

The Evaluation of High School Geography 9 and High School Geography 11 Text Books With Some Formulas of Readability

*Yılmaz GEÇİT**

Abstract

The purpose of this study is to evaluate readability of 9th and 11th grade geography textbooks currently used in schools. As known, one of the most fundamental features in a text-book is the readability of the text by students. In addition, it is also very important that the fluency and suitability of books match age level. In this study, the CLOZE and FOG tests were used to test the readability of geography textbooks. While the CLOZE test and FLESH formula give information largely on the level of readability of books, the FOG and SMOG formulas are being used to determine the suitability of books for age level of students. However, these tests and formulae have been developed in accordance with the grammar structure of English on the basis of lengths of syllables, words, and sentences. Thus, the Turkish application may show some anomalies. In this study, previously adopted and translated to Turkish version of the original tests and formula were applied. As conclusion, this study shows that the readability of the 9th and 11th grade geography books in Turkey is very low with respect to the CLOZE test, in medium strength with respect to the FLESH test. With respect to the FOG and SMOG tests, texts in the books are not suitable for age level of students.

Key Words

Geography Textbooks, Readability, CLOZE and FOG Tests, FLESH and SMOG Formulas.

** Correspondence:* Assist. Prof. Yılmaz GEÇİT, Rize University Faculty of Education, Department of Elementary Education, Çayeli-Rize/Turkey.
E-mail: yilmaz.gecit@rize.edu.tr

Providing transfer of knowledge to next generations, textbooks are the leading sources most frequently referred to by teachers as well. According to a research, 85–90% of the content referred to in social sciences is obtained from textbooks and resource books (Myers & Savage, 2005, p. 18). Covering all the items of the curriculum makes these resources the most preferred ones (Büyükalın, 2003, p. 117). Besides their features such as having different functions compared to other course tools and their ease of use, the fact of our country not having adequate capacity in terms of other course tools and materials provide a basis for textbooks for being widely used.

Textbooks constitute the most fundamental source of reference for students. They are printed educational and instructional materials comprised of rich texts equipped with cognitive and perceptive capabilities appropriate for age and knowledge levels of students, prepared on the basis of principles on which education programs are grounded, and transferring the contained knowledge to students (Çiftçi, Çeçen & Melanlıoğlu, 2007, p. 206). These books are at the same time the most important tools enabling the individual to work independently and repeat the information for many times (Ünsal & Güneş, p. 388). On the other hand, they arrange the knowledge students possess and improve their memories, develop and strengthen future generations in individual, social, economic, ideological and cultural respects (Güneş, 2002, p. 3). Textbooks are described as follows under Textbooks Regulations, Article 4 Ministry of National Education (Amended: 1.9.2006/26276): “They are printed works with content prepared in line with academic curriculum to be used in formal and non-formal education institutions and which could be produced in chapters when necessary” (Milli Eğitim Bakanlığı [MEB], 2009).

Students can only encounter with books or texts via textbooks, particularly in countries such as Turkey where the rate of reading books is not quite high (Tekşan & Güneş, 2006, p. 459). Just this point by itself is a clear evidence for the importance of the mission assumed by textbooks. Therefore, texts in the textbooks should be perfect and appropriate for the relevant level (Çiftçi et al., 2007, p. 207). It is significantly important for these books to be easily comprehended by students, for the information contained in the books to be meaningful for them, remembered for a long time, correlated with life whenever necessary; in short, it is important that these data be converted to knowledge and practice.

In order to achieve these, texts should be arranged within a specified plan with their contents formed into gradual levels as chapters and the chapters to be the prerequisite for the subsequent chapter(s) (Sönmez, 2003, p. 25).

