Comparison of the Texts Selected from a Turkish Textbook and the Texts Produced by Artificial Intelligence Chatbots in Terms of Vocabulary[1]

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Abstract: Studies on text production by artificial intelligence are increasing. In this study, the vocabulary of five texts from different genres randomly selected from the 2nd-grade Turkish textbook and five texts on similar topics and genres written by three different artificial intelligence programs (ChatGPT 3.5, Gemini, Magic School) were examined. In the study where qualitative design was used, the data were analyzed by document analysis. The different words and types/token ratios of the texts were compared for this study. Additionally, the relationship between these variables was also examined. According to the findings of the study, while there was no obvious superiority between the texts selected from the textbook and the texts produced by ChatGPT and Magic School, it was noteworthy that the texts written by Gemini generally had the least word variety. In addition, it was determined that as the total words in the texts increased, the number of different words increased significantly, and as the total words increased, the types/token ratio decreased significantly. The findings of the study were discussed in the light of the literature.

Keywords: Artificial intelligence, vocabulary, ChatGPT, text generation, chatbot

Introduction

It is known that vocabulary is related to skills such as reading, writing, speaking, and reading comprehension (Bilge & Kalenderoğlu, 2022; Kent et al., 2014; Murphy, 2016; Quinn, 2012; Rodríguez-Aranda, 2003). Therefore, it is necessary to pay attention to the development of students' vocabulary. One of the biggest resources for improving vocabulary is textbooks (Keklik, 2011; Kuzey, 2021). Considering that some students do not have a book other than a textbook at home (Karadağ & Kurudayıoğlu, 2010), it becomes clearer how important textbooks are in teaching vocabulary.

However, studies show that a system is not followed in textbooks in terms of vocabulary, vocabulary does not increase as the grade level increases (Karadağ & Kurudayıoğlu, 2010), there are very serious differences between publishing houses (Kargın, 2019; Kayhan & Serin, 2023; Yavuz, 2020), some vocabulary elements (such as proverbs) sometimes do not find a place in the books at all (Kargın, 2019; Yavuz, 2020), textbooks are insufficient in teaching vocabulary, activities related to vocabulary teaching in textbooks are distributed irregularly between grade levels, and some types of activities are not used at all (Karagöl & Tarakçı, 2019; Yıldırım, 2006). It is known that teachers frequently use certain methods, such as using a dictionary, in vocabulary teaching activities and use others little or not at all (Uçar, 2012; Uğur, 2014). As a result, it was determined that the majority of students understood the vocabulary elements in the textbooks at a "medium" or "low" level (Ceran & Çoban, 2017). Therefore, it is recommended that educational materials should be organized to develop students' vocabulary (Karadağ & Kurudayıoğlu, 2010), and if necessary, special texts should be written according to the students' levels by special commissions (Altaş, 2023).

Students need to encounter words more than once in order to develop their vocabulary (Karadağ, 2013). For this reason, it may be useful to repeatedly present the words that need to be taught in the

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classroom. For this concern, the National Reading Panel (2000) recommends that words be taught both repeatedly and in different contexts. However, it is seen that the repetition rate of some words in textbooks is very low. For example, it has been determined that 50% of the words in the texts of the first to fifth-grade Turkish textbooks are mentioned only once in relevant textbooks (Karadağ & Kurudayıoğlu, 2010). Therefore, teachers need to spend extra time for teaching vocabulary. Unfortunately, it is known that teachers do not even prefer to use vocabulary teaching methods that require more time, due to lack of time (Uğur, 2014). For this reason, it does not seem possible to search for additional resources for teachers to teach vocabulary repeatedly and in different contexts, as recommended by the National Reading Panel (2000). Instead, it may be possible to print text in a short time using artificial intelligence. Considering that teachers need an assistant due to their high course load (Demir Dülger & Gümüşeli, 2023), it is important to determine to what extent artificial intelligence can meet the need for text finding in vocabulary teaching. In this regard, the question of the research was shaped as follows:

What is the distribution of vocabulary (number of different words and types/token ratio) in the texts selected from the 2nd-grade Turkish textbook and generated with three different chatbots?

Literature Review

Vocabulary and Textbook

Some national reports (National Reading Panel, 2000) provide information on how important vocabulary is for students' academic success. Although all field courses have responsibility for developing vocabulary, it is known that the main burden is on native language courses (Ceran & Çoban, 2017). The most important material for native language lessons is considered as textbook (Keklik, 2011; Köroğlu & Balcı, 2022; Kuzey, 2021; Uğur, 2014). As a matter of fact, it is stated that the texts in textbooks are very important in improving vocabulary (Demir, 2016).

However, using textbooks has significant disadvantages. Studies have shown that teachers think that textbooks harm teachers' creativity (Kara Özkan, 2021), that the books are not suitable for students, that they are insufficient in terms of subject matter (Özmantar et al., 2017), that students like auxiliary resources more, and that textbooks are boring (Taş & Minaz, 2018). In addition, since the textbooks are uniform, they have limitations regarding the different levels of students in the target audience (Coşkun & Taş, 2008).

