

Readability Of Higher Education Institutions Exam Basic Proficiency Test Turkish Questions

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ABSTRACT

Readability is a measurable quantitative feature of texts. Readability gives information about how easy or difficult a text is to read. This information can help decide appropriate texts for courses and exams. There are 3 formulas, called Ateşman, Çetinkaya-Uzun, and Bezirci-Yılmaz, which are widely used in determining the readability of Turkish texts. The purpose of this study is to determine the readability of the Turkish questions in the Higher Education Institutions Exam, the Basic Proficiency Test conducted between 2019-2023 with Ateşman and Bezirci-Yılmaz formulas. The dataset consists of a total of 200 questions, 40 from each year, asked between 2019 and 2023. According to the findings, it was revealed that both formulas used in the study were consistent and the readability levels of the formulas were similar. According to the used formulas, it was observed that the questions in 2019 were the easiest and the test questions in 2021 were the most difficult to read. It has been determined that the number of questions in question types varies over the years, phonics questions are the question type with the easiest, and questions related to sentence meaning are the most difficult readability level. It was concluded that the questions were mainly at the difficult level according to the Ateşman formula, and at the academic level according to the Bezirci-Yılmaz formula.

Statement of Publication Ethics

This study was conducted in accordance with scientific publication ethics. Ethics Committee Decision is not required for this study.

Authors' Contribution Rate

Both authors were equally involved in the literature review, data collection, data analysis, and reporting stages.

Conflict of Interest

The authors declare that this study has no conflict of interest.

Reference

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Introduction

Education finds its place in every stage of human life, whether in formal educational institutions or outside of these institutions. First, the individual must be mentally prepared, willing, and feel the need to learn and adapt to the situations. Measurement and evaluation are carried out as a result of the education process provided in formal educational institutions. In a study conducted approximately fifty years ago, Deale (1975) defined evaluation as a term covering everything done by the individual's teacher or others at every stage of life regarding what they have learned. It is possible to say that measurement and evaluation can have different forms and different purposes. Şimşek (2000) stated that evaluation can be done formally in the form of classical exams and tests; and informally in the form of mutual conversations and discussions. The quality, validity, and reliability of the evaluations made, the nature of the subject or information to be measured, the purpose and requirements in measurement, the methods that can be used in measurement and evaluation, and the positive and negative aspects of these methods have made it necessary to consider measurement and evaluation as an important issue to be taken into consideration when preparing measurement tools.

Measurement and evaluation activities in education are important tools that enable understanding the gains students have gained during the process, taking steps to improve or support the process by evaluating the education-training process, and re-evaluating the materials or methods used. Measurement and evaluation should be carried out in order to monitor the learning process, evaluate student performance, improve the teaching process, increase student motivation, evaluate program effectiveness, and ensure equality and justice. Measurement and evaluation, which has an important role in education, provide teachers, administrators, and policymakers with valuable information about student performance. This information helps students to be supported more effectively and to continuously improve the education system.

Büyüköztürk (2016) stated that the purpose of the central exams held at the national level in Turkey is to rank students according to their success. In addition to national and international evaluations, class or course-based evaluations are also carried out. Therefore, tests and assessments held at the national level differ in terms of purpose from course-based exams held at the national level.

Continuously and rapidly developing technology has also changed the human resources qualifications needed today. Every secondary school graduate dreams of attending a higher education institution that will play a key role in their chosen profession. For this purpose, there is a central exam called the Higher Education Institutions Exam (YKS) that students in Turkey must take. Eşme (2014) stated that in countries like Turkey, where higher education opportunities are limited and the young population is high, university entrance exams such as YKS have an important place in determining the future of the young generation. The demand for qualified schools and the limited quota have made central exams mandatory (Reyhanlıoğlu & Tiryaki, 2021).

Before 1960, faculties/colleges with suitable quotas accepted students without exams, while faculties/colleges with limited quotas accepted students according to their

own criteria. With the transformation of higher education into mass education and the high demand, student admission through central exams was first implemented in the 1961-1962 academic year at Ankara University's Faculty of Political Sciences, Faculty of Language, History, and Geography, and the Social Services Academy. The Inter-University Selection and Placement Center (ÜSYM) was established in the 1963-1964 academic year. The Student Selection and Placement Center (ÖSYM), established within the Higher Education Council in 1982, assumed the responsibility for university admissions. The two-stage exam was implemented as a single-stage exam in 1999. The single-stage exam was changed in favor of the ÖSS exam, which was used to measure talent and place students (Kılıcı, 2003).

Although university entrance exams later became two-stage exams again, many changes were made until the two-stage exam application that is implemented today was adopted. Despite the important advantages of the applied test method such as objectivity, low cost, quick reading of questions, and breadth of subject coverage, the university entrance exam is the target of criticism by teachers, parents, and students due to the pressure it creates on pre-university education (Eşme, 2014). Due to the criticisms made on the university entrance exam, different models have been tried and today the exam is divided into the Basic Proficiency Test (TYT) and Field Proficiency Test (AYT).

The YKS exam, introduced in 2018, consists of two sessions: TYT and AYT. The number of questions varies between the two sessions. For example, the TYT Turkish test, which assesses basic competencies, includes 40 questions, while the AYT Turkish test (Turkish Language and Literature), which assesses field-specific competencies, has 24 questions. The TYT Turkish test covers seven topics, with the number of questions from each topic varying annually. TYT questions prepared by ÖSYM are publicly available on the institution's official website.

Although there are many different applications in the university entrance exam system, the only application that does not change in the exam system is that the exams consist of multiple-choice questions. Tezbaşaran (1994) stated that the six thinking skills in the Bloom taxonomy are measured with the university entrance exam. The first three skills of knowledge, comprehension, application, analysis, synthesis, and evaluation are related to the student's lower-level thinking skills; the last three are aimed at higher-order thinking skills that require the student to use and evaluate what they have learned. The success of an exam depends on the ability to measure the skills mentioned above. However, as Eşme (2014) stated, the university entrance exam can only measure lower-order skills. The fact that the exam consists of only multiple-choice tests is not suitable for measuring higher-order skills such as analysis, synthesis, and evaluation.

Kılıcı (2003) stated that university entrance exams play a crucial role in shaping student tendencies, and the changes implemented were intended to encourage students to place greater emphasis on courses in secondary education and to increase the impact of secondary education success. The goal was to shift away from directing students to external institutions for knowledge acquisition, instead focusing on an exam system designed to measure talent and promote the application of knowledge. The aim was to create a system based on interpretation rather than rote learning. However, students' interest in vocational education declined with the introduction of this exam system.

