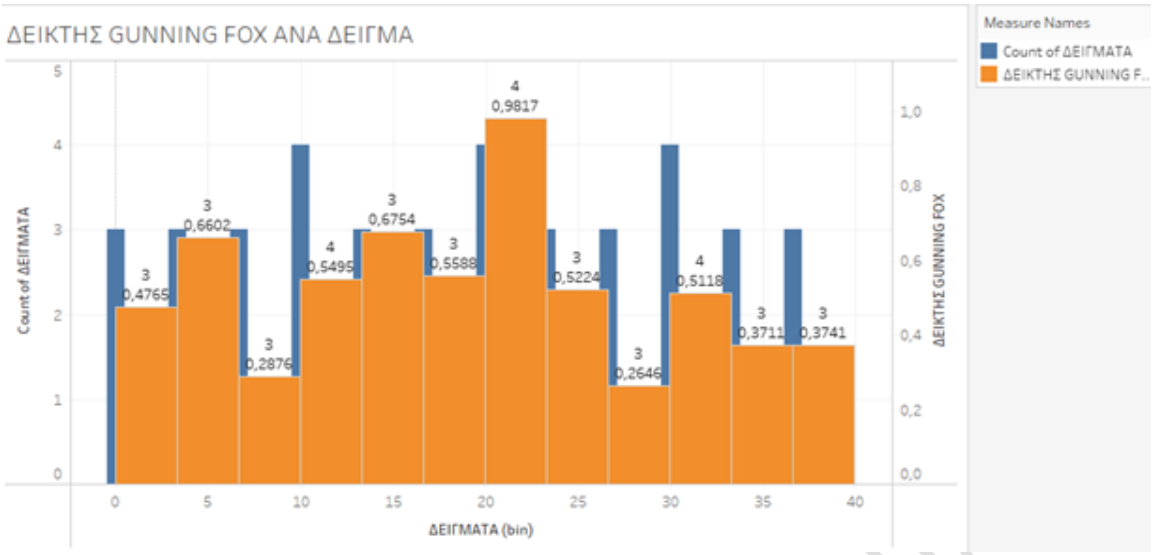
Graph 2 displays on the left that 37 samples are within the topic, while the Flesch-Kincaid ease level reaches 10.8%. This probably means that the degree of ease of Readability is high, as the lower this percentage, the more difficult the level of Readability. This result is probably due to the fact that in some samples less frequent and everyday vocabulary has been used, even monosyllabic words, which are less easy to use, instead of, for example, polysyllabic words such as the word *interessant*, which although longer, are more common. On the contrary, in the right panel, 2 off-topic samples are observed with a total ease level of 1.5%, which is also considered high in terms of the degree of difficulty of Readability of these two samples. The picture we get from the average of the characters is significant, since an amount of 472% is noted for the samples that are on-topic and 778 for the two samples that are off-topic. The average percentage of spelling errors is very significant. In 37 samples, 2.7% is displayed and two that are off-topic display 9.5%. In the majority of samples, we therefore see a lower percentage of spelling errors, while in both categories there is almost the same result in terms of the average score, i.e. approximately 3, on a scale of 1-6 based on the German grading system with grade (mark) 1 being excellent and 6 being poor.

If we suppose that these results concern a foreign student in the 2nd-5th grade of primary school, we would say that the general performance seems to be good with the exception of perhaps those two samples, where while there is a higher average of words (136%), average of syllables (184%), average of characters (778%), what perhaps influenced the final result was the fact that the two samples were off-topic. These percentages show encouraging results of the ability of a foreign student to produce sentences and texts in a language other than his native language while interacting on a daily basis in the German language, influenced by the common language, which here is German.



Graph 2: On topic (N = Yes) or off topic (O = No) by Flesch-Kincaid ease level for variables from the left to the right red bars=number of samples, blue=average of words, green=avg. of syllables, yellow=avg. of characters, purple=avg. of evaluation, pink=Flesch-Kincaid ease grade, orange=avg. of spelling errors

Regarding the Gunning Fog index (graph 3), there are 4 samples with a difficulty level of 0.98% and 0.67%, which are the highest values among 39 samples, and 3 samples present the lowest index values of 0.28% and 0.26%, probably because in these samples there were easier or even misspelled words. These results are not related to the fact that 6 samples are off-topic or have perhaps been zeroed out, but to the fact that the use of words, the number of syllables and characters is lower compared to the remaining 33 samples. However, because the majority of the samples present quite high values, we could say indicatively that the results of the research are quite satisfactory for a bilingual student at these early ages.



