



# Readability and Suitability Assessment of Adolescent Education Material in Preventing Hookah Smoking

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Received 2018 August 10; Revised 2019 January 25; Accepted 2019 January 28.

## Abstract

**Background:** Educational material is frequently used by health providers to inform adolescences about the health hazards of hookah. However, little attention has been paid to the readability and suitability of these adolescent educational materials.

**Objectives:** The aim of this study was to determine the readability and suitability of adolescent educational material in preventing hookah smoking.

**Patients and Methods:** Multiple authoritative resources were chosen for the design and preparation of educational material and were then tailored to the target group. Readability was measured by using the readability assessment of materials (RAM); and suitability was determined by the suitability assessment of materials (SAM) that considers characteristics such as content, graphics, layout/topography, and cultural appropriateness. Fifteen reviewers, including 10 adolescents and 5 health experts scored the educational material.

**Results:** The mean readability score  $\pm$  standard deviation (SD) of the educational media was  $9 \pm 1.9$ ,  $10 \pm 1.1$ , and  $9 \pm 1.7$ , for the pamphlet, brochure, and poster, respectively, which were increased to  $15 \pm 1.3$ ,  $17 \pm 0.7$ , and  $16 \pm 1.5$  after tailoring the content. The average SAM scores before and after tailoring the content were 79% for the pamphlet, which was increased to 90%; 81% for the brochure, which was increased to 93%; and 79% for the poster, which was increased to 93%. The increase in all scores was significant ( $P < 0.05$ ). The final tailored educational material was rated "superior media" on the SAM ratings.

**Conclusions:** The findings indicated that the readability and suitability of the educational material were increased. Compliance with these recommendations may increase the likelihood of consumer perception and recall.

**Keywords:** Smoking Water Pipes (Hookah), Adolescent, Educational Technology

## 1. Background

Increasing people's knowledge and health literacy can help prevent health problems (1). Poor health is an independent risk factor for low use of preventive services, higher hospital admission, medication non-adherence, and mortality, and is a consequence of inadequate health literacy (2).

Health literacy is the ability to obtain, read, understand, and use the information in order to make appropriate health decisions and follow instructions for treatment

(3). Health literacy is essential to promote healthy individuals and communities (4).

Low health literacy has a significant negative impact on both the health care system and individual health (5). One way to increase health literacy is to prepare appropriate educational material and tailor it to the target group (6). The benefits and importance of providing adolescences with education are widely confirmed. Educational material is frequently used by health workers and have advantages such as portability and consistency (7). Much

of this information is forgotten, when only oral information is provided. Thus health workers are encouraged to provide written educational material to people to reinforce and supplement information that has been provided orally (8).

The instrument used to assess the appropriateness of written material are readability and suitability. Readability refers to the easiness or difficulty of reading an educational medium. However, readability alone is not enough for improving perception. Suitability offers a systematic method to objectively assess the suitability of health information materials for a particular audience in a short time (9).

One of the hazardous lifestyle factors, especially among adolescents and young people is tobacco use (10). Smoking, especially hookah smoking, is the leading cause of preventable death. Hookah is as addictive as traditional cigarettes and is hazardous to a smoker's health (11). The prevalence of hookah consumption among young people and adolescence is increasing around the world (12).

Hookah tobacco is often flavored with molasses, fruit pulp, honey, artificial fruit flavors, coconut, mint, or coffee. Flavorings sweeten the taste and aroma of tobacco and make it more appealing, especially in young people (13).

Tobacco smoke contains more than 4000 different chemicals, which most of them are produced during the process of burning and it contains more than 40 carcinogens, including hydrocarbons and heavy metals (14).

Smoking causes different diseases and it is better to avoid all tobacco products because none of them are safe (15). People who smoke hookah are at risk of many illnesses such as respiratory disease, cardiovascular disease, cancer, infertility, and oral and dental problems (16). Hookah can also cause digestive diseases, respiratory infections, and herpes through oral tube (17).

About 8 million tobacco-related deaths are predicted by 2030 (18) and if this trend continues, it is predicted that one billion people will die by the end of the 21st century due to smoking Tobacco (19).

A survey among high school students in Iran, about the prevalence of smoking hookah, indicated that 51.9% of the boys and 34.4% of the girls smoked hookah (20). Another study done in Tehran reported a prevalence of 29% of hookah use among Iranian students (21). A study among students at the University of Florida (USA) indicated that 46.4% of students smoked hookah (22) and another study in Jordanian medical students showed that 59% of males and 13% of females smoked hookah (23).