Text Readability

The concept of readability is defined as the ease of reading words and sentences, and this concept is expressed as the feature of the comprehensibility of the text (Dubay, 2004). Readability measurements provide information about how difficult a text is to read. This information helps determine appropriate texts for students.

Various approaches have been used in studies measuring text readability. The first of these approaches is the measurement based on reader characteristics (Duff, 2019). From the perspective of reader characteristics, text readability depends on how well the reader grasps its true meaning, the interpretations they draw from it, and the techniques they use to comprehend it. (Tennent, 2014). Therefore, when the readability of texts is evaluated from the perspective of the reader, the difficulty of the text and the difficulty of reading are concepts that are used interchangeably.

Another perspective on readability is that the readability of the text is not associated with the reader. Instead, the readability of the text is determined by independent and changeable language-related factors. According to this second perspective, Begeny and Greene (2014) evaluate readability as a mathematical process in which analyses such as regression can also be used. Writing and word lists resulting from word and sentence lengths and syllable counts can be used as readability criteria (Vajjala & Meurers, 2014).

The readability of the text is one of the most important issues to consider when teaching and evaluating reading skills to students. According to West (2024), the factors affecting readability are as follows; length of the text, length of sentences in the text, number of syllables, number of low and high-frequency words in the text, complexity of syntax and grammar in the text, presence or absence of visual cues, predictability of the storyline, amount of topics covered in the text, readability (spacing, format, font, etc.), students' background knowledge about the text. Rye (1982 cited in Lüle Mert, 2013), who stated that similar titles affect readability, determined 11 elements that affect the readability of the text: the child's skills and desire to read, physical environment, type of printing, column width and line spacing, the purpose of reading, text layout, the importance of the subject, word frequency, word length, and syntax.

In Texthelp (2024), readability is defined as a concept related to how easy or difficult it is to read a text. The readability of a text can vary depending on its presentation (such as font selection, spacing or colors) and context. One of the factors that affect readability is the length of the sentences used, sentence structure, and the number of syllables in the words. To convey the intended message, attention should be paid to readability (Texthelp, 2024). Lüle Mert (2013) stated that the sentence length in texts should increase as the student gets older and evaluated that the sentence and word lengths in texts create an obstacle for the reader.

University entrance exams consist of multiple-choice questions, where open-ended questions are not used due to their cost. It is thought that the preparation of exam questions and the readability of question texts are important factors that can affect student success. Since having difficult readability makes it difficult to understand the exam texts, exams can become difficult due to difficult readability even if the information asked is easy.

It is seen that there are studies on different subjects in the literature on the readability of texts (Güneş, 2023; Bozkurt et al., 2022; Sariçam et al., 2021; Kösecioğulları et al., 2020; Özcan, 2013; Bezirci & Yılmaz, 2010; Çetinkaya, 2010; Solmaz, 2009; Demir, 2008; Budak, 2005; Ateşman, 1997). In a study investigating the readability levels of texts on websites prepared for educational purposes, Keskinçilic and Karataş (2023) concluded that the rate of website readability was at a moderate level of 50%, that of easy levels was 20%, and that of difficult levels was 30%. The researchers interpreted these findings as indicating that the text design and readability levels are aligned.

Lüle Mert (2013), who investigated the readability level of texts in Turkish textbooks in Turkey, determined in her study that the readability scores of texts in textbooks vary according to the level of education, that the reader-age level is ignored in informative texts, that narrative texts are more suitable for the education level of the reader, and that readability is not taken into consideration per the age and education level of the student. It has been revealed that the texts in textbooks presented to students in the age group that should have a high readability level have low readability.

Johannes and Zaanen (2021), who conducted a study on the readability of exams, stated that they expected differences in readability among English exam texts and calculated readability scores using nine readability criteria for English exams to test this. In the study, they determined that the readability of the texts in the exams was consistent over the years.

In another study on the readability of exam questions, Allan et al. (2005) stated that one of the many factors determining the difficulty levels of exams was the readability of the question texts. The contexts of the questions, their order, and the order of the statements affect the difficulty level and readability. While some of the texts in the exam questions legitimately consist of elements that help measure the student's knowledge, it has been stated that other elements, such as whether everyday language is used or not, are related to readability.

Ulusoy (2009), who conducted a study on the use of the fill-in-the-blank test in measuring reading level and readability, aimed to determine the reading levels of texts in social and science textbooks. In the study, it was observed that the fill-in-the-blank test failed to distinguish students according to their reading levels, students did not use clues to fill in the blanks and had problems in extracting meaning from the text.

Güneş (2023) examined the readability levels of science exam questions in the High School Entrance Exam (LGS) held between 2018 and 2021 using the Ateşman formula. It was stated that there were no questions at very easy level and that the questions were not distributed homogeneously according to readability levels.

In another study, Bozkurt et al. (2022) determined the readability of 20 Turkish questions asked in the 2021 LGS using the Ateşman and Çetinkaya-Uzun formulas. In addition, the 2020 and 2019 exam average readability values were also presented in the study. It was seen that the average readability of the 2019, 2020 and 2021 LGS Turkish test was at the medium level according to the Ateşman formula and at the educational reading level according to the Çetinkaya-Uzun formula. It was determined that the

readability of the exams held in 2019 and 2020 were close to each other, and the 2021 exam had the easiest readability.

Purpose of the Study

The readability of texts in exams can affect students' success. The importance of readability is even greater in the preparation of question texts, especially in important exams such as YKS. It is necessary to pay attention to readability in the question texts used in this exam, which determines students' future professions, faculties, and departments they will study. Grape (2024) explains readability with a question, "Have you ever come across an article that gave you a headache while trying to understand it?". A text with a high readability level creates such an effect. For this reason, students taking the YKS exam can positively affect their success rates by understanding the question texts they read and having more readable questions. This study aims to investigate the readability of TYT Turkish questions from YKS exams.

Research Questions

There are studies in the literature examining the readability of Turkish and science questions in the High School Entrance Exam (LGS) (Güneş, 2023; Bozkurt et al., 2022; Sarıçam et al., 2021; Kösecioğulları et al., 2020). However, no study has been found that addresses the readability of TYT Turkish test questions between the years 2019-2023. In this respect, this study, which will be the first in the literature in terms of its subject and scope, sought answers to the following questions regarding the TYT Turkish tests conducted between the years 2019-2023:

1. What are the average number of sentences, words, syllables and letters in the tests, the average number of words in sentences, and the average number of letters and syllables in words?
2. What is the readability of the tests?
3. What is the readability of the tests according to their topics?
4. What is the distribution of test questions according to their readability levels?