In addition to these negativities, textbooks also have significant disadvantages in terms of vocabulary and vocabulary teaching methods and techniques. It is known that in some textbooks, 50% of the words are mentioned only once (Karadağ & Kurudayıoğlu, 2010). However, according to the National Reading Panel (2000), words need to be shown repeatedly to develop vocabulary. Some vocabulary teaching methods and techniques are not included in the books at all, while some have a frequency of more than 30 (Karagöl & Tarakçı, 2019). It has been stated that vocabulary teaching methods and techniques are not distributed equally in books published by different publishing houses, some methods and techniques are included very frequently and this may be boring for students, and the methods and techniques are aimed at short-term perceptual memory (Dilidüzgün, 2014; Sarıca, 2014; Yıldırım, 2006). However, studies are showing that entertaining teaching methods are more effective (Gülsoy & Uçgun, 2013; Varışoğlu et al., 2014). It is also stated that teachers do not vary their vocabulary teaching methods and this is likely to result in students getting bored (Uçar, 2012). The fact that textbook authors choose texts by adhering to internet sources rather than printed sources (Tekşan et al., 2023) indicates that there are problems even in the preparation process of textbooks. From this perspective, it becomes clear that there is no systematic process for the development of vocabulary in textbooks.

It is emphasized that there are significant differences in terms of vocabulary in Turkish textbooks published by different publishing houses (Kargın, 2019; Kayhan & Serin, 2023; Yavuz, 2020). It is very striking that in some studies, the vocabulary in the mother tongue textbooks of the Ministry of National Education is significantly behind those published by private publishing houses (Apaydın, 2010; Çeçen et al., 2014; Gökçe, 2014; Turhan, 2010; Uludağ, 2010). There seems to be no systematic increase in vocabulary as the grade level increases in native language textbooks (Büyükhellaç, 2014; Karadağ & Kurudayıoğlu, 2010; Sayın & Doğan, 2023; Uluçay, 2011), and some of the vocabulary

elements (such as proverbs) are not included at all or are not included enough. Giving little space (Apaydın, 2010; Gündoğdu, 2012; Kuzey, 2021; Turhan, 2010; Uludağ, 2010) and insufficient types/token ratio (Bayburtlu, 2020) are among the important limitations of textbooks regarding vocabulary teaching. According to the studies, the fact that students have various problems learning the words in textbooks (Dilidüzgün, 2014; Murat, 2014) reveals the inadequacy of textbooks. In this respect, it can be predicted that textbooks will be inadequate in improving vocabulary.

Despite the many disadvantages of textbooks, it has been found that teachers use textbooks very frequently in lessons (Köroğlu & Balcı, 2022). It is known that teachers are not aware of vocabulary teaching methods and techniques that are not included in textbooks, do not prefer time-consuming vocabulary teaching methods, and prefer easily applicable activities in textbooks (Uğur, 2014). However, they may turn to different resources for different students in terms of academic success (Kara Özkan, 2021). Therefore, it is understood that other resources should be used in addition to textbooks to develop students' vocabulary in native language courses. It is not recommended to use textbooks as the sole source (Coşkun & Taş, 2008).

Artificial Intelligence and Education

Artificial intelligence, which has a great impact on almost every field of humanity, has also rapidly shown its impact in the field of education. Research focuses on how artificial intelligence can be used in education and what its effects may be. Various concerns are also expressed in this regard, although not as much as the possible contributions of artificial intelligence. Among these concerns, issues such as artificial intelligence may be biased towards learners by learning prejudices, not taking creativity into account when evaluation is made, not being able to replace humans because it has no emotions, and providing incorrect/incomplete information to the questions asked (Demir Dülger & Gümüşeli, 2023; Şenocak, 2020; Yalçın-Çelik & Çoban, 2023). Despite these concerns, it is an undeniable fact that there are many positive aspects of artificial intelligence in education.

Designing personalized training thanks to artificial intelligence (Alkayış, 2021), giving rapid feedback to students, (Şenocak, 2020), and providing economy in education by reducing material purchasing, saving time, and reducing the workload of educators (Demir Dülger & Gümüşeli, 2023; Şenocak, 2020) are of great importance. It is stated that artificial intelligence is useful even in areas such as measurement and evaluation (Sarıoğlu, 2023). Considering that the number of institutions providing artificial intelligence-supported education is increasing (Alkayış, 2021), it can be stated that it is appropriate to include competencies and needs related to artificial intelligence in teacher qualifications (Göker, 2021; Sezer, 2022). Therefore, studies on how useful artificial intelligence can be in education are increasing.