Given the tendency of some adolescents to use hookah, it is necessary to use educational material to educate them about the harms of hookah and its usage. For all target groups, written educational material for health issue will

be useful, if it is understood by the recipient (24). Though, little attention has been paid to the readability and suitability of this adolescent education material for preventing hookah smoking.

## 2. Objectives

The aim of this study was to determine the readability and suitability of adolescent education material in preventing hookah smoking.

## 3. Patients and Methods

### 3.1. Study Design and Population

This study was conducted in 2018 in Sirjan, located in the southeast of Iran. The participants enrolled in this study were 10 people (5 male and 5 female) aged between 12 - 15 years old and 5 health experts (2 health education specialists and 3 educational technologists). In order to select 10 adolescents, two schools were selected randomly in Sirjan city, a girls' school and a boys' school. After visiting the selected schools, the participants were chosen randomly from the list of the students.

In this study, media and educational material, including printed material in the health centers, educational books, manuals, pamphlets, brochures, and websites of the Ministry of Health were visited and educational material (pamphlets, brochures, and posters) were made about hookah and their complications. In order to evaluate the appropriateness of the prepared educational material, readability and suitability tools were used. The readability of the material was assessed by "readability assessment of materials" (RAM) and suitability was assessed through "suitability assessment materials" (SAM).

Initially, the educational materials were evaluated technically by the experts. Then, according to their views, the necessary changes were made and the media were tailored according to the target group. Tailored material was then returned to the target group and the suitability and readability were assessed again.

### 3.2. Readability Assessment of Materials (RAM)

RAM assesses the difficulty of reading an educational medium in three parts, which are having a specialized content (range of scores 0 - 6), misspelling (range of scores 0 - 6), and typographical mistakes (range of scores 0 - 6). The range of scores in media readability assessment is from 0 to 18 and the acceptable score is more than 10 (25).

### 3.3. Suitability Assessment of Materials

The SAM incorporates other variables into its assessment. The SAM method rates written materials on 22 factors grouped in 6 categories: “content”, “literacy demand”, “graphics”, “layout and typography”, “learning stimulation and motivation”, and “cultural appropriateness”. Each factor is rated as superior (2 points), adequate (1 point), or not suitable (0 points) (26). Factors that do not apply to the material are rated not applicable. The total possible score is 44, of which 2 points are deducted for non-applicable factors. The ratings for each item are then summed to yield the total SAM score. This is then converted into a percentage score by dividing the total SAM score by the total possible score for that particular material. The material was rated as not suitable (0% - 39%), adequate (40% - 69%), or superior (70% - 100%) (27).

### 3.4. Statistical Analysis

The Kolmogorov-Smirnov (KS) test was used to check the normality of quantitative variables and showed that the data had a normal distribution. The collected data were analyzed by SPSS software version 16. Descriptive statistics were reported for all variables. The mean score of SAM and RAM before and after tailoring was compared using paired *t*-tests. The level of significance in the tests was considered less than 0.05.

## 4. Results

The mean readability score of the educational material was 9, 10, and 9, for pamphlet, brochure, and poster, respectively; which increased to 15, 17, and 16, after tailoring the content (Table 1).

**Table 1.** Mean Score of the “Readability Assessment of Materials” Before and After Tailoring<sup>a</sup>

Readability Score	Materials		
	Pamphlet	Brochure	Poster
Before	9 ± 1.9	10 ± 1.1	9 ± 1.7
After	15 ± 1.3	17 ± 0.7	16 ± 1.5

<sup>a</sup>Values are expressed as mean ± SD.

The result showed the average SAM score for the pamphlet was 79%, which significantly increased to 90% after tailoring the content. Those findings showed the final educational material was “superior media” on the SAM ratings (Table 2).

The average SAM score for the brochure was 81%, which significantly increased to 93% after tailoring the content.

Those findings showed the final educational material was “superior media” on the SAM ratings (Table 3).

The average SAM score for the poster was 79%, which significantly increased to 93% after tailoring the content. Those findings showed the final educational material was “superior media” on the SAM ratings (Table 4).

## 5. Discussion

Each year, a huge amount of funding is spent on the production of educational media that are made according to the needs of the audience, or their cultural characteristics. This is, in particular, true for print media. In fact, educational media have different characteristics and it is the duty of educators to make them aware of what is available to them (28).