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173 **Graph 3:** Samples per Gunning Fog indicator

174 In graph 4, we observe in a panoramic and overall manner the percentages of the final
175 degree of difficulty, the degrees of difficulty and ease respectively to the Flesch-
176 Kincaid index and the Gunning Fog index in the 39 samples in total. The final grade
177 is quite high (18.98%), while the Flesch-Kincaid ease grade is also high (12.31%).
178 Finally, the two difficulty grades Flesch-Kincaid and Gunning Fog correspond to
179 5.06% and 6.23%, equally high for grades 2-5 of Primary School. These specific
180 results display in a more detailed way that the vocabulary used as well as the
181 grammatical phenomena of the samples represent the school classes in question and
182 give a positive impression of the student's profile.
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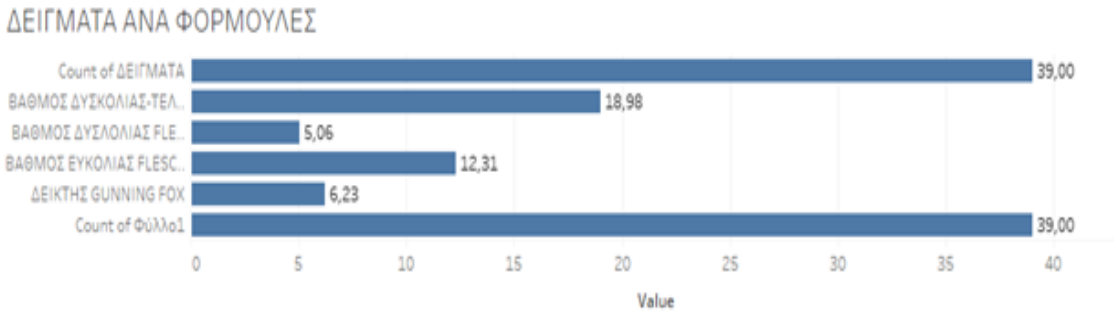

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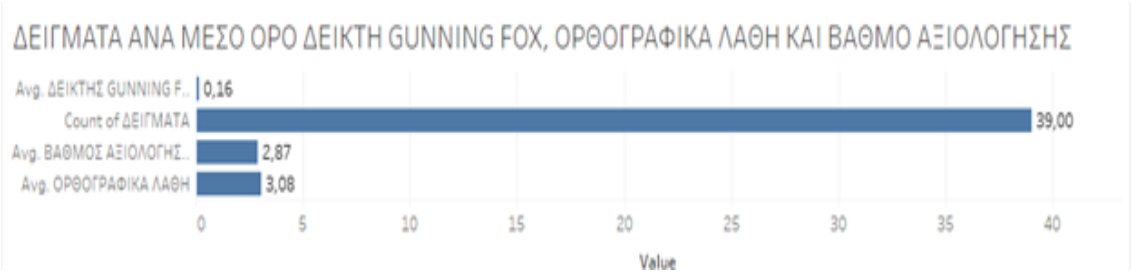
185 **Graph 4:** Samples by Readability Formulas (from the top to the bottom: total number
186 of samples, final Flesch-Kincaid Readability grade (grade of difficulty), Flesch-
187 Kincaid Readability grade (grade of difficulty), Flesch-Kincaid grade of easiness,
188 Gunning Fog Index, total number of samples
189

190 In addition to the average Gunning Fog index (0.16), graph 5 displays an average of
191 2.87 as an evaluation score and approximately 3 errors on average across the 39
192 samples. These results indicate a relative facility in the production of written texts and
193 should be acceptable in the case of a bilingual student in primary school.