One of the areas of education where artificial intelligence is most frequently used is language learning. Studies are showing that artificial intelligence is very useful in language learning (Çınar Yağcı & Aydın Yıldız, 2023). Artificial intelligence has positive aspects such as giving quick feedback to the foreign language learner, making explanations, and making translations between languages (Şenyaman, 2023). However, it is still far from perfect. In the studies, important findings such as artificial intelligence not being able to understand some information in the target language (Şenyaman, 2023), giving inadequate answers about the cultural context, sometimes adding expressions of its own, changing sentence structures while translating, experiencing subject-object confusion (Yıkar, 2023), using sentences that may be above the level of new language learners, not being able to recognize some mistakes and comprehension-based mistakes made by foreign language learners, and making serious mistakes in preparing practice questions (Zileli, 2023) were included. Hence, it can be concluded that there is a relationship between text type and text quality in text-based studies carried out through artificial intelligence applications.

Since texts occupy an important place within the scope of language learning, it is necessary to investigate the success of artificial intelligence in text production. Because artificial intelligence is based on algorithms, it is stated that the only field it cannot master is literature, but new studies show that this problem can be overcome (Aydoğdu Çelik, 2023). For instance, discussions about artificial intelligence's academic text production still continue (Çınar Yağcı & Aydın Yıldız, 2023). It is known

that artificial intelligence has many deficiencies and mistakes in writing an informative text. However, it can show varying performances in other text types.

It is noteworthy that studies show that artificial intelligence can produce text suitable for the target audience (Güzeldemirci, 2024). Although it is seen that artificial intelligence generally complies with the technical features in literary genres, respects the formal features in genres such as poetry, and can use the images of some literary movements, the texts produced by artificial intelligence are criticized for being too mechanical, not capturing the cultural context, having inadequate language and style, sometimes being insufficient in content, and lacking human depth and figurative language (Aydoğdu Çelik, 2023; Yazbahar, 2023; Yıkar, 2023). Despite these criticisms, the rapid progress of developments in the field of artificial intelligence supports the idea that many problems will be overcome and more qualified texts will be produced in the near future.

Method

In this study, words in five texts selected from the 2nd-grade Turkish textbook published by the Ministry of National Education of the Republic of Turkey (Muştu & Karahisar, 2023) were examined. In addition, the words in the texts produced by ChatGPT, Gemini, and Magic School were also examined. Therefore, the vocabulary variables of texts from four different sources were compared. Therefore, a qualitative research method was preferred in this study and document analysis was conducted. Document analysis are the examination of the content of all kinds of documents (Fraenkel et al., 2012). This study aimed to reveal which source is richer in terms of vocabulary, based on the vocabulary data in the texts obtained from four different sources.

Data Collection Tools

In this study, the 2nd-grade Turkish textbook (Muştu & Karahisar, 2023), ChatGPT (3.5), Gemini, and Magic School artificial intelligence applications were used as data collection tools. The texts selected from the textbook were chosen randomly. The texts are a 219-word narrative text called "Ata'nın Yaşamı"; An informative text called "Tombik" (143 words); An informative text called "Şenşakrak Doğayı Anlatıyor" (192 words); A poem called "Vücudumu tanıyorum" (66 words) and a theater text of Karagöz and Hacivat called "Mektup" (320 words). ChatGPT (3.5), Gemini, and Magic School were preferred to write similar texts. These applications are preferred because ChatGPT and Gemini are among the most well-known artificial intelligence programs and have free versions. Magic School, on the other hand, was preferred because it is specific to education and because it can introduce texts and imitate these texts in its free version. Thus, it was aimed to evaluate the outputs of free and widely known artificial intelligence chatbots that teachers can easily choose.

The commands were given to each artificial intelligence application to write similar texts selected from the textbook in terms of genre, subject, and total number of words. The process for giving commands is explained below.

Process of Printing Texts in Artificial Intelligence Chatbots

Text Writing Process in ChatGPT and Gemini

In this study, ChatGPT 3.5 and the free version of Gemini were used. ChatGPT and Gemini were first asked if they could write a text for primary school students. Both apps generated texts directly instead of saying "Yes, I can generate." They were asked what criteria were used in the texts they generated. GPT responded by providing simple language use, visual images, segmentation, relevant and child-friendly subject matter, and emotional and motivating tone, while Gemini responded by providing a target audience, reading and comprehension skills, the concept of friendship, text type, and some additional information. When asked what other criteria were taken into consideration, ChatGPT stated the following criteria: "selection of language appropriate to the age group, fun and interactive learning, compliance with educational standards, security and harmony, encouraging student participation". Gemini listed features such as education program, developmental features, values education, diversity, and visuality. Following this answer, they were asked whether they would be able to create appropriate text if they were told the conditions the Ministry of National Education of Türkiye was looking for in their textbooks. When they said they could create it, the articles in the relevant regulation (M.N.E., 2023) were introduced to both chatbots. In the next step, the outcomes related to reading skills were

introduced in the 2nd-grade Turkish course outcomes (M.N.E, 2019) and they were asked to create texts accordingly. In creating the texts, the relevant texts were not introduced to the applications. The subject, type, and number of words of the relevant text taken from the book were given in the command. For example, commands were given such as "Write an informative text consisting of 200 words about nature." Thus, it was ensured that the texts were quite similar to the M.E.B. text in terms of their features.