Preparation and evaluation of textbooks, which constitute an important element of education process for all its stakeholders is another important factor. This point suggests that textbooks need to be prepared in certain standards. The regulations used in the preparation of textbooks in our country are determined by the Head Council of Education and Morality under Ministry of National Education. Furthermore, the Turkish Standards Institute stipulates the standards with which textbooks must comply under Standard No. TS 10220 (Tekbıyık, 2006, p. 442). Generally, 4 steps are followed for writing textbooks in Turkey. In the first step, academic curriculum is examined in detail and the topic titles contained in the annual curriculum are converted into key questions to form up the texts in these books. The second is the textbook design step, in which page layouts, student activities relevant to the unit topics, images, maps etc. are determined. In the third step, the text is created by taking the textbook design and relevant key questions as a guide. In the final step, guide books and exercise books are produced (Demirkaya & Tömal, 2002, p. 154). The first three steps in particular have great importance to provide readability for the textbook. Moreover, it is stated that the instructional effectiveness of a written material (textbooks, course notes, guide books, school newspapers, bulletins, etc.) depends specifically on three fundamental variables: (a) readability level of the material, (b) content of the material, and (c) design of the material (layout and look) (Yalın, 2007, p. 150).

With their importance tried to be explained above in a general sense, it can be understood that one of the fundamental features required for textbooks to fulfill their designated functions is the level of readability. Readability can be defined as the degree allowing a student to read the text fast and be able to understand what is being read (Ulu Kalın, 2007). It could also be defined as the state of being comprehended easily or with difficulty by the reader (Ateşman, 1997, p. 71). The number of words in each sentence, number of syllables in each word, number of ideas intended to be emphasized in a sentence, continuity of ideas are the features which determine readability in a text (Tekbıyık, 2006, p. 442). Readability mostly aims at determining difficulty of texts in

consideration of their quantitative characteristics, namely lengths of sentences and words and the number of unknown words. The determination of the degree of difficulty for texts and determination of their appropriateness for the intended levels are the most fundamental measures for readability (Zorbaz, 2007, p. 89).

Educators state that textbooks and other reading materials be appropriate for the reading levels of students to enable them to handle and overcome the problems they encounter with while reading written materials (Ornstein & Lasley, 2000, p. 232). The issue whether written materials are appropriate for the levels of students is directly related with what the students can learn during the classes and to what extent. The reason is that it is difficult for students to obtain information from a text beyond their reading levels. Nonetheless, it is also difficult for students to create sufficient motivation to focus on an over easy text for reading (Yazıcı & Yeşilbursa, 2007, p. 84).

Reading experts have stated three types of reading levels for students. These reading levels are as follows (Dolgin, 1975, p. 251, Naylor & Diem, 1987, p. 313 cited in Yazıcı & Yeşilbursa, 2007, p. 84; Theodore, 1975, p. 254):

Independent Reading Level: The material that could be read by students at this level indicates a material students can handle without seeking help from outside sources. Students can easily learn almost everything provided by the author; they are familiar with the words, possess the necessary skills to derive the ideas implied by the text and can comprehend the concepts stated without any difficulty.

Educational Reading Level: The material for the educational level indicates a material which students can comprehend when assisted by the instructor. At this level, the instructor should probably provide an overview as to what the students will be reading, ask them guiding questions and start a class discussion immediately after the reading process finishes improving comprehension of the text.

Insufficient Reading Level: At this level, the students are not able to work adequately with the materials on hand. Materials are so difficult for students such that a reasonable amount of educational help is insufficient for students to form a bridge between their skills and the expectations of the author. Word recognition and comprehension is very difficult and students can demonstrate observable signs of anxi-

ety. These can result in a reduction in text comprehension by students and the subsequent reading text can be totally ignored. Such materials should be prevented from being used in educational activities.

Purpose of the Research

In this study, we intended to evaluate the geography textbooks of 9th and 11th grades, which are stipulated to be instructed in Turkish high schools with the resolutions of the Head Council of Education and Morality under Ministry of National Education dated 28.06.2006 & no. 288 and 19.04.2007 & no. 88 respectively, by using certain readability formulas. To the contrary of many previously conducted studies, during this evaluation, we used various formulas and tests with international validity, all together and simultaneously, in their versions adapted to the Turkish language. By this means, we tried to reveal the appropriateness of these mentioned textbooks for the target age level of students attending different types of schools.

