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The Readability and Design of Health Education Materials*

Sağlık Eğitim Materyallerinin Okunabilirliği ve Tasarımı

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Original Research

Abstract

Objective: The aim of the study was to assess readability and design of health education materials.

Methods: This is a descriptive study. Thirty-seven education materials prepared by Denizli Provincial Directorate of Health and Turkish Republic Ministry of Health and used in primary health care services in Denizli were examined in this study. Flesch Reading Ease Score and Turkish Readability Value were used to evaluate readability of the health education materials. The design of health education materials were evaluated using a twenty-seven-item list developed by the researchers.

Results: Mean Flesch Reading Ease score was 44.59±23.46, and mean Turkish Readability Value was 11.02±3.63. The results indicate that those health education materials are difficult to read. The design of the education materials, although the title, information, content, and language were superior, page layout, writing style, and figures were inappropriate.

Conclusions: The readability levels were found higher than the level of sixth grade. Therefore, it is recommended that the health education materials should be reorganized for easier reading comprehension, and their organization and design as well as their readability should be evaluated for the sake of comprehensibility so that those materials can fulfill their purposes.

Keywords: Readability, Health education, Handbooks.

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Öz

Amaç: Bu çalışmanın amacı sağlık eğitim materyallerinin okunabilirliğini ve tasarımını değerlendirmektir.

Yöntem: Tanımlayıcı bir çalışmadır. Bu çalışmada Denizli’de birinci basamak sağlık hizmetlerinde kullanılan, Denizli İl Sağlık Müdürlüğü ve Türkiye Cumhuriyeti Sağlık Bakanlığı tarafından hazırlanan 37 eğitim materyali incelenmiştir. Sağlık eğitim materyallerinin okunabilirliğinin değerlendirilmesinde Flesch okuma kolaylığı puanı ve Türkçe okunabilirlik değeri kullanılmıştır. Sağlık eğitim materyallerinin tasarımı araştırmacılar tarafından geliştirilen 27 maddelik liste ile değerlendirilmiştir.

Bulgular: Flesch okuma kolaylığı puanı $44,59 \pm 23,46$, Türkçe okunabilirlik değeri $11,02 \pm 3,63$ ’dür. Bu sonuçlar sağlık eğitim materyallerinin okumak için zor olduğunu göstermektedir. Eğitim materyallerinin tasarımında başlık, bilgi, içerik ve dil çok uygun, sayfa yapısı ve yazım stili, şekiller uygun değildir.

Sonuçlar: Okunabilirlik düzeyi altıncı sınıf düzeyinden daha yüksek bulunmuştur. Bu nedenle, okuyucular tarafından kolay anlaşılabilmesi için yeniden düzenlenmesi önerilmektedir. Sağlık eğitim materyallerinin amacına ulaşabilmesi ve daha kolay anlaşılabilmesi için okunabilirliğinin yanı sıra düzen ve tasarım açısından da değerlendirilmesi önerilmektedir.

Anahtar kelimeler: Okunabilirlik, Sağlık eğitimi, Broşürler.

Introduction

The maintenance and improvement of health depends on people changing their lifestyles, as well as their advancement in health sciences. Health education is one of the most successful ways to encourage this. Written education materials are commonly used in health education.¹ These materials reinforce and help to internalize verbally given information. They help individuals to recognize their own problems and select the best solution, to determine the kind of assistance they need from health professional and how to meet these needs.²

The literacy and education levels of the target group are quite important for the success of health education. This is why written education materials should be appropriate to education level of the target group.³

A series of studies found considerable differences between the grade levels of target groups and the readability levels of their health education materials (HEMs). It has been found that HEMs are often too difficult for the target groups to read.^{2,4-6} Nurses are responsible for the creation and dissemination of health education materials in their practice areas, better understanding of the diverse components related to health literacy, including tools to measure the readability of materials, will assist healthcare providers in the design and implementation of improved health education materials.⁶ For this reason, readable, well-designed and easily understandable written education materials should be developed in health education.

Readability, an important attribute of written material, affects the reader’s ability to comprehend. Readability describes ease of comprehension and is calculated using mathematical formulas that assess the difficulty of a document’s vocabulary and sentence length.⁴ DuBay (2004) reported that Klare defined readability as ease of comprehension and understanding based on writing style.⁷ Readability is the reader’s ability to understand a text.⁸

Various analyses were used to assess the readability level of written materials.^{4,5,7,9} The most commonly used include the Flesch-Kincaid (FK), the Flesch Reading Ease (FRE), and the Simple Measure of Gobbledygook (SMOG).¹⁰⁻¹³ The results obtained using these formulas indicate the education level that the written materials suit.