Magic School

Unlike other chatbots, Magic School is education-specific and can rewrite content for different reading levels (AI Tools for Education, 2023). Although ChatGPT and Gemini also have this feature, text definition could not be done since they do not work with the free version. In Magic School, since the text can be introduced in the free version, it was preferred to introduce the text in the textbook. Hence, during the text production process at Magic School, the texts in the Ministry of National Education of Türkiye (M.N.E.) book were copied and the command was asked to rewrite the text with the same number of words in the original text.

Analysis of Data

Texts obtained from four different sources were first transferred to Word. Then, based on the Turkish Language Association dictionary (Turkish Language Association, 2023), inflectional suffixes of words were extracted and the words converted into root or stem forms. These lists were then analyzed with the Simple Concordance program. Three variables were obtained in the vocabulary: total number of words, number of different words, and types/token ratio. The numbers for these variables were obtained from the Simple Concordance program.

Descriptive statistics were primarily included in the analysis of the data. Then, Spearman-Brown analysis was performed to look at the correlation between the variables of vocabulary. SPSS was used to analyze the data.

Findings

In this part of the study, findings regarding vocabulary are included.

Table 1 gives the descriptive statistics results of the total number of words, number of different words and types/token results in all texts.

Table 1.
Descriptive Statistics for the texts

		Total Words	Different Words	Types/Token
Atatürk (Narrative)	M.N.E	191	122	0.6387
	ChatGPT 3.5	180	105	0.5833
	Gemini	173	95	0.6262
	Magic School	198	124	0.5491
Nine Stone (Informative)	M.N.E	137	81	0.5912
	ChatGPT 3.5	131	81	0.6183
	Gemini	159	67	0.4219
	Magic School	129	76	0.5891
Nature (Informative)	M.N.E	174	114	0.6550
	ChatGPT 3.5	171	116	0.6744
	Gemini	173	121	0.6994
	Magic School	185	117	0.6324
Body (Poem)	M.N.E	62	57	0.9193
	ChatGPT 3.5	61	54	0.8852
	Gemini	63	48	0.7619
	Magic School	69	63	0.9130
Karagöz and Hacivat (Theatre)	M.N.E	320	150	0.4687
	ChatGPT 3.5	319	161	0.5047
	Gemini	297	111	0.3737
	Magic School	243	156	0.6420

According to Table 1, the most different words in Atatürk's text belongs to Magic School (124), M.N.E. (122), ChatGPT (105), and Gemini (95). The range between the texts with the most and least "different words" is 29 words. In terms of types/token ratio, M.N.E. comes first, followed by Gemini, ChatGPT, and Magic School.

While M.N.E and ChatGPT share the first place in the number of different words in the Nine Stones text, Magic School is in the third place and Gemini is in the last place. The range of different word variables in the Nine Stones is 14 words. Considering the types/token ratios, ChatGPT is in the first place, followed by M.N.E., Magic School, and Gemini.

Gemini, Magic School, ChatGPT, and M.N.E. have the highest number of different words in the Nature text, respectively. The different word range in the Nature text is 7. In the types/tokens ratio, Gemini, ChatGPT, M.N.E. and Magic School are in order.

The ones that use the most different words in the Body poem are Magic School, M.N.E., ChatGPT, and Gemini, respectively. The range between different words in this text is 15. The ranking in types/token ratio is M.N.E., Magic School, ChatGPT, and Gemini.

The most different words in the Karagöz and Hacivat text are ChatGPT, Magic School, M.N.E. and Gemini included. The range between different words is 50 words in this text. The ones with the highest types/token ratio are Magic School, ChatGPT, M.N.E., and Gemini.