Major Readability Tests

One of the tests educators could apply on students for determination of the readability of books is the CLOZE test (Wellington, 1994, p.178). The CLOZE test applied to determine the readability degree is principally a 'fill-in-the-blanks' test. Fill-in-the-blanks tests are based on the removal of certain number of words from a reading text in certain intervals. Students are requested to fill in these sentences with appropriate words (Kobayashi, 2002, p. 571). In fact, with the fill-in-the-blanks tests developed by Taylor, language skills of students are attempted to be tested (Theodore, 1975, p. 254). In this study, an evaluation is made according to the results of the fill-in-the-blanks type the CLOZE test initially applied on the students on the basis of the number of correct words filled in by students. If the number of correct answers filled in by students is 60% and above, this means that the text can be read independently, lower than 40% indicates a very difficult text and a score between 40-60% means that the text can be read and understood only with an instructor support (Wellington, 1994, p. 178). The CLOZE test is based on random removal of either of 5-6 words starting from the second sentence without touching the first sentence, from a text of approximately 275 words selected from a book which students have not

read before. However, other methods are being suggested regarding the fill-in-the-blanks tests. For example, according to Theodore (1975, p. 254); one of each 7 words starting from the second sentence excluding the first sentence of a paragraph is removed from the two selected passages and this procedure is continued until obtaining 50 blanks in total in both passages. However, it has been stated that it could be difficult to remove 50 words, particularly for students encountering reading difficulties, and instead of this it could be more meaningful to remove 25 or 33 words (Alvermann & Phelps, 2005, p. 141). Once the reading level of students is determined, it becomes possible for teachers to use readability formulas to evaluate the difficulty of written materials (Yazıcı & Yeşilbursa, 2007, p. 93). Readability formulas used widely in determination of readability level of materials are FLESH, FOG, SMOG and FRY (Çepni, Gökdere & Taş, 2001, p. 357). These formulas are directly related with sentence lengths and syllable structures. Since the number and length of sentences in a text and the number of syllables forming the words differ from one language to another, direct application of these formulas to Turkish language may not lead to positive results. For this reason, the FLESH formula adapted to Turkish by Ateşman (1997, p. 73) as well as the FOG and SMOG formulas adapted to Turkish by Çepni, Gökdere and Taş (2001, p. 361) are used. These formulas, used in numerous countries, are based on the lengths of sentences and words. And this very point is in fact considered to be an important limitation of these formulas by some educators. According to these views, the number of items with unknown meanings is more effective in determination of readability level than the rates of long words and sentences in a text (Budak, 2005, p. 1).

Literature Search

Although an increase is observed in studies carried out to determine the levels of readability of textbooks in recent years, it is difficult to state that these are sufficient. Below is some brief information regarding studies carried out on this field in our country.

One of the most important studies carried out regarding *readability* in Turkey is the study in which Ateşman (1997) adapted the FLESH formula to Turkish. It is important with respect to the adaptation of this formula, which yields positive results in determination of readability lev-

els of English texts, to our language by taking Turkish language structure into consideration and enabling reliable measurement of readability.

Another study includes the evaluation of 2 units of primary education 4th and 5th grade textbooks on vocational training according to the FOG formula (Kaya, 1998). At the end of this study, it was determined that there is no significant difference between the evaluation made according to the said formula and the textbooks.

In the study performed for the determination of readability of 9th grade physics textbook and appropriateness for target students' age level, the readability of book was determined to be low according to the CLOZE test but appropriate for student age level with regard to the FOG test (Tekbıyık, 2006).

In the graduate thesis prepared by Temur (2002), a comparison was made in terms of readability between texts in primary education 5th grade Turkish textbooks and essays of students who read this book, and in the end it was determined that the texts in the book have a higher level of readability compared to student essays, however this difference did not have a significant meaning.

In a study performed on the word lengths and readability of tales in 1st to 8th grade Turkish textbooks, it was concluded that word and sentence lengths of tales contained in the textbooks do not indicate a distribution appropriate for class levels of students (Zorbaz, 2007).

In another study performed by Çiftçi, Çeçen and Melanoğlu (2007), the formula of FLESH as adapted to Turkish by Ateşman is applied to texts on 6th grade Turkish textbooks (texts other than poetry and drama). As a consequence, word and sentence lengths of narrative texts in the book were determined to be shorter in comparison with informative texts, and accordingly their rate of readability was higher.