It has been recommended that HEMs be written at no higher than a fifth grade reading level.⁴ Even individuals with higher reading levels were found to prefer information that is written at lower levels, as it is easier to comprehend and takes less time to read.¹⁴ HEMs written at a high reading level are difficult for many readers to understand, and thus less effectively pass on the intended message than those written at a lower grade reading level.¹⁵

Readability formulas provide quantitative information about the readability of the written education materials. The data obtained using readability formulas do not give exact results regarding the comprehension or incomprehension of texts. In other words, by using only these data, one cannot decide whether a text is easy, difficult or superior for a given grade level. The design parameters of education materials, such as page layout and writing style, figures, headings, information, content and language should also be used to obtain qualitative data, which is considered important for the multi-dimensional evaluation of education materials. Thus qualitative data and the quantitative data obtained using readability formulas will be combined, and a more objective assessment can be made.¹⁶

The readability of HEMs were evaluated for a variety of healthcare topics, including mental health,¹³ cancer education,¹⁷ strokes,¹⁰ dental care,¹⁸ breastfeeding,¹⁹ physical activity²⁰ and newborn screening,²¹ but few focused on community-based settings serving low-income populations. In addition, there are few studies in the literature that examine the readability of Turkish HEMs given to individuals for health care. For this reason, the purpose of this study was to measure the readability and design of HEMs.

Two research questions guided this study:

1. What are the readability levels of education materials that used in primary health care in Denizli?
2. What are the design suitability of education materials that used in primary health care in Denizli?

Methods

This is a descriptive study that assesses the readability and design of HEMs.

Procedure

The population of the study consisted of health education materials sent to primary health care by Denizli's Provincial Directorate of Health in 2011. In this study were examined education materials that prepared by Provincial Directorate of Health and by the Ministry of Health. The researchers gathered all education materials from Provincial Directorate of Health. The sample is not selected and reach all of the education materials (n=37). Of the education materials included in this study, twenty were prepared by Provincial Directorate of Health and seventeen were prepared by the Ministry of Health. All of the education materials examined in this study are written in Turkish.

Education materials examined in this study cover a variety of topics in health education. These are the titles of the HEMs: Nutrition for Primary School Students, Developmental Dysplasia of the Hip, Pesticide Poisoning, Infant Nutrition, Iodized Salt, Healthy Milk, Thalassemia, Coping with Stress, Newborn Screening, Obesity, Breast Self-examination, Menopause-Osteoporosis and Nutrition, Cancer and Nutrition, Chronic Obstructive Pulmonary Disease, Physical Activity, Diabetes, Vaccines, Carbon monoxide Poisoning, Breast Milk, Diarrheal Diseases, Botulism, Sleep Disorders, Weight Control, Family Planning, The Importance of Breakfast, Violence against Women, Smoking and Health.

The Evaluation Process

Readability Assessment. The readability of HEM was determined using two tools: Flesch Reading Ease (FRE), Turkish Readability Value (TRV).

Flesch Reading Ease is not the only available readability formula; however, the FRE is one of the most frequently used in the health education literature.^{9,18,21} The Flesch Reading Ease uses average sentence length and average syllables per word to determine reading ease. This readability measure is calculated by using the following formula: $206,835 - 1,015 \times (\text{average number of words per sentence}) - 84,6 \times (\text{average number of syllables per word})$.^{7,22}

FRE scores range from 0 to 100, with a lower score being more difficult to read than a higher score. It uses sentence length and polysyllabic words to determine difficulty and does not assign a grade level. It is the standard used by most of the insurance industry for consumer documents and contracts. A score of 70 or above is described as “easy” and is written at the grade school level. A score of 60 to 70 is described as “standard” and is written at approximately at the high school level. A score of 60 or below is described as “difficult.” Table 1 shows the FRE ranking scores and their estimated reading grade levels.^{6,7,21,22}

The Turkish Readability Value was developed by Bezirci and Yılmaz. The formula is as follows: $(\text{average number of words per sentence}) \times (\text{three-syllable word count} \times 0,84) + (\text{four-syllable word count} \times 1,5) + (\text{five-syllable word count} \times 3,5) + (\text{six-syllable word count} \times 26,25)$, and the square root of the result gives Turkish readability value. This value shows the degree of readability by education level in Turkey (Table 1).²³

The Design of Written HEMs. A twenty-seven item list derived from the literature on health education was developed by the researchers to assess the design of HEM.^{4,24-27} This list is divided into five categories: page layout and writing style, figures, headings, information and content, and language. The list contains nine items in *page layout and writing style*, two items in *figures*, two items in *headings*, four items in *information and content* of education materials, and ten items in *language* (as shown in Table 4). Each of the twenty-seven items is rated in terms of the degree to which they meet set criteria, on a scale of 2 (superior), 1 (adequate) or 0 (inadequate). All 37 education materials were independently evaluated and scored by two researcher. The mean design of HEMs scores were used in the analysis. In pilot study, 10 health education materials were evaluated by three nurse researchers. It was determined to be understandable items.