Method

In this study, the quantitative characteristics and readability of all questions in the TYT Turkish test between 2019 and 2023 were analyzed. Only obtaining the question booklets, determining and assigning the types of questions, and creating the question texts were performed manually; all other operations were performed with the developed software. Textual data was processed and saved in the database using the software in which Natural Language Processing (NLP) techniques were applied. Queries were run on the tables stored in the database, and the data required for the study were obtained as a result of calculations made through the software developed.

This study is a descriptive qualitative survey study using the quantitative features of the texts. In studies conducted with the descriptive analysis approach, the available data are systematically described, summarized, analyzed and interpreted according to predetermined themes. The aim of this approach is to reveal the current situation related to

the subject of the study as completely and accurately as possible with the data (Büyüköztürk et al., 2013). For this reason, in this study, data were presented categorically according to their subjects, years and readability formulas. In this way, it was aimed to make it easier to see and compare the current status of these components as well as their status relative to each other.

This section also provides information on the characteristics of the dataset created from TYT Turkish tests, details of the collection and processing of data, how and with which techniques these processes were carried out, and also used readability formulas.

Publication Ethics

In this study, all the rules specified in the “Higher Education Institutions Scientific Research and Publication Ethics Directive” were followed.

Dataset

The dataset of this study consists of all questions in the TYT Turkish test between 2019 and 2023. In this study, which was conducted with 40 Turkish questions from each year, a total of 200 questions, the quantitative characteristics and readability of the questions were analyzed. The numbers of questions constituting the dataset by year and topic headings are presented in Table 1. Although it varies from year to year, it was seen that more than half of the questions were paragraph questions, and the least questions related to phonetics were asked in the tests.

Table 1. Number of Questions According to Topics

Topics	2019	2020	2021	2022	2023	All
Word Meaning	3	1	4	4	3	15
Sentence Meaning	3	6	3	3	4	19
Phonology	1	-	1	-	1	3
Grammar	8	3	2	3	2	18
Punctuation	1	2	2	2	2	9
Spelling Rules	2	2	2	2	2	10
Paragraph	22	26	26	26	26	126
Total	40	40	40	40	40	200

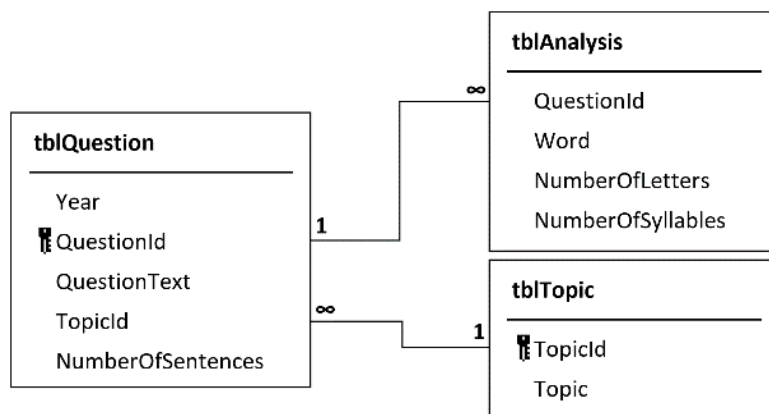
Data Collection and Processing

The inclusion of all TYT Turkish questions between 2019 and 2023 in the scope of the study and the quantitative characteristics of 200 questions as well as the need for detailed data needed in readability calculations are obstacles to performing the operations manually. To overcome these obstacles, the software developed for this study can be used in almost all operations.

The schema of the database created following the normalization rules to be used in keeping the data to be processed is shown in Figure 1. There are 3 tables in the database with defined relationships between them. First, the topics of the questions asked in the exam were determined and added to the table (tblTopic) as numbers (TopicId) and topics (Topic). Then, year (Year), question number (QuestionId), question text (QuestionText),

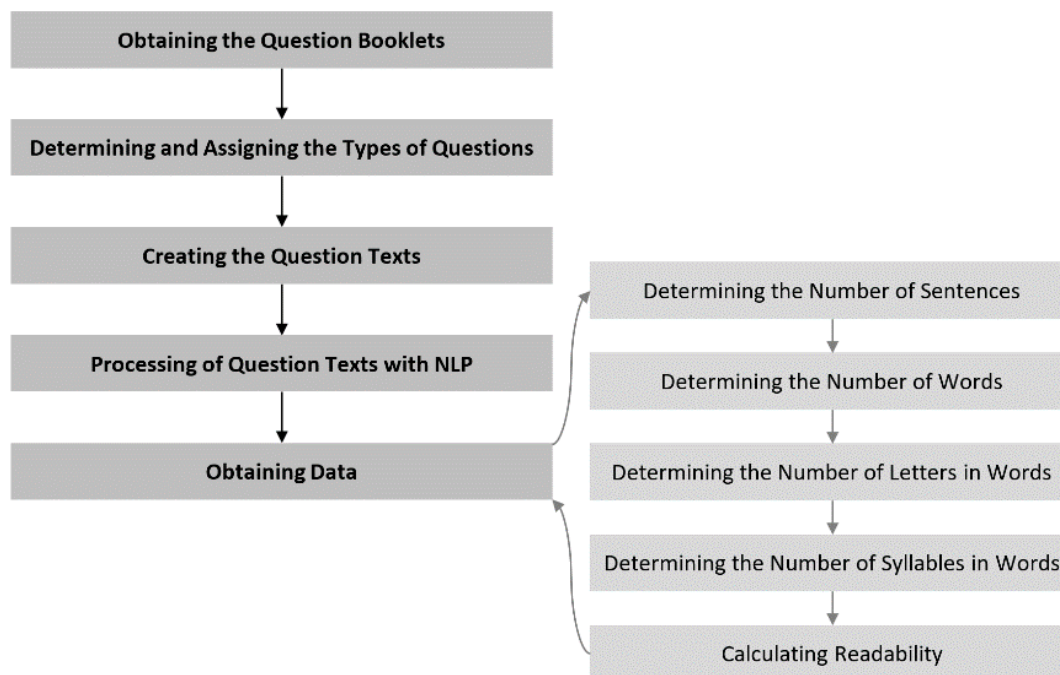
which is the combination of the question stem and its options, and the number of the topic of the question (TopicId) were manually added to the table (tblQuestion). The number of sentences of the question (NumberOfSentences) was added to the table (tblQuestion) with the developed software. Finally, with the developed software, each question text was separated into words according to the space character, the number of questions to which each word belongs (QuestionId), the word itself (Word), the number of letters (NumberOfLetters), and syllables (NumberOfSyllables) of the word were saved in the table (tblAnalysis).