Graph 1 shows the change in the total number of words in all texts according to the source of the text.
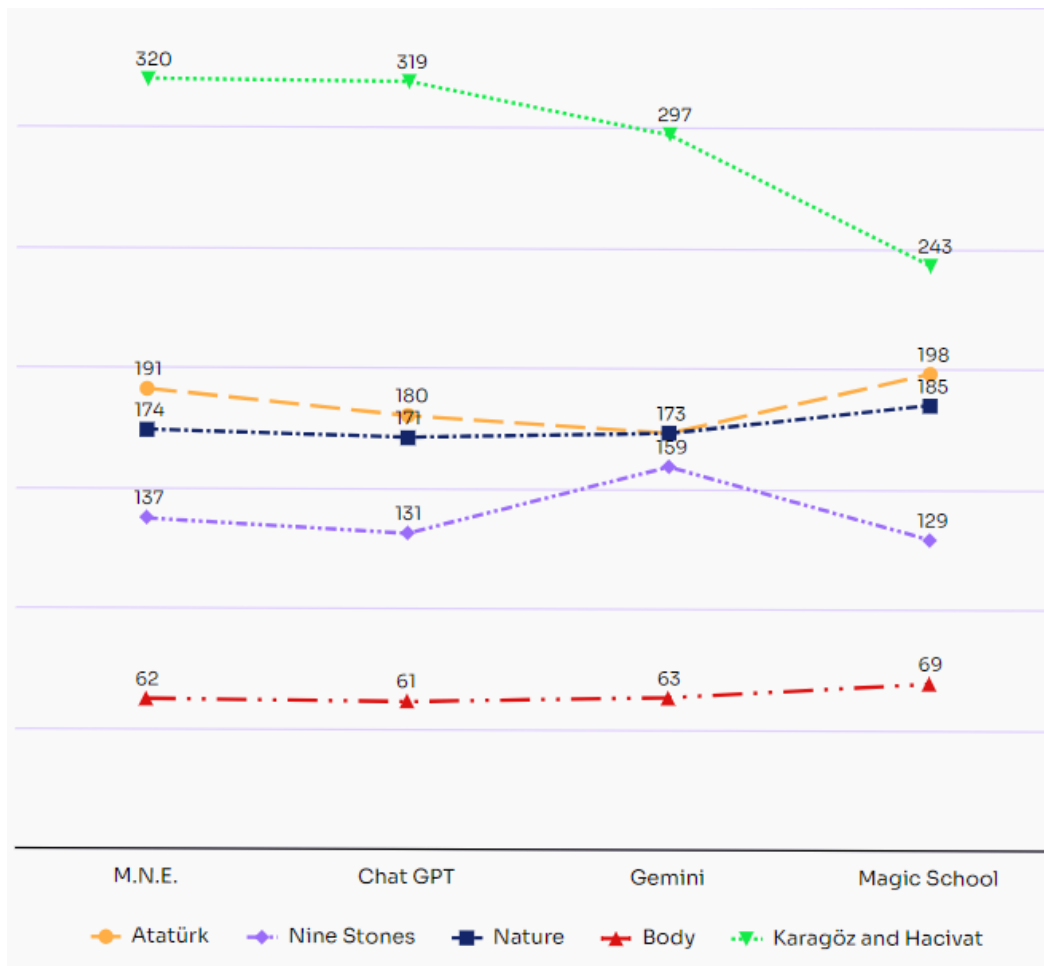
Graph 1. Total words of texts

Graph 1 indicates that the most total words are included in the Karagöz and Hacivat texts (243-320 words). It is noteworthy that Magic School has produced a very short text in this text. While the total

number of words in the Atatürk text varies between 173-198, it varies between 171-185 in the Nature text, 129-159 in the Nine Stones text, and 61-69 in the Body text.

Graph 2 shows different word numbers in the texts.

Graph 2. Different words of all texts

According to Graph 2, the most different number of words in the Karagöz and Hacivat text is in ChatGPT (161 words). It is followed by Magic School (156) and M.N.E. Gemini, on the other hand, is far behind according to other sources (111). Magic School (124) has the most different words in Atatürk's text, followed by M.N.E (122), ChatGPT (105) and Gemini (95). In the Nature, the most diverse number of words is in Gemini (121), followed by Magic School (117), ChatGPT (116), and M.N.E (114). In the text of Nine Stones, M.N.E. and ChatGPT ranked first with 81 words each, while Magic School (76) ranked the second. Gemini came last again (67 words). In the poem Body, Magic School (63) ranks first, followed by M.N.E. (57), ChatGPT (54) and Gemini (48).

Graph 3 shows the types/token ratios of the texts.
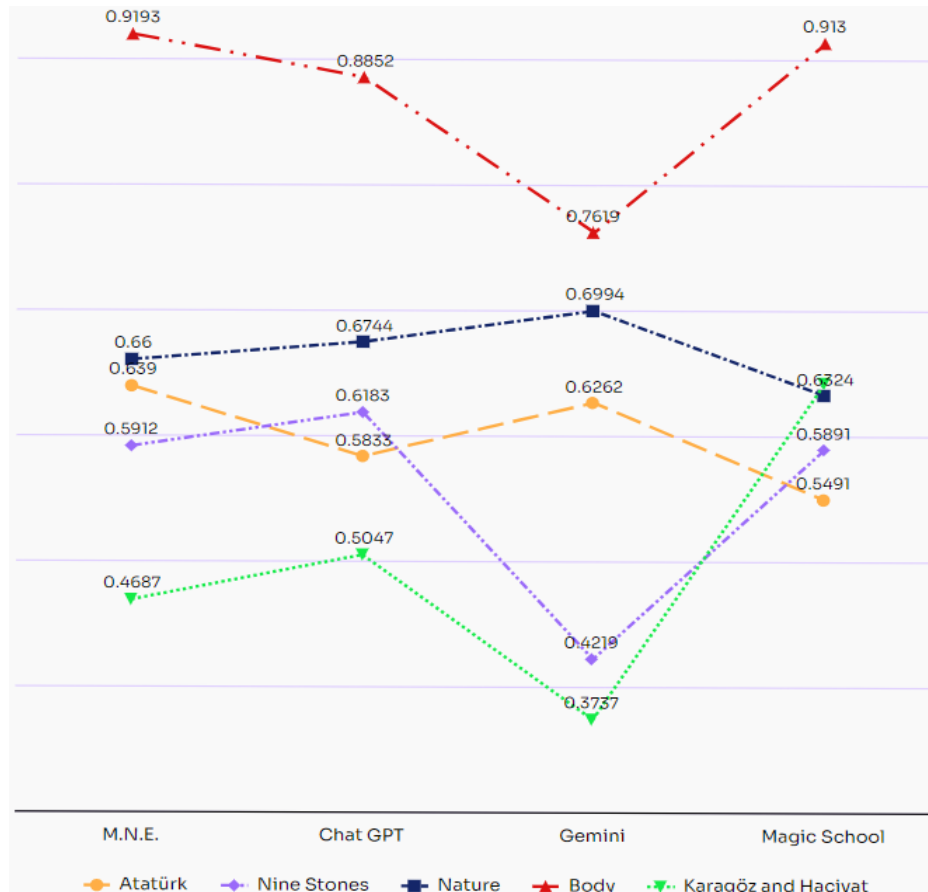
Graph 3. Types/token ratios of all texts