Ethical considerations

The Denizli Provincial Health Directorate granted written permission to evaluate of educational materials.

Data analysis

The data were analyzed with a computer using Excel and SPSS 15.0 Packet software. The readability of HEM was assessed using FRE and TRV. Readability levels for each brochure were calculated as mean scores. The design of the education material was evaluated using numerical and percentage values.

Limitations

The study analyzed a total of thirty-seven written health education material used in 2011. Only brochures in Turkish were evaluated in this study. The study results may be generalized for this kind of education materials.

Results

Table 1. Classification of Readability Values

	<i>Score</i>	<i>Estimated reading grade</i>	<i>Reading difficulty</i>
Flesch Reading Ease	90-100	5 th grade	Very Easy
	80-90	6 th grade	Easy
	70-80	7 th grade	Fairly Easy
	60-70	8 th -9 th grade	Standard
	50-60	10 th -12 th grade	Fairly Difficult
	30-50	13 th -16 th grade	Difficult
	0-30	College graduate	Very Difficult
Turkish Readability Value	6-7	6 th -7 th grade	
	8-9	8 th -9 th grade	
	10-11	10 th -11 th grade	
	12 or more	12 th grade and above	

A total of thirty-seven education materials were reviewed. Readability scores for the education materials as measured by FRE and TRV are presented in Table 2. The mean FRE score was 44,59 ± 23,46 (13th -16th grade), the mean TRV was 11,02±3,63 (eleventh grade).

Table 2. Flesch Reading Ease and Turkish Readability Value Readability Scores

<i>Readability</i>	<i>Range (min-max)</i>	<i>Mean</i>	<i>SD</i>	<i>Grade</i>
Flesch Reading Ease	5.52-112.85	44.59	23.46	13 th -16 th grade
Turkish Readability Value	6.82 - 21.55	11.02	3.63	11 th grade

The reading levels of the HEM are shown in Table 3. The majority (45,9%-30-50) of the readability levels of the education materials were scored as difficult by the FRE (13th-16th grade, difficult) and as difficult (12 or more) by the TRV score.

Table 3. The Distribution of Readability Scores According to Grade Level

	<i>Score</i>	<i>n</i>	<i>%</i>
Flesch Reading Ease	90-100	2	5.4
	80-90	-	-
	70-80	1	2.7
	60-70	6	16.2
	50-60	2	5.4
	30-50	17	45.9
	0-30	9	24.3
Turkish Readability Value	6-7	6	16.2
	8-9	8	21.6
	10-11	8	21.6
	12 or more	15	40.6

Table 4 presents the frequency of design of HEM scores for each evaluation criterion. Considering page layout and writing style, the font color of 67.6% (n=25) and font type of 62.2% (n=23) were found to be superior, while font size of 51.4% (n=19) were found to be inadequate. The analysis of the figures indicated that their comprehensibility was 51.4% (n=19) adequate, and the figures of 45.9% (n=17) were deemed superior considering the subject content. All the HEM examined in the study were well-designed with regard to headings, and the majority were well-designed in terms of information, content and language.

Table 4. The Design of Health Education Materials (n=37)