Figure 1. Database Schema



The flow chart of the processes carried out within the scope of the study, from receiving the questions to obtaining the data, is given in Figure 2.

Figure 2. Process Flow Chart



The processes include 5 main steps: obtaining the question booklets, determining and assigning the types of questions, creating the question texts, processing the question texts with NLP, and obtaining the data.

Obtaining the Question Booklets; The question booklets of the TYT exam held between 2019 and 2023 are published on the ÖSYM official website with all the questions open (ÖSYM, 2024). 200 questions of the Turkish test to be used in the study were taken from the digital forms (pdf-portable document format) of the booklets.

Determining and Assigning the Types of Questions; 200 questions were examined, and it was determined which of the 7 topics the questions belonged to and saved in the database.

Creating the Question Texts; In this study, the question stem and options were not considered separately; the question stem and options were combined to form the question text, and the study was carried out on the question texts.

Processing of Question Texts with NLP; In this stage, which is one of the most important steps of the study, first the questions were performed through a preprocessing process. The preprocessing process can be defined as a set of processes that are not a single process but are carried out manually and include sub-processes. In the first step of the preprocessing, several rules were applied. In the first of these rules, the parts that do not indicate a sentence in the question stem or options were removed from the content; the parts of the question texts that are not in sentence order were excluded from the scope. The question texts were purified from the Roman numerals in the questions with A), B), C), D), E), and preceding options. In addition, the numbers indicating the order in the question texts, other numbers, and special characters such as % were expressed in writing. For all the processes after this stage, the software developed for this study in the Visual Studio environment and C# language was used.

Obtaining Data; In this step, the data was obtained by applying NLP techniques. In order to determine the number of sentences in the questions, the punctuation marks indicate the sentence . (period), ? (question mark), ! (exclamation mark) and ... (ellipsis) were counted. In determining the number of words, the question texts were divided according to the space character and the number of parts formed and the number of words of each question were determined. In addition, the number of letters of the words were determined with the help of the function in the developed software. The determination of the number of syllables of the words was carried out by counting the number of vowels in the relevant word. This data was stored in the database to be used and processed in the next steps. The average number of sentences, words and letters of the questions, the average number of words in the sentence, the average number of letters and syllables of the words, as well as the average sentence length according to the number of words used in the readability formulas, the average word length according to the number of syllables and the average number of words with 3, 4, 5, 6 or more syllables in a sentence, and also the question readability were obtained with the help of various queries run on the database, calculations and operations performed in the developed software. The developed software was also used in obtaining the data to be presented in the findings section.

Readability Formulas

Çetinkaya (2010) defined the readability formula as a prediction tool that aims to classify texts in terms of reading difficulties or ease according to the structural features of the text. In these formulas, different variables are processed with different coefficients and the readability of the texts is calculated. On the other hand, it should be noted that the readability formula prepared for one language cannot be used directly in another language.

There are 3 readability formulas created for Turkish and widely used in studies: Ateşman (Ateşman, 1997), Bezirci-Yılmaz (Bezirci & Yılmaz, 2010) and Çetinkaya-Uzun (Çetinkaya, 2010). In the Ateşman readability formula developed in 1997, 5 levels correspond to the readability value (very easy, easy, medium, difficult, and very difficult), in the Bezirci-Yılmaz formula developed in 2010, 4 levels correspond to the readability value (elementary school, high school, undergraduate and academic), in the Çetinkaya-Uzun formula developed in 2010, 3 readability levels corresponding to the readability score (independent reading, educational reading and disabled level) and 3 education levels (5th, 6th and 7th grades; 8th and 9th grades; 10th, 11th and 12th grades) were defined. In the Çetinkaya-Uzun formula, the education level is only between 5th and 12th grades; however, this formula was not included in the study because the questions to be examined for readability within the scope of this study may be outside the specified ranges. Table 2 presents the names of the readability formulas used in the study, calculation formulas, readability values, and readability levels.

Table 2. Readability Formulas

Readability Formula	Calculation Formula	Readability Value	Readability Level
Ateşman	$= 198.825 - 40.175 * X1 - 2.61 * X2$ X1: Average Word length by syllable count X2: Average sentence length by word count	90-100	Very Easy
		70-89	Easy
		50-69	Medium
		30-49	Difficult
		1-29	Very Difficult
Bezirci-Yılmaz	$= \sqrt{OKS * (H3 * 0.84 + H4 * 1.5 + H5 * 3.5 + H6 * 26.25)}$ OKS: Average sentence length by word count H3: Average number of 3-syllable words in a sentence H4: Average number of 4-syllable words in a sentence H5: Average number of 5-syllable words in a sentence H6: Average number of 6 or more syllable words in a sentence	1-8	Elementary School
		9-12	High School
		13-16	Undergraduate
		16+	Academic

Results

This section presents the findings obtained from 200 questions asked in TYT Turkish tests between 2019 and 2023. The quantitative characteristics of the tests, the readability of each test calculated using the Ateşman and Bezirci-Yılmaz formulas, the readability of the question types, and the level and number of questions according to the levels in the readability formulas are presented separately in the tables according to the years, thus trying to reveal the change in the Turkish exam over the years. In addition, the year of the 200 Turkish questions examined between 2019 and 2023 within the scope of the study, the numbers, types of the questions, and readability data are also given between Appendix 1 and Appendix 5.

1. What is the average number of sentences, words, syllables, and letters of the questions in the tests, the average number of words in sentences, and the average number of letters and syllables in words?

The quantitative data from the TYT Turkish tests conducted between 2019-2023 are shown in the table below. When Table 3 is examined, it is seen that the year with the lowest average sentence, word, syllable, and letter count of the questions is 2019, and the year with the highest is 2023. It was determined that the questions consist of approximately 8-9 sentences, 95-115 words, 280-340 syllables, and 660-790 letters on average. In addition, it was concluded that the sentences generally consist of an average of 12.60 words, words consist of 6.91 letters and 2.96 syllables; the average letter and syllable counts of the words are close to each other between the given years, and these data show very little variation according to the years.