Graph 3 shows that the poem Body has the highest types/token ratio, followed by the text Nature. Then comes the Atatürk, the Nine stones, and the Karagöz and Hacivat text, respectively. When the results are analysed according to the sources of the texts, the findings are as follows: In the Body text, M.N.E. has the highest different word rate (0.9193), followed by Magic School (0.913), ChatGPT (0.8852) and Gemini (0.7619). The highest rates in the Nature text are Gemini (0.6994), ChatGPT (0.6744), M.N.E. (0.66), and Magic School (0.6324). The highest rates in Ataturk's text are respectively M.N.E. (0.639), Gemini (0.6262), ChatGPT (0.5833), and Magic School (0.5491). The highest rates in the Nine Stones text are ChatGPT (0.6183), M.N.E. (0.5912), Magic School (0.5891), and Gemini (0.4219). The highest rates in the Karagöz and Hacivat text are respectively Magic School (0.642), ChatGPT (0.5047), M.N.E. (0.4687), and Gemini (0.3737).

Table 2 shows the correlation results between the total number of words in all sources, the number of different words, and types/token ratios.

Table 2.
The correlations between variables of vocabularies of all texts together

	Total words	Different words	Types/token
Total words	X		
Different Words	.905*	X	
Types/token	-.626**	-.392	X

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

Table 2 indicates that when the total number of texts increases, the number of different words also increases at a very high rate ($r=905$, $p<.05$). However, as the total number of words increases, the ratio of different words to the total word decreases significantly ($r=-.626$, $p<.05$). There was no significant correlation between different words and types/token ratio in all texts ($r=-392$, $p>.05$).

Discussion

The aim of this study is to compare the vocabulary variables (total words, number of different words, types/token ratio) of five different texts selected from the second grade Turkish textbook published by the Ministry of National Education and artificial intelligence robots (ChatGPT 3.5, Gemini and Magic School) on the same subject and type. The study was conducted in quantitative desing and the data of second grade texts obtained from four different sources (M.N.E., ChatGPT, Gemini and Magic School) were presented in terms of their diversity in vocabulary. In this part of the study, the limitations of the study, interpretations of the findings and suggestions are included.

Interpretations of Main Findings

Since it was not deemed necessary to compare total word counts in the study, only descriptive statistics of different word counts and types/token ratios were discussed. In the text titled "Atatürk", Magic School ranked first in the number of different words, followed by M.N.E, ChatGPT and Gemini. In Atatürk's text, range was 29 words. In types/token ratio in Atatürk, M.N.E. was first, followed by Gemini, ChatGPT and Magic School. In the text named Nine Stone, M.N.E and ChatGPT took first place in different word counts, followed by Magic School and Gemini, respectively. The range of this text was 14. In the types/token ratio, ChatGPT was first, followed by M.N.E., Magic School and Gemini, respectively.

In the informative text called Nature, Gemini came first in terms of different word counts, Magic School came second, ChatGPT came third, and M.N.E. was in fourth place. Range was seven words. In types/token ratio, Gemini was first, followed by ChatGPT, M.N.E. and Magic School.

In the poem titled Body, Magic School ranked first in the number of different words, followed by M.N.E., ChatGPT and Gemini. The rank is 15. M.N.E. ranked first in the types/token ratio, followed by Magic School, ChatGPT and Gemini. In the Karagöz and Hacivat theater texts, ChatGPT ranked first in different word counts, Magic School ranked second, and M.N.E. came third and Gemini came fourth. Range was 50 words. In types/token ratio, Magic School ranked first, followed by ChatGPT, M.N.E and Gemini.

Overall, Magic School and ChatGPT ranked first two times in different words, while M.N.E. and Gemini ranked once. Magic School took the top two ranks in terms of different word count four times, M.N.E. three times, ChatGPT twice, and Gemini once. When the latest rankings are analyzed, M.N.E. came in last once, and Gemini ranked last four times. ChatGPT and Magic School have never been last.

In the types/token ratio, M.N.E. had the first rank twice, while others had the first rank once each. M.N.E. and ChatGPT ranked in the top two three times, while Magic School and Gemini ranked in the top two twice each. M.N.E. and ChatGPT have never been last, while Magic School has been last twice. Gemini has been in last place three times.