In a study performed on readability of *Children's Books* series published by the Ministry of National Education in 1996, 40 books out of 52 were determined to be prepared in compliance to readability criteria (Güneş, 2000).

In another study conducted by Yazıcı and Yeşilbursa (2007), measurement tools used for determining the appropriateness of written materials for students particularly in courses of social studies course were examined and such tools were stated to be fill-in-the-blanks tests, labyrinth tests, readability formulas and expert opinions.

In an article with the purpose of examining topics of physics in 8th grade science textbook, which was assessed to be convenient to be used as a basic course book between 1993 to 1999 in terms of content, educational design, visual presentation, language and narration of subjects, existing problems were detected with regard to the foregoing criteria (Ünsal & Güneş, 2003).

In a study performed with a sample of limited number of students to determine readability of 9th grade geography textbook and its appropriateness for age level of target students, readability level of the book is determined to be low according to the CLOZE test. According to the findings obtained by applying solely the FOG formula out of formulas for readability, the textbook was stated to be appropriate target age level (Ulu Kalın & Topkaya, 2007). In another study performed on 12th grade geography textbook, a limited number of students were taken as a sample and as a result, readability level was determined to be low under the CLOZE test (Ulu Kalın, Çapuk, Topkaya & Alım, 2009). In our study examining the readability of 10th grade geography textbook on the basis of different types of schools, readability was determined to be quite low under the CLOZE test, particularly for vocational and ordinary high schools. On the other hand, the FOG test yielded an appropriate value for age level (Turan & Geçit, in press).

In a study with the purpose of evaluating current science textbooks with some formulas of readability in 2001, readability formulas were applied to 6 different textbooks instructed in different grades (6th, 7th, and 8th) of schools under the Ministry of National Education and it was concluded that these formulas did not yield a precise reading age for Science textbooks in Turkish. For this reason, new formulas are produced on the basis of the FOG and SMOG formulas (Çepni et al., 2001). The study in which the FLESH, SMOG, FOG, FRY tests were adapted to Turkish by Çepni, Gökdere and Küçük (2002) and various science textbooks were examined is also noteworthy.

Limitations

Items providing data to the CLOZE test are limited to the participation of 472 students attending to various high schools in different Turkish cities in 2009/2010 academic year. For other tests and formulas, the limitation is defined by the analysis which is made only on the relevant paragraphs in the examined textbooks.

Method

Model of Research

This study conducted with the purpose of determining the readability levels of high school 9th and 11th grade geography textbooks is assessed to be a descriptive study, due to the reason that descriptive studies carry out research to enlighten a situation, make evaluations in line with applicable standards and to reveal the relation between events by working on the existent events without making any changes on the research environments (Çepni, 2009, p. 64).

Sampling

We used random sampling in our study. We drew the samples randomly from a bag containing names of schools located at the city centers of 3 different geographical regions. We tried to improve the universal representability characteristic of the sample through creating a homogeneous group from a set of common high school types in our country. Sampling is constituted by students from different types of schools from various parts of Turkey in compliance with the purpose and content of this study. The sample includes a total of 472 students during 2009–2010 academic year from Muş Science High School (20), Muş Anatolian High School (78), Trabzon Akçaabat Anatolian High School (84), Trabzon Merkez Vocational High School for Girls (96), İstanbul Üsküdar Çengelköy High School (98) and İstanbul Ümraniye Namık Kemal High School (96), respectively. Among these students, 296 are in 9th grade and 176 are in 11th grade.

Collection of Data

In this study, data are collected in two forms in compliance with the purposes of the CLOZE and FOG tests with proven validity and reliability by internationally conducted studies and the FLESH, SMOG readability formulas, as examined in detail in the introduction part. Initially, texts of approximately 270-275 words are selected for the CLOZE test from Geography textbooks of 9th and 11th grades of intermediate education published by the Head Council of Education and Morality under Ministry of National Education. In these texts, the first sentences are left untouched. Then, a text with blanks is formed by

means of randomly removing one in every 5-6 words starting from the second sentence. Students are requested to fill in the blanks correctly.