Table 3. Quantitative Data of The Tests

Quantitative Data	2019	2020	2021	2022	2023	All
Average Number of Sentences in Questions	7.98	8.10	8.28	8.38	9.05	8.36
Average Number of Words in Questions	97.25	99.65	105.65	109.30	114.48	105.27
Average Number of Syllables in Questions	282.95	293.53	319.20	324.68	340.15	312.10
Average Number of Letters in Questions	663.00	687.78	741.98	753.48	791.40	727.53
Average Number of Words in Sentences	12.19	12.30	12.77	13.05	12.65	12.60
Average Number of Letters in Words	6.82	6.90	7.02	6.89	6.91	6.91
Average Number of Syllables in Words	2.91	2.95	3.02	2.97	2.97	2.96

2. What is the readability of the tests?

The average readability of the TYT Turkish tests conducted between 2019-2023 according to the Ateşman and Bezirci-Yılmaz readability formulas is given in the table below. According to Table 4, it was observed that the readability level of the TYT Turkish test was at the medium or difficult level according to the Ateşman formula, the easiest exam was the exams held in 2019 and the most difficult exams were the exams held in 2021. However, as a result of the analysis conducted according to the Bezirci-Yılmaz formula, it was determined that the exams in the given years were at the academic level, the easiest was the Turkish tests of 2019 and the most difficult was the Turkish tests of 2022.

Table 4. Average Readability Value and Levels of The Tests

Readability Formula	2019	2020	2021	2022	2023	All
Ateşman	50.11	48.38	44.12	45.42	46.44	46.83
	Medium	Difficult	Difficult	Difficult	Difficult	Difficult
Bezirci-Yılmaz	16.58	17.60	18.14	18.31	17.77	17.69
	Academic	Academic	Academic	Academic	Academic	Academic

3. What is the readability of the tests according to their topics?

The analysis of the question types in the TYT Turkish tests conducted between 2019-2023 was carried out according to the Ateşman readability formula and the average readability is given in the table below. When Table 5 is examined, it is seen that word

meaning questions were of medium difficulty in 2020 and 2021 and at the difficult level in other years; sentence meaning questions were at the difficult level in all years. It was determined that phonetics questions were not asked in the tests in 2020 and 2022, but the phonetics questions in 2021 were at the easy level, and the phonetics questions in 2019 and 2023 were of medium difficulty. Grammar questions were of medium difficulty in 2019, 2021 and 2023, and at the difficult level in 2020 and 2022; questions related to punctuation marks were of difficult level only in 2020 and at the medium level in other years; it was determined that questions related to spelling rules were of medium difficulty in 2020, 2022 and 2023, and of difficult level in 2019 and 2021; finally, paragraph questions were of medium difficulty in 2019 and of difficult level in other years. When all years were evaluated together, it was concluded that questions related to phonetics, grammar, punctuation and spelling rules were of medium difficulty; word meaning, sentence meaning and paragraph questions were of difficult level; on the other hand, phonetics questions were the easiest questions in Turkish tests, while questions related to sentence meaning were the most difficult questions in terms of readability.

Table 5. Average Readability Values and Levels of Question Types (Ateşman)

Topics	2019	2020	2021	2022	2023	All
Word Meaning	43.85	66.29	54.11	35.82	44.08	46.23
	Difficult	Medium	Medium	Difficult	Difficult	Difficult
Sentence Meaning	32.46	39.88	42.38	42.55	31.29	38.25
	Difficult	Difficult	Difficult	Difficult	Difficult	Difficult
Phonology	51.05	-	74.04	-	63.74	62.53
	Medium		Easy		Medium	Medium
Grammar	50.54	47.73	50.16	45.18	53.38	50.18
	Medium	Difficult	Medium	Difficult	Medium	Medium
Punctuation Marks	61.61	45.86	54.24	58.05	60.88	57.35
	Medium	Difficult	Medium	Medium	Medium	Medium
Spelling Rules	43.67	52.94	36.14	63.92	56.72	51.29
	Difficult	Medium	Difficult	Medium	Medium	Medium
Paragraph	52.08	49.03	41.87	44.80	46.46	46.77
	Medium	Difficult	Difficult	Difficult	Difficult	Difficult

The question types in the TYT Turkish tests conducted between 2019-2023 were analyzed according to the Bezirci-Yılmaz readability formula and the average readabilities are presented in Table 6. It was observed that word meaning questions were at the high school level in 2020, at the undergraduate level in 2021, and at the academic level in 2019, 2022, and 2023; sentence meaning questions were at the undergraduate in 2021 and 2022, and at the academic level in 2019, 2020, and 2023. It was determined that phonetics questions, which are few, were at the elementary school in 2023, at the high school level in 2021, and at the undergraduate level in 2019, and also large differences were found between the levels of questions in this question type by year. Grammar questions were at the high school level in 2021, at the undergraduate level in 2020 and 2023, and at the academic level in 2019 and 2022; punctuation questions were at the high school level in 2019 and 2023, at the undergraduate level in 2021 and 2022, and at the academic level in 2020; spelling rules questions were at the high school level in 2022 and 2023, at the undergraduate level in 2020, and at the academic level in 2019 and 2021; paragraph questions were at the undergraduate level only in 2019 and at the academic level in other

years. When all years were evaluated together, it was determined that phonetics questions were at the high school level; grammar, punctuation, and spelling rules questions were at the undergraduate level; word meaning, sentence meaning, and paragraph questions were at the academic level. As in the Ateşman formula, it was concluded that phonetics questions were the easiest and sentence-meaning questions were the most difficult in the Bezirci-Yılmaz formula.

Table 6. Average Readability Values and Levels of Question Types (Bezirci-Yılmaz)

Topics	2019	2020	2021	2022	2023	All
Word Meaning	18.22 Academic	11.82 High School	13.75 Undergraduate	24.24 Academic	17.68 Academic	17.71 Academic
Sentence Meaning	25.73 Academic	19.77 Academic	14.44 Undergraduate	15.38 Undergraduate	24.68 Academic	19.46 Academic
Phonology	13.75 Undergraduate	-	10.33 High School	-	8.05 Elementary School	10.99 High School
Grammar	16.44 Academic	15.74 Undergraduate	12.81 High School	19.08 Academic	15.21 Undergraduate	15.89 Undergraduate
Punctuation Marks	12.89 High School	18.02 Academic	14.24 Undergraduate	13.01 Undergraduate	11.39 High School	13.33 Undergraduate
Spelling Rules	18.76 Academic	13.57 Undergraduate	20.38 Academic	9.42 High School	11.40 High School	14.49 Undergraduate
Paragraph	15.78 Undergraduate	17.72 Academic	19.96 Academic	18.93 Academic	17.98 Academic	18.09 Academic

4. What is the distribution of test questions according to readability levels?

The distribution of questions in TYT Turkish tests conducted between 2019 and 2023 according to Ateşman formula levels is given in the table below. When Table 7 is examined, it is determined that the questions were mostly of medium difficulty or difficult in 2019 and difficult in other years; there were no very easy level questions in the given years, and there were only three questions in total at the easy level. According to the Ateşman formula, it was determined that the 12th question (Appendix D), which is at the easy level in 2022, regarding the topic of spelling rules, was the easiest in all years, and the 7th question (Appendix E), which is at the very difficult level, regarding the topic of meaning in a sentence, was the most difficult in 2023.