Criteria	Score of 2 (superior)		Score of 1 (adequate)		Score of 0 (not adequate)	
	n	%	n	%	n	%
1. Page Layout and Writing						
a. Cover design	10	27.0	18	48.6	9	24.3
b. Location of text and spaces	14	37.8	18	48.6	5	13.5
c. Background color	22	59.5	11	29.7	4	10.8
d. Large white space	19	51.4	13	35.1	5	13.5
e. Paragraph length (4-5 lines)	10	27.0	16	43.2	11	29.7
f. Line length	11	29.7	17	45.9	9	24.3
g. Font color	25	67.6	9	24.3	3	8.1
h. Font size (12 or higher)	12	32.4	6	16.2	19	51.4
i. Font type	23	62.2	9	24.3	5	13.5
2. Figures						
a. Understandability of figures	12	32.4	19	51.4	6	16.2
b. Appropriateness of figures for content	17	45.9	16	43.2	4	10.8
3. Headings						
a. Appropriateness of headings to content	31	83.8	6	16.2	-	-
b. Font type of headings	37	100.0	-	-	-	-
4. Information and content						
a. Accuracy of information	34	91.9	3	8.1	-	-
b. Suitability of information to local culture	34	91.9	3	8.1	-	-
c. Availability of information	34	91.9	3	8.1	-	-
d. Not using unnecessary information and details	28	75.7	7	18.9	-	-
5. Language						
a. Understandability of language	12	32.4	24	64.9	1	2.7
b. Not using unnecessary repetitions and wordiness	35	94.6	2	5.4	-	-
c. Short and clear sentences	22	59.5	15	40.5	-	-
d. Not using words complicating meaning	22	59.5	15	40.5	-	-
e. Turkish counterparts of foreign words	30	81.1	7	18.9	-	-
f. Unexplained terminological language (jargon)	31	83.8	6	16.2	-	-
g. Literary language	17	45.9	19	51.4	1	2.7
h. Writing rules	36	97.3	1	2.7	-	-
i. Not using typographical errors and misspelled words	36	97.3	1	2.7	-	-
j. Grammar	36	97.3	1	2.7	-	-

Discussion

The Readability of HEMs. Written patient education materials are one way to help empower patients.²⁸ Written HEMs should be produced at a level likely to be understood. The readability of a written education material is an objective measure of the reading skills an individual must possess to understand that material.²⁹ The readability of HEMs examined in this study was assessed by FRE and TRV scores. The mean FRE score was 44.59 ± 23.46 (13th-16th grade), the mean TRV was 11.02 ± 3.63 (eleventh grade) (Table 2). The standard deviation of FRE scores indicate that there was a wide range of readability for HEMs. The relatively high standard deviation scores are consistent with the range scores. As a result of both calculations, the readability levels of education materials were determined to be difficult.

It has been recommended that the readability of patient education materials should not be higher than the sixth to eighth grade level.^{4,6,29} The average duration of school attendance in Turkey is 6.5 years,³⁰ meaning that these education materials were prepared in at a higher level than the education level of the public. The reading levels of HEMs, as measured by the two readability tools used by this study, were above the recommended reading level for written HEMs, making them difficult for the average adult reader.

Several studies found that printed health information materials are often written at a high reading level. The FRE score of 35 education materials for a low-income population studied by Wilson (2009) was found to be 63.40 (eighth and ninth grade), while the FRE score of parent education materials was found 53.26 (tenth to twelfth grade) in Arnold's study (2006).^{6,21} Shieh and Hosei (2008) determined that 86% of the printed materials from the community and 53% from the Healthy Start program required a reading grade level higher than the recommended sixth to eighth grade. In the same study, the readability levels of written education materials were found to be ninth grade or higher.¹⁵ Similarly, Kaya and Kaya (2008) determined that the FRE score of twenty education materials was 49.74 ± 18.64 , which is above the twelfth grade reading level.² Other studies show that HEMs are not written in a way that can be easily read by their target groups.^{31,32} Our findings are in line with the findings of earlier studies.

The Design of HEMs. The content and design characteristics of HEMs have received far less attention in the literature than the issue of reading levels. However, these features can also influence the comprehension of information.^{4,10} Therefore, for easy readability and understandability, it is important to design education materials with suitable page layout and writing style, figures and language, as well as headings, information and content. Health professional should improve themselves in these fields for developing education materials.¹⁶ This study analyzed the design of HEMs according to five categories.

Page layout and writing style: The layout and writing style of HEMs are quite important. When the layout and writing style of the education materials are not designed to simplify the reading, they cannot be well understood by readers regardless of the quality of the content.²¹ In terms of page layout and writing style, half of the education materials used superior font colors (67.6%) and font types (62.2%); however, some features such as cover design, paragraph lengths, line lengths and font size were found inadequate and should be improved. Hoffmann and McKenna (2006) showed that,

although 89% of the written education materials were adequate in terms of content and design, some areas like stimulation that encourages reader interaction, summaries of sections or the entire material, font sizes of at least 12 point, and captions that explain figures needed to be improved. These features can easily be incorporated into the written materials to enhance their suitability as education materials.¹⁰

Figures: One of the best way for attracting attention and interest in education is the use of visual elements that support the words. A single image can substitute for many words.³³ Embellishing education materials with suitable images, figures and graphs simplifies the learning process and helps readers to recall what they have read. Furthermore, it makes the material more attractive and interesting, and can draw attention to important clues and guidance. Thus a sufficient number of simple, realistic and conspicuous images, figures and graphs should be included in HEMs.³⁴ In terms of figures, this study found that the comprehensibility of figures was adequate in 51.4% (n=19) of the education materials analyzed and it was superior in 45.9% (n=17) in terms of compatibility with the content. Demir et al. (2008) and Akansel, Aydin' s (2011) studies, found that the pictures/graphs of the of the materials were found inadequate.^{25,35} Using well designed and understandable pictures and graphs are important to give desired message along with the text.