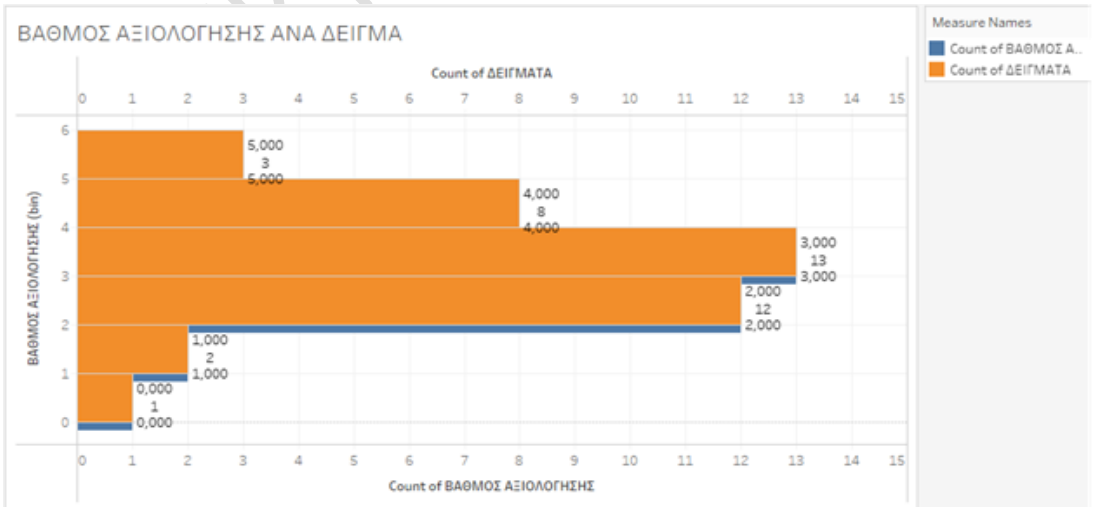
Graph 5: Samples (39) by average Gunning Fog index, avg. spelling errors and avg. rating score in the bottom (3.08)

Graph 6 displays the majority of the samples, i.e. 13, score a grade of 3 (good), which for the German educational system means quite satisfactory, while 1 sample scores a grade of 0, i.e. it was eliminated because the topic was obviously not developed at all or was off-topic.

On the other hand, 3 samples were rated with a grade of 5, which is a negative result; however, none of the 39 samples was rated with a grade of 6, which is the worst mark for the German educational system. In general, therefore, the performance appears to be quite good, with the difficulties that a bilingual student in the first grades of primary school faces.

Two samples were rated excellent (1), 8 samples were rated 4 (moderate to poor performance) and the majority of the samples were rated 2 (very good), 12 samples and 13 were rated 3 (good).

The above results partly show that there is a relatively satisfactory performance since we are referring to a bilingual student and it is also important to say that probably as the grade level increases, the degree of difficulty also increases regarding the content that must be produced during the production of written texts, which is the natural development of any student.



Graph 6: Evaluation score per sample

Conclusion

In conclusion, the following points will be mentioned:

1. Words that are of greater difficulty as they are not used frequently in the everyday life of a bilingual student and are associated with History, Biology, Geography or Religious Studies present more spelling errors such as the words *Minerralstoffe, Nerstoffe, Wiltkatze, Hun, Allmede, Flurkwang, Feldgraswirtschaft, Himalya, Atemsutzmaske, Baterie-Hanlampe, Dreleitwagen, Lindenberb, , Lebensted, Gebhatshagen.*
2. Multisyllabic words increase the level of Readability when spelling errors are not observed by bilingual students in the first grades of elementary school (*Nagetiere, Busfahrer, Löwenzahn, Sonnenblume, Hausmeister, Heimtier, Zwergkaninchen, aufmerksam, wunderbar, Backhilfsmittel, Abschleppdienst, Scheibenwischerblätter).*
3. The majority of the samples (37) are on-topic while only 2 are off-topic. This result seems to be encouraging as this is a bilingual elementary school student who may have difficulty using the most appropriate vocabulary or could lack vocabulary and comprehension of the test instructions.
4. Finally, on average, most samples appear to have a final assessment score of 2 and 3, which for the German educational system constitutes a relatively good grade in the first classes of primary school. These marks display as accepted for bilingual students at early ages and should considered as positive.

In closing, it should be noted that it is of particular priority to collect even more parameters that positively influence the degree of difficulty of the Readability of texts produced by bilingual students.

If the research is expanded to more countries or even more school classes, an international database and advanced tools for measuring the degree of Readability may be constructed, thus creating even more useful educational material for the educational community worldwide.

This, on the other hand, would perhaps improve the testing of bilingual students by contributing to more reliable assessments (Kapeta, 2020) of written production, while teachers would probably be able to use more modern tools to create more valid and reliable tests for bilingual students.

Last but not least, bilingualism can be a valuable language tool for young students, as previous studies have shown that bilingual students have developed foreign language learning capabilities while growing up in a multicultural environment.

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