Table 7. Number of Questions According To Ateşman Formula Levels

Readability Levels	2019	2020	2021	2022	2023	All
Very Easy	-	-	-	-	-	-
Easy	1	-	1	1	-	3
Medium	17	15	7	7	14	60
Difficult	17	23	31	28	23	122
Very Difficult	5	2	1	4	3	15

Data on the distribution of questions in TYT Turkish tests conducted between 2019 and 2023 according to the Bezirci-Yılmaz formula levels are given in Table 8. According to the table, it was seen that the questions were mostly at the academic level, and there were only 4 questions at the elementary school level between 2019 and 2023. According to the Bezirci-Yılmaz formula, it was determined that the 24th question of the exam held in

2020 (Appendix B), the paragraph question at the elementary school level, was the easiest question between 2019-2023, and the 7th question of the exam held in 2023 (Appendix E), the meaning question at the academic level, was the most difficult.

Table 8. Number of Questions According to Bezirci-Yılmaz Formula Levels

Readability Levels	2019	2020	2021	2022	2023	All
Elementary School	1	1	-	1	1	4
High School	8	5	5	5	6	29
Undergraduate	9	6	6	5	7	33
Academic	22	28	29	29	26	134

Conclusion, Discussion and Suggestions

In this study examining the readability of TYT Turkish questions between 2019-2023, Ateşman and Bezirci-Yılmaz readability formulas were used. The findings obtained from the study show that the results obtained from these two formulas are consistent and the readability levels between the levels are similar.

When average readability is examined by year, according to the Ateşman and Bezirci-Yılmaz formulas, it was determined that the Turkish questions with the easiest readability between 2019 and 2023 were asked in 2019. Different results were obtained according to the formulas in the most difficult readability. According to the Ateşman formula, the exam with the most difficult readability was held in 2021, and according to the Bezirci-Yılmaz formula, it was held in 2022. According to both formulas, it was seen that the readability of the questions varied by year; the readability of the questions was not consistent over the years, and it did not show a certain trend. According to the Ateşman formula, the most questions in all years were at the difficult level. In addition, the most medium and very difficult level questions were in the exam held in 2019, and the difficult level questions were in the exam held in 2021. According to the Bezirci-Yılmaz formula, the most questions between 2019 and 2023 were at the academic level. Additionally, it was determined that the highest number of high school and undergraduate level questions were asked in the exam held in 2019, while the highest number of academic level questions were asked in the exam held in 2021 and 2022.

When the question types are considered, it has been determined that questions aimed at measuring phonetics are the easiest readability, and questions aimed at measuring semantics in sentences are the most difficult readability according to both formulas. It has been observed that there is an inconsistency in the distribution of the number of questions according to question types over the years, that some question types are asked more or less in some years, and that there is no equal distribution.

In general, it was determined that there were more questions in the difficult category in all years within the readability levels of the exams. Considering that many students applied for the YKS exams, it can be said that having more questions in the difficult and very difficult categories was used to increase the distinctiveness of the exam. While most of the participants can do the easy questions, the number of students who get the difficult and very difficult questions right will decrease, and the distinctiveness of the

exam and therefore the questions, that is, the ability to distinguish between those who know and those who do not, will increase.

Güneş (2023) conducted a study with the same readability formulas. It was stated that the questions did not show a homogeneous distribution according to their readability levels, there were no questions at the very easy level, and there were more questions at some levels. Bozkurt et al. (2022), who examined the readability levels of LGS Turkish questions, stated that the average readability of the 2019, 2020 and 2021 LGS Turkish test was at the medium level according to the Ateşman formula. The readabilities of the exams held in 2019, 2020, and 2021 were close to each other, and the exam in 2021 was the easiest to read. When these results are compared with the results of the current study, it was seen that the readabilities of the LGS and YKS exams differ.

The purpose of YKS exams is to place students in a department or program in a faculty, college, or vocational school of a university in line with their preferences, considering their success rankings. TYT and AYT exams within the scope of YKS applied in Turkey are the basic measurement tools used to determine where students will be placed in line with this purpose. Although the tests used in YKS are not perfect tools, it is also not possible to develop a tool called a perfect measurement tool. No matter how policymakers decide to place students, there can always be students who are treated unfairly or measured incorrectly. When students are placed in departments with the wrong methods, this situation can result in the dissatisfaction of the students and the departments they are placed in. On the other hand, it can also be said that universities and departments will be saved from many hidden costs when students are placed in departments with the right methods. Because students who are placed in a department other than their talents fail a course, extending the term and dropping out of school can create significant costs for the country's economy. Students studying in departments that are suitable for their talents will reduce costs and increase the success of the school or department.

Methods that will provide more accurate measurements in the YKS exam should be developed or existing methods should be used. Because this exam affects almost all the lives of students. Readability, as one of these methods, should be considered in exam questions, and it would be beneficial to assess whether the questions are suitable for students' levels by reviewing readability data after they are created. Otherwise, it should not be ignored that this will have negative costs in terms of satisfaction, success, and economy for both the students and the country.

Although the readability levels of the applied tests do not provide information about the content of the exams, it can be said that readability is a factor that increases success. Question texts with an easy-to-read level can be read more easily by students. However, it should not be overlooked that the YKS exam is the main criterion for placing students and that this exam only measures students' skills such as knowledge and reading comprehension. In addition, using new exam methods that can measure students' application, analysis, and synthesis skills can be a more accurate student selection method. Moreover, doing so can help select students who are more suitable for departments that provide education based on talent and application rather than just knowledge.