At the second phase of research, different paragraphs are selected from various parts of the same book to be used for the FOG test as well as the FLESH and SMOG formulas and paragraphs are evaluated with the version of tests and formulas determined by us as adapted to Turkish. Out of these tests and formulas, the FLESH formula has been improved to be compatible with Turkish grammar structure by Ateşman (1997) and likewise, the SMOG formula and the FOG test by Çepni, Gökdere and Taş (2001) and as indicated in the Literature Search section above, these have been used in many country level studies. Furthermore, all texts are selected randomly from textbooks as a requisite by the procedures of these tests and formulas with international validity. By this means, readability levels of texts in the book and their appropriateness for target student age levels are attempted to be revealed.

Analysis of Data

Data are analyzed in accordance with the procedures of the CLOZE and FOG tests as well as the FLESH and SMOG formulas. With the CLOZE test, readability of geography textbook is determined with replies given by students from different types of schools. Again, readability of books are tried to be determined with the FLESH formula while appropriateness of readability of paragraphs contained in the book for student age level is examined with the SMOG formula and FOG test.

Findings

Readability of 9th and 11th Grade Geography Textbooks according to the CLOZE Test

According to the CLOZE test, the number of students getting 60 points and over is only one and that student was from a Science High School. More than half (55%) of 20 high school students forming the sample got points between 40 and 60. It is noteworthy that even for these type of schools, the number of students getting 40 points and lower is around 40%. In Anatolian High School type for 9th grade students, results were also similar. The only and the most obvious difference is the lack of students getting 60 points and over. Results obtained

from Ordinary and Vocational High Schools are much more negative. More than 80% of their students received 40 points or lower.

The test could only be applied to students of Ordinary and Anatolian High School students, since 11th grade geography course is instructed in these types of schools as a common mandatory course for the relevant departments. A significantly major percentage of students in Ordinary High School type (97%) received 40 points or lower. While approximately 40% of Anatolian High School students received points between 40 and 60, it is worth of attention that the percentage of students in this group getting 40 points or lower was 60%.

Readability Levels of Textbooks according to the FLESH Formula as Adapted to Turkish by Ateşman

Readability Number = $198,825 - 40,175x_1 - 2,610x_2$

X_1 = Average word length in terms of syllables

X_2 = Average sentence length in terms of words.

Readability level of 9th grade geography textbook was determined by applying the FLESH formula which is adapted to Turkish by Ateşman on 3 separate paragraphs. Significant differences are observed between paragraphs with respect to this formula procedure. For example, while readability level of 1st paragraph has medium difficulty according to the formula developed by Ateşman, it is seen to be easier compared to the other 2 paragraphs. The value 52,362 calculated as the average of third paragraph is an indicator of the book's readability level being at medium difficulty in general. However, it should be emphasized that readability measurement is related with the style of text in general. This information is limited only with the book's degree of difficulty and does not indicate whether the text is good or bad (Ateşman, 1997, p. 74).

When we look at the readability degrees of paragraphs in 11th grade geography textbook, it is remarkable that they are not completely parallel to each other; particularly 3rd paragraph is quite more difficult compared to other two paragraphs. When the average of three paragraphs is taken, a value of 59,215 is derived which confirms that the readability of the book is at medium difficulty.

Appropriateness of Books for Target Student Age Levels According to the FOG Test Adapted to Turkish By Çepni, Gökdere and Taş (2001)

As a result of the examination of 3 paragraphs selected from 9th grade textbook as per FOG test procedure, the formula adapted to Turkish by Çepni, Gökdere and Taş is implemented and the following findings are derived:

$S = \text{Total Number of Words/Number of Sentences}$

$N = \text{Total Number of Multi-syllable Words(four or more)/Number of Sentences}$

US Class Level = $0,6 (S + N)$. By adding 5 to US Class Level, reading age is obtained.

Different results are obtained in the analysis of paragraphs made to determine the appropriateness of 9th grade textbook for target student age level. Assuming the 9th grade age average is 15 in our country, the fact of 1st paragraph in particular being far below this age level is revealed. When the average of three paragraphs is taken, the derived value of 14,6 is seen to be near the average age level.

In our country, 11th grade student age level is around 17 on the average. It is understood that the first two of examined paragraphs are below this level, while the last paragraph is at this level. When the average of three paragraphs is taken, the derived value of 16,1 indicates that the book is slightly below the target student age level.