Headings: Headings that helped make the message clearer and easier to follow were short and explanatory or used question-and-answer formats, rather than single words or abstract phrases that might not be understood by the general public. Any titles or subheadings should be larger than the main text and clearly visible.²¹ Appropriateness of headings to content was found to be superior in 83,8% of the HEMs, and font style was found to be superior in all of the analyzed materials (100%). Arnold et al. found that most brochures used headings to break up text and to let parents know what would be discussed next, but 84% needed at least some improvement in this area.²¹

Information and content: Simple and understandable information and content should be presented in education materials to make them effective. The format of the written material should be understandable so that people can learn the information they need. When information in education materials is written in an obscure style that people cannot easily understand, it complicates the learning process.³⁶ In the current study, almost all the education materials suitably present accurate and up-to-date, useful, culturally appropriate information and contain inappropriate, unnecessary information and details. Akansel and Aydin's study found that the aim of the most materials were easy to understand and content was open. Cultural suitability of the materials was found to be moderate for Turkish population.³⁵ Demir et al. (2008) found that cultural suitability of the materials were complete.²⁵ Hoffmann and McKenna (2006) gave all the materials they considered superior scores in cultural appropriateness.¹⁰ The findings of the current study are compatible with the results of Demir et al. (2008) and Hoffmann and McKenna (2006).

Language: Long sentences and complicated sentence structures make texts difficult to read. The current study found education materials superior prepared in terms of grammar and writing rules. Furthermore, the majority of the materials do not have typographical errors and misspelled words, unnecessary repetition and wordiness. The Turkish counterparts of foreign words are used in the materials, and they were superior terminologically. Although the use of medical terminology in patient education materials is often unavoidable, it has a profound impact on readability because of

the use of polysyllabic medical terms. Medical terms should always be defined, and less complex words should be used whenever possible.⁶ Arnold et al. made an some effort to use short sentences (88%) and familiar words (82%) in most of their education materials.²¹ Johansson et al. found that most of the materials (96%) included no medical jargon or other technical terms. All the materials (100%) used short and simple sentences.²⁸ We found the language of the education materials we analyzed to be generally either superior or adequate. We may thus infer that language is deemed sufficiently important by those who are preparing the education materials.

Our findings regarding the design of HEMs show that headings, information and content, language are more carefully prepared than page layout and writing style, figures.

Conclusion

This study indicates that these HEMs are difficult to read. The target group in health education consists of people with different education levels. Therefore, the readability of the education materials should also cover the primary school level. The HEMs were found to be written on a level higher than sixth grade, and they should therefore be revised to facilitate reader comprehension.

Furthermore, although the headings, information, content and language are superior prepared, the design of the materials, should be improved with regard to page layout and writing style, figures. Nurses must serve as patient advocates, have a key role in educating, and incorporate literacy assessment and health education techniques for health literacy into daily practice. Patient education materials must be at appropriate literacy levels, demonstrate cultural competence, and use multiple strategies to convey educational topics.⁶

In line with these results, culturally and linguistically appropriate formulas and criteria should be developed to evaluate the readability and design of written HEMs, and the reliability and the validity of these scales should be tested. In addition to the readability of the materials, design should also be examined to obtain qualitative data. Further studies are needed to determine the readability and assess the design of the written HEMs developed by nurses.

Practical Implications

The use of HEMs is an important part of our practice. Nurses must expand their knowledge of all aspects of literacy and readability and take a proactive role in assessment and development of HEMs. Nursing staff also need to get feedback on how well educational materials serve their purpose so that they make meaningful contributions to the updating and revision of those materials.²⁸

Since clear and easily understandable education materials effectively increase the responsibility of patients and their capacity for self-care, HEMs must be examined for readability to find out whether they are superior for the target group.

Contribution of Authors

Design of Study: F H İ

Data Collection or/and Analysis: F H İ, N K, İ Ö-Ç, G K-A, A K

Preparation of Manuscript: F H İ, N K, G K-A, İ Ö-Ç, A K

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