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Appendices

Appendix A. Readability Data of 2019 TYT Turkish Questions

Question Number	Question Type	Ateşman Formula		Bezirci-Yılmaz Formula	
		Readability Value	Readability Level	Readability Value	Readability Level
1	Word Meaning	28.90	Very Difficult	21.63	Academic
2	Word Meaning	50.21	Medium	11.35	High School
3	Word Meaning	46.94	Difficult	19.60	Academic
4	Sentence Meaning	36.14	Difficult	21.25	Academic
5	Sentence Meaning	25.54	Very Difficult	31.43	Academic
6	Sentence Meaning	30.39	Difficult	28.21	Academic
7	Phonology	51.05	Medium	13.75	Undergraduate
8	Grammar	45.38	Difficult	20.49	Academic
9	Grammar	21.47	Very Difficult	26.64	Academic
10	Grammar	54.31	Medium	28.44	Academic
11	Grammar	26.84	Very Difficult	26.49	Academic
12	Grammar	39.93	Difficult	16.53	Academic
13	Grammar	46.14	Difficult	14.49	Undergraduate
14	Grammar	61.28	Medium	7.76	Elementary School
15	Grammar	65.11	Medium	17.09	Academic
16	Spelling Rules	43.32	Difficult	15.06	Undergraduate
17	Punctuation Marks	61.61	Medium	12.89	High School
18	Spelling Rules	40.26	Difficult	21.75	Academic
19	Paragraph	60.37	Medium	14.19	Undergraduate
20	Paragraph	34.68	Difficult	17.67	Academic
21	Paragraph	52.08	Medium	11.27	High School
22	Paragraph	58.18	Medium	11.98	High School
23	Paragraph	43.35	Difficult	17.98	Academic
24	Paragraph	35.89	Difficult	22.54	Academic
25	Paragraph	59.76	Medium	13.35	Undergraduate
26	Paragraph	25.28	Very Difficult	30.96	Academic
27	Paragraph	48.14	Difficult	16.22	Academic
28	Paragraph	40.93	Difficult	20.18	Academic
29	Paragraph	70.49	Easy	12.79	High School
30	Paragraph	61.69	Medium	13.57	Undergraduate
31	Paragraph	55.02	Medium	12.66	High School
32	Paragraph	38.01	Difficult	19.52	Academic
33	Paragraph	55.16	Medium	17.11	Academic
34	Paragraph	47.79	Difficult	15.87	Undergraduate
35	Paragraph	62.60	Medium	10.57	High School
36	Paragraph	62.18	Medium	10.68	High School
37	Paragraph	60.44	Medium	13.40	Undergraduate
38	Paragraph	66.24	Medium	13.68	Undergraduate
39	Paragraph	38.27	Difficult	20.96	Academic
40	Paragraph	39.43	Difficult	19.05	Academic

Appendix B. Readability Data of 2020 TYT Turkish Questions

Question Number	Question Type	Ateşman Formula		Bezirci-Yılmaz Formula	
		Readability Value	Readability Level	Readability Value	Readability Level
1	Word Meaning	66.29	Medium	11.82	High School
2	Sentence Meaning	44.26	Difficult	16.66	Academic
3	Sentence Meaning	39.99	Difficult	20.21	Academic
4	Sentence Meaning	29.79	Difficult	24.74	Academic
5	Sentence Meaning	35.26	Difficult	20.81	Academic
6	Sentence Meaning	55.75	Medium	14.08	Undergraduate
7	Sentence Meaning	31.78	Difficult	22.70	Academic
8	Grammar	24.28	Very Difficult	22.91	Academic
9	Grammar	60.54	Medium	11.00	High School
10	Grammar	41.06	Difficult	18.77	Academic
11	Spelling Rules	56.53	Medium	15.11	Undergraduate
12	Spelling Rules	49.28	Difficult	11.85	High School
13	Punctuation Marks	53.69	Medium	14.81	Undergraduate
14	Punctuation Marks	25.21	Very Difficult	23.98	Academic
15	Paragraph	40.19	Difficult	20.19	Academic
16	Paragraph	32.70	Difficult	17.25	Academic
17	Paragraph	40.74	Difficult	17.51	Academic
18	Paragraph	54.67	Medium	19.76	Academic
19	Paragraph	51.82	Medium	18.51	Academic
20	Paragraph	44.87	Difficult	19.58	Academic
21	Paragraph	54.60	Medium	15.18	Undergraduate
22	Paragraph	50.29	Medium	18.63	Academic
23	Paragraph	42.28	Difficult	24.90	Academic
24	Paragraph	69.41	Medium	7.06	Elementary School
25	Paragraph	44.79	Difficult	21.93	Academic
26	Paragraph	40.19	Difficult	18.68	Academic
27	Paragraph	40.69	Difficult	18.24	Academic
28	Paragraph	47.85	Difficult	15.03	Undergraduate
29	Paragraph	59.38	Medium	12.26	High School
30	Paragraph	45.01	Difficult	17.90	Academic
31	Paragraph	46.23	Difficult	15.18	Undergraduate
32	Paragraph	51.07	Medium	18.32	Academic
33	Paragraph	47.13	Difficult	17.65	Academic
34	Paragraph	54.67	Medium	12.65	High School
35	Paragraph	45.51	Difficult	17.36	Academic
36	Paragraph	45.97	Difficult	17.34	Academic
37	Paragraph	55.52	Medium	18.52	Academic
38	Paragraph	54.71	Medium	17.56	Academic
39	Paragraph	39.34	Difficult	21.38	Academic
40	Paragraph	32.28	Difficult	27.39	Academic

Appendix C. Readability Data of 2021 TYT Turkish Questions

Question Number	Question Type	Ateşman Formula		Bezirci-Yılmaz Formula	
		Readability Value	Readability Level	Readability Value	Readability Level
1	Word Meaning	64.29	Medium	14.02	Undergraduate
2	Word Meaning	49.69	Medium	16.80	Academic
3	Word Meaning	61.03	Medium	9.48	High School
4	Word Meaning	47.71	Difficult	14.79	Undergraduate
5	Sentence Meaning	37.98	Difficult	16.85	Academic
6	Sentence Meaning	48.80	Difficult	14.97	Undergraduate
7	Sentence Meaning	40.35	Difficult	18.66	Academic
8	Phonology	74.04	Easy	10.33	High School
9	Grammar	47.28	Difficult	21.02	Academic
10	Grammar	50.35	Medium	11.19	High School
11	Punctuation Marks	42.72	Difficult	20.32	Academic
12	Punctuation Marks	61.60	Medium	10.50	High School
13	Spelling Rules	31.06	Difficult	18.63	Academic
14	Spelling Rules	36.57	Difficult	20.32	Academic
15	Paragraph	40.94	Difficult	21.22	Academic
16	Paragraph	46.01	Difficult	19.45	Academic
17	Paragraph	38.11	Difficult	22.74	Academic
18	Paragraph	35.52	Difficult	24.98	Academic
19	Paragraph	49.63	Medium	17.89	Academic
20	Paragraph	41.12	Difficult	14.78	Undergraduate
21	Paragraph	25.11	Very Difficult	23.40	Academic
22	Paragraph	38.54	Difficult	17.84	Academic
23	Paragraph	42.07	Difficult	21.09	Academic
24	Paragraph	39.98	Difficult	18.63	Academic
25	Paragraph	37.47	Difficult	23.63	Academic
26	Paragraph	51.21	Medium	12.01	High School
27	Paragraph	46.42	Difficult	14.94	Undergraduate
28	Paragraph	41.69	Difficult	22.29	Academic
29	Paragraph	42.52	Difficult	17.42	Academic
30	Sentence Meaning	42.45	Difficult	19.70	Academic
31	Paragraph	43.19	Difficult	16.79	Academic
32	Paragraph	43.19	Difficult	17.91	Academic
33	Paragraph	46.44	Difficult	17.79	Academic
34	Paragraph	48.14	Difficult	14.71	Undergraduate
35	Paragraph	36.91	Difficult	20.88	Academic
36	Paragraph	34.24	Difficult	23.44	Academic
37	Paragraph	45.62	Difficult	16.77	Academic
38	Paragraph	46.14	Difficult	19.72	Academic
39	Paragraph	30.97	Difficult	25.44	Academic
40	Paragraph	29.75	Difficult	25.11	Academic