Based on these results, it can be interpreted that Magic School is one step ahead in different word counts. This is because it has appeared in the top two four times. Then come the original texts in M.N.E. However, these comments are far from definitive because Magic School came last twice in the types/token ratio. This can be interpreted as Magic School repeating words more frequently than ChatGPT and M.N.E.

ChatGPT and M.N.E. took the top two places in the types/token ratio three times each, while Magic School was in the top two twice. Considered as a whole, it seems difficult to make a definitive comment about which of M.N.E., ChatGPT and Magic School is better. However, a definitive comment is that Gemini generally lags behind other artificial intelligence robots and M.N.E. The fact that it is mostly last in both the number of different words and the types/token ratio shows that Gemini is weaker in terms of vocabulary in creating Turkish text.

This closeness found in this study has also been detected in different studies on different subjects. In a study comparing ChatGPT 3.5 and Bard according to their answers to questions prepared according to Bloom's taxonomy, it was observed that the two chatbots scored 35 and 38 points out of 60 (Yalçın-Çelik & Çoban, 2023). The fact that the difference is not high can be interpreted as artificial intelligence robots producing similar outputs to each other.

In general, there are study findings that artificial intelligence can be used in language teaching. As an example, some studies conclude that the vocabulary of foreign language learners can be improved by using artificial intelligence (Şenyaman, 2023). In a study on the use of artificial intelligence in teaching Turkish as a foreign language (Zileli, 2023), it was found that ChatGPT could find technical word errors, but could not find incorrect word usage caused by the context. Similarly, in a study on the usability of artificial intelligence in the Persian-Turkish context (Yıkar, 2023), it was determined that artificial intelligence could provide successful results, but made mistakes in some words and had various limitations. Therefore, at least for now, it seems necessary to use artificial intelligence chatbots as an assistant and make the necessary checks instead of completely trusting them to produce texts for courses. It is also noticeable that artificial intelligence has problems in counting words. Although some studies indicate that artificial intelligence can be used in measurement and evaluation (Sarıoğlu, 2023), it is noteworthy that in this study, errors are constantly encountered even in a simple word count. This leads to the conclusion that artificial intelligence still has a long way to go in language learning. However, it is possible for teachers, especially those who are short of time, to use artificial intelligence robots.

In the study, the correlation between the variables of the vocabulary of the texts was also examined. In this respect, the correlations between the total words, different words and types/token ratios in the texts were examined. As a result, as the total number of words increases, the number of different words also increases perfectly, and 81.9% of the variance in this increase is explained by this correlation. It was determined that the types/token ratio also decreased significantly and the variance explanation rate was 39.2%. The correlation between the number of different words and types/token ratio was not significant. These findings regarding vocabulary variables coincide with the findings in the study conducted with Turkish students and students learning Turkish as a foreign language. In a study conducted on students learning Turkish as a foreign language, it was observed that as the total number of words increases, the number of different words increases significantly, there is a high positive correlation between the total and the word diversity rate, and there is no significant correlation between the number of different words and the word diversity rate (Bilge & Demirel, 2022). A similar finding was found in another study on students learning Turkish as a foreign language (Göçen, 2016) and students learning Turkish as their native language (Temur, 2006). Therefore, the relationships between vocabulary variables in texts produced by artificial intelligence are parallel to the relationships between vocabulary variables in texts produced by humans.

Conclusions

The study results show that artificial intelligence robots can be used in vocabulary teaching, but expert control is required. Since students need to encounter words repeatedly in different contexts in developing vocabulary (National Reading Panel, 2000), it is possible for teachers to present these words to students through texts produced in artificial intelligence instead of finding them from different sources. In particular, the fact that teachers prefer fast vocabulary teaching methods because they are short of time (Uğur, 2014) and that half of the words in the textbooks are mentioned only once in the relevant book (Karadağ & Kurudayıoğlu, 2010) may further encourage the use of artificial intelligence robots. The quality and original content can be produced quickly by using artificial intelligence and that it will be more economical in terms of time and effort than producing these contents without artificial intelligence (Güzeldemirci, 2024). However, it should be taken into consideration that artificial intelligence robots have significant limitations in this regard. One of these is that artificial intelligence robots cannot determine the correct number even in word counting. Although the study attempted to adjust the number of words in the commands given to artificial intelligence robots, the desired result was not achieved. Artificial intelligence robots generally produced texts with far fewer words than desired. Therefore, artificial intelligence chatbots were repeatedly commanded to increase or decrease the number of words. This is also a time-consuming process.