Appropriateness of Books for Target Student Age Levels According to the SMOG Formula Adapted to Turkish by Çepni, Gökdere and Taş (2001)

As a result of the examination of 3 paragraphs selected from 9th grade textbook as per SMOG formula procedure, the formula adapted to Turkish by Çepni, Gökdere and Taş is implemented and the following findings are derived:

3 paragraphs, each with 10 sentences and approximately 100 words are selected from beginning, middle and end of the textbook.

Total number of words with 3 or more syllables in 30 selected sentences.

Square root of the total is taken.

8 is added to the result obtained and thus, reading age is found (Wellington, 1994, p. 178).

The number of words with four and more syllables in total in the three paragraphs selected from the 9th grade textbook is 87. When the square root of this value is taken and 5 is added to the square root value (approximately 9,3), 14,3 age value is obtained. Accordingly, according to the evaluation made with the adapted SMOG formula, it could be said that the readability of 9th grade textbook is lower than normal level, since it is already known that average age value for 9th grade in Turkey is around 15.

All 3 paragraphs selected from 11th grade geography textbook is evaluated with the same method and the appropriateness of the 11th grade geography textbook for the target students age level is tried to be found.

Total number of words with four or more syllables in this paragraph = 36

At the end of the examination made on three paragraphs of 11th grade geography textbook, 108 words with four or more syllables are found. As required by the applied formula, when square root of 108 is taken and 5 is added to it, 15,4 is obtained which is a value far below the 11th grade student age level in our country.

Discussion

As a result of this study with the purpose of evaluating the 9th and 11th grade geography textbooks with certain readability tests and formulas with international validity, important findings are obtained.

As a result of this study, the readability of stated textbooks is determined to be inappropriate for almost all types of schools under the CLOZE test. However, this appropriateness degree is somewhat closer to the average for Science and Anatolian high schools. The findings' being far below the average especially for vocational and ordinary high schools indicates the need to revise these textbooks with respect to readability. As known, more successful students coming from elementary schools attend Science and Anatolian types of high schools in our country, while students with lower success levels attend Ordinary and Vocational types. However, despite all these differences, the readability degree of existent textbooks should be determined by taking into account all such student profiles in order to be able to meet both the general objectives of national education and the basic objectives of geography course

As a result of implementation of the FLESH formula designated for determination of readability levels of books and improved by Ateşman in accordance with Turkish grammar structure, readability levels of both books are determined to be at medium difficulty. Again, we think that these textbooks should certainly be revised by taking into account the readiness levels of vocational and general high school students in particular. The reason is that the mentioned textbooks are full of many geographical concepts and terms. Addition of readability level problems to the intensity of such concepts and terms may lead to courses to be boring and the topics to be stuck at abstract levels for students.

According to the FOG test and the SMOG formula adapted to Turkish by Çepni, Gökdere and Taş (2001) with the purpose of determining appropriateness of texts in the book with student age level and in which syllable and word length standards in Turkish texts are also considered, the textbooks are seen to be generally below target student age level. While the FOG test yields to outcomes quite closer to average values, the SMOG formula results are noticed to be far away from average on the basis of 11th grade geography textbook.

It is striking that readability levels of books are above the student age level under the CLOZE test and the FLESH formula, while these books are under age level of target students under SMOG formula. In fact, this situation makes it necessary to develop new formulas for readability levels of texts, since most of the applied formulas are developed on the basis of word and sentence lengths only. Furthermore, tests and formulas should also be developed taking the words cited in texts which are not known by the students into account.

Moreover, these internationally valid tests and formulas give certain information regarding the difficulty or easiness of the texts. In other words, the difficulty level of texts is displayed by their qualitative characteristics. Formulas and tests should be developed for measuring qualitative characteristics of texts besides these quantitative characteristics.

As a consequence, it is necessary to pay attention to appropriateness of the texts for student levels while writing geography textbooks and this appropriateness should be checked with current tests or those to be developed. In this context, the books should be written by authors with a reasonable command on readability formulas and a good knowledge of Turkish grammar structure and characteristics, and experts of the indicated subjects should be designated in control commissions.

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