Appendix D. Readability Data of 2022 TYT Turkish Questions

Question Number	Question Type	Ateşman Formula		Bezirci-Yılmaz Formula	
		Readability Value	Readability Level	Readability Value	Readability Level
1	Word Meaning	25.66	Very Difficult	30.27	Academic
2	Word Meaning	49.41	Difficult	16.90	Academic
3	Word Meaning	35.47	Difficult	21.31	Academic
4	Word Meaning	30.96	Difficult	28.59	Academic
5	Sentence Meaning	39.73	Difficult	15.71	Undergraduate
6	Sentence Meaning	48.59	Difficult	14.46	Undergraduate
7	Sentence Meaning	41.10	Difficult	15.56	Undergraduate
8	Grammar	45.50	Difficult	20.77	Academic
9	Grammar	47.46	Difficult	16.34	Academic
10	Grammar	38.89	Difficult	22.89	Academic
11	Spelling Rules	42.91	Difficult	12.56	High School
12	Spelling Rules	81.48	Easy	7.16	Elementary School
13	Punctuation Marks	52.32	Medium	16.54	Academic
14	Punctuation Marks	61.12	Medium	11.07	High School
15	Paragraph	58.29	Medium	13.32	Undergraduate
16	Paragraph	44.15	Difficult	17.31	Academic
17	Paragraph	36.13	Difficult	20.79	Academic
18	Paragraph	48.93	Difficult	17.73	Academic
19	Paragraph	68.57	Medium	9.48	High School
20	Paragraph	32.45	Difficult	24.39	Academic
21	Paragraph	43.42	Difficult	20.72	Academic
22	Paragraph	28.15	Very Difficult	26.11	Academic
23	Paragraph	36.09	Difficult	22.49	Academic
24	Paragraph	50.91	Medium	19.24	Academic
25	Paragraph	62.26	Medium	12.68	High School
26	Paragraph	52.63	Medium	13.09	Undergraduate
27	Paragraph	31.40	Difficult	29.42	Academic
28	Paragraph	15.60	Very Difficult	33.04	Academic
29	Paragraph	47.92	Difficult	12.95	High School
30	Paragraph	44.76	Difficult	17.55	Academic
31	Paragraph	41.61	Difficult	16.60	Academic
32	Paragraph	47.76	Difficult	19.52	Academic
33	Paragraph	39.14	Difficult	22.36	Academic
34	Paragraph	28.52	Very Difficult	28.48	Academic
35	Paragraph	40.21	Difficult	19.33	Academic
36	Paragraph	37.90	Difficult	21.07	Academic
37	Paragraph	41.46	Difficult	18.43	Academic
38	Paragraph	39.44	Difficult	19.02	Academic
39	Paragraph	44.95	Difficult	21.72	Academic
40	Paragraph	48.72	Difficult	17.97	Academic

Appendix E. Readability Data of 2023 TYT Turkish Questions

Question Number	Question Type	Ateşman Formula		Bezirci-Yılmaz Formula	
		Readability Value	Readability Level	Readability Value	Readability Level
1	Word Meaning	46.30	Difficult	23.48	Academic
2	Word Meaning	43.73	Difficult	13.65	Undergraduate
3	Word Meaning	42.28	Difficult	20.75	Academic
4	Sentence Meaning	44.45	Difficult	17.21	Academic
5	Sentence Meaning	39.39	Difficult	16.71	Academic
6	Sentence Meaning	36.17	Difficult	18.95	Academic
7	Sentence Meaning	-1.00	Very Difficult	45.99	Academic
8	Grammar	56.50	Medium	12.45	High School
9	Grammar	43.57	Difficult	19.85	Academic
10	Phonology	63.74	Medium	8.05	Elementary School
11	Spelling Rules	53.64	Medium	10.88	High School
12	Spelling Rules	59.33	Medium	11.69	High School
13	Punctuation Marks	51.87	Medium	12.43	High School
14	Punctuation Marks	64.94	Medium	10.91	High School
15	Paragraph	55.72	Medium	14.59	Undergraduate
16	Paragraph	46.01	Difficult	16.38	Academic
17	Paragraph	40.79	Difficult	21.43	Academic
18	Paragraph	30.25	Difficult	25.56	Academic
19	Paragraph	49.90	Medium	15.60	Undergraduate
20	Paragraph	41.27	Difficult	22.60	Academic
21	Paragraph	39.26	Difficult	19.33	Academic
22	Paragraph	46.26	Difficult	16.66	Academic
23	Paragraph	56.92	Medium	16.57	Academic
24	Paragraph	68.92	Medium	10.00	High School
25	Paragraph	51.02	Medium	15.33	Undergraduate
26	Paragraph	44.77	Difficult	14.83	Undergraduate
27	Paragraph	45.73	Difficult	16.88	Academic
28	Paragraph	40.86	Difficult	18.92	Academic
29	Paragraph	24.34	Very Difficult	26.88	Academic
30	Paragraph	27.44	Very Difficult	28.63	Academic
31	Paragraph	36.58	Difficult	22.85	Academic
32	Paragraph	52.49	Medium	18.60	Academic
33	Paragraph	53.64	Medium	13.36	Undergraduate
34	Paragraph	48.72	Difficult	15.54	Undergraduate
35	Paragraph	30.15	Difficult	26.26	Academic
36	Paragraph	43.33	Difficult	18.28	Academic
37	Paragraph	42.83	Difficult	16.99	Academic
38	Paragraph	40.55	Difficult	17.39	Academic
39	Paragraph	49.53	Medium	16.57	Academic
40	Paragraph	46.14	Difficult	20.04	Academic