Another problem of artificial intelligence robots is the mechanical texture of texts. In some studies, it is stated that although artificial intelligence robots produce text suitable for the desired literary forms, they are weak in terms of language and style (Aydoğdu Çelik, 2023; Yazbahar, 2023). It is an important finding that cultural contexts are not taken into account, especially in literary texts (Yıkar,

2023). In the texts produced by artificial intelligence, it is sometimes very easy to understand that the texts are not human-made. In this study, only word counts were taken into account, but the content of the texts was not mentioned. It should be mentioned here that the texts were produced with poor content and that the results were not suitable for the desired genre. For example, in the text of Karagöz and Hacivat, there is no "funny humor resulting from misunderstanding" in the traditional sense. This may cause students to misunderstand the type of text and get bored. Therefore, significant content-related arrangements are required in text production in chatbots. It is stated that the narrative can be strengthened with support from artificial intelligence (Anadolu, 2019). However, considering that artificial intelligence does not approach texts like humans and makes evaluations based on a number of patterns (Şenocak, 2020), it may be necessary to make improvements with various commands to be given to artificial intelligence, and even the person who wants to produce the text can make additions and deletions. Thus, especially for teachers, it may be possible to produce texts in a shorter time instead of searching for texts by reading from different sources. Here, perhaps printing texts such as stories, poems and informative texts rather than culture-specific texts may yield more consistent results. Because it has been determined that artificial intelligence robots can make serious mistakes when cultural issues come into play (Çınar Yağcı & Aydın Yıldız, 2023; Yıkar, 2023).

Another problem that is likely to be encountered in text production using artificial intelligence robots is the accuracy of the information in the texts. Artificial intelligence includes incorrect information in the answers they give to questions (Yalçın-Çelik & Çoban, 2023). One of the ways to overcome this may be to keep the texts short (Zileli, 2023). Errors are less likely to occur in shorter texts. In addition, teacher control and editing of texts are the most important ways to minimize errors.

Recommendations

Based on the study, it is possible to make some suggestions to teachers and researchers. First of all, it is possible for teachers to use artificial intelligence robots in teaching vocabulary, but it may be recommended that they make changes to the texts to reduce the lack of emotion and mechanicalness in the texts written by artificial intelligence. Thus, artificial intelligence can be used as an assistant that provides a template to the teacher rather than producing the text. Otherwise, since artificial intelligence will produce literary text based only on form, a text processing process suitable for the achievements in language lessons may be disrupted.

Researchers can investigate how to obtain data from texts at different grade levels. In fact, studies can provide important ideas on how the vocabulary are to change as the grade level increases. In addition, studies on how accurately and frequently vocabulary elements (proverbs, idioms, terms, reduplications, etc.) are used in artificial intelligence are also considered important.

In this study, free versions of artificial intelligence robots were used. In addition, only texts produced by three artificial intelligence robots and obtained from MNE were used. There is a need for studies based on the comparison of different artificial intelligence robots, paid versions of these robots, and texts in textbooks from different publishing houses. In addition, texts should be examined not only in terms of vocabulary but also in other aspects (fluency, consistency, cohesion, suitability for the level, etc.).

In future studies, it is recommended that researchers conduct studies to determine how the data is after training the artificial intelligence on different text types and vocabulary. Investigating ways for artificial intelligence robots to reach maximum vocabulary diversity can help teachers find more qualified texts.

Limitations

The findings in this study should be interpreted considering several limitations. Firstly, it is almost impossible to make artificial intelligence robots write texts with the same word count as the word count in the texts in M.N.E. Achieving the precise word count specified poses a considerable challenge for artificial intelligence systems. Moreover, these systems often encounter significant difficulties in producing text that approximates the desired word count. Especially as the number of words increases, the difference between the number of words desired in the text and the number of words in the texts written by artificial intelligence has begun to increase significantly. Therefore, there may be

undesirable biases, especially in different word counts and types/token ratio. The reason for this is that an increase in the total number of words in the produced text is associated with a positive increase in the number of different words and a negative increase in the types/token ratio (see Table 2). Continuous repetition of commands were made to maintain the word count. The data is not based on the first printed text. Because there were times when the number of words in the text was much lower or higher than expected. This could have caused serious biases in the types/token and different words data. This should also be noted as an important limitation.

The second important limitation of the study is that only the vocabulary of the texts was examined. Consistency, quality, fluency, suitability for grade level, etc. of the content of the texts have been ignored. The study focused only on vocabulary variables of the texts.

Another limitation is that since the texts of the chat robots in the study were in Turkish, no inferences could be made regarding the results in different languages.

It should also be taken into consideration that there are no texts from the books of different chatbots and publishing houses other than M.N.E.; that the texts selected from M.N.E. are limited to 5 texts and selected genres, and that they are limited to second grade texts only. Considering that M.N.E. is behind the books of private publishing houses in terms of vocabulary in some studies (Çeçen et al., 2014; Uludağ, 2010), the cases where artificial intelligence robots have higher data than M.N.E. in this study may be invalid in other publishing houses.

In the study, artificial intelligence robots were not given a command to increase word diversity. They were asked to write texts only in accordance with the required conditions (level of students, achievements, etc.). Therefore, the texts received from artificial intelligence robots are texts that are not specifically printed for vocabulary diversity.

The text type selected from M.N.E. in the study is one story, two informative texts, one poem and one theater text. The lack of different text types is another limitation of the study.

Free versions of artificial intelligence robots were used in the study. It should be taken into consideration that the data may differ in paid versions.

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