Educators must choose the best and most effective type of media and educational methods that suit the needs and level of learners. Standard training material is one of the important factors in better and more effective training. The present study aimed to determine the readability and suitability of some prepared adolescences education material in preventing hookah smoking.

Readability is the ease by which a reader can understand a written text. In this study, analysis of readability showed that most of the initial materials were written at a lower than advised reading level for adolescences. The findings showed that after tailoring, readability improved and the text was well edited and properly laid out for the target group. This finding is consistent with results from the Okuhara et al. study in Japan about the educational material on cancer screening announcements in municipal newspapers (29) and Rhee et al. in the USA about the educational material about rheumatic diseases (9). In these studies, education material was written at a high readability level and had an effect on the target group.

However, the results of Walsh and Volsko in the USA about the readability assessment of internet-based consumer health information (30), is not consistent with this study and the educational material assessed in their study did not have proper readability and were in the category of “difficult” media.

The SAM instrument is a validated method for evaluating written health-related educational materials. It is used to evaluate printed materials in terms of categories and factors known to enhance people’s understanding of printed material (31).

In this study, the average SAM score increased after tailoring the content. Hoffmann et al.’s study in Australia about assessing the suitability of written stroke material was in line with our findings and showed printed material

**Table 2.** Results of the Assessment Pamphlet SAM Score Check List Before and After Tailoring<sup>a</sup>

SAM Item and Description	Score Before Tailoring	Score After Tailoring	P Value	
<b>1- Content</b>				
a. Purpose is evident	2 ± 0.0	2 ± 0.0	0.002	
b. Content about behavior	1.5 ± 0.3	2 ± 0.0		
c. Scope is limited	2 ± 0.0	2 ± 0.0		
d. Summary or review included	1 ± 0.2	1.8 ± 0.3		
<b>2- Literacy demand</b>				
a. Reading grade level	1.5 ± 0.7	2 ± 0.0		
b. Writing style, active voice	1 ± 0.6	2 ± 0.0		
c. Vocabulary uses common words	1.5 ± 0.6	2 ± 0.0		
d. Context is given first	1 ± 0.6	2 ± 0.0		
e. Learning aids via "road signs"	1 ± 0.8	1.5 ± 0.4		
<b>3- Graphics</b>				
a. Cover graphic shows purpose	1.5 ± 0.6	1.8 ± 0.3		
b. Type of graphics	2 ± 0.0	2 ± 0.0		
c. Relevance of illustrations	2 ± 0.0	2 ± 0.0		
d. List, tables, etc. explained	1 ± 0.7	1.4 ± 0.5		
e. Captions used for graphics	2 ± 0.0	2 ± 0.0		
<b>4- Layout and typography</b>				
a. Layout factors	2 ± 0.0	2 ± 0.0		
b. Typography	1.5 ± 0.7	1.5 ± 0.6		
c. Subheads (chunking) used	1 ± 0.7	1.5 ± 0.6		
<b>5- Learning stimulation, motivation</b>				
a. Interaction used	2 ± 0.0	2 ± 0.0		
b. Behaviors are modeled and specific	2 ± 0.0	2 ± 0.0		
c. Motivation-self-efficacy	1.5 ± 0.7	2 ± 0.0		
<b>6- Cultural appropriateness</b>				
a. Match in logic, language, experience	2 ± 0.0	2 ± 0.0		
b. Cultural image and examples	2 ± 0.0	2 ± 0.0		
<b>Total score earned by SAM</b>	35	40		
<b>Percentage points earned by SAM</b>	79	90	Superior media	

Abbreviation: SAM, suitability assessment of materials.

<sup>a</sup>Values are expressed as mean ± SD.

enhance people's understanding. Finnie et al. in a systematic review showed only two of the seven Cancer Education Print and Web-based material were suitable (32).

Thus modifying written educational material and tailoring them according to the target audience is important for facilitating learning and recall of the information.

A limitation of this study was that readability was only assessed for printed material, but it can also be assessed for electronic and audiovisual media. It is also suggested

that precise planning should be done for the production and distribution of educational media in accordance with the readability standards. Also, health care workers who prepare education material should be properly trained for this goal.

### 5.1. Conclusions

The content and design of written education material should be evaluated before using them for adolescences

**Table 3.** Results of the Assessment Brochure SAM Score Check List Before and After Tailoring<sup>a</sup>

SAM Item and Description	Score Before the Tailoring	Score After the Tailoring	P Value
<b>1- Content</b>			
a. Purpose is evident	2 ± 0.0	2 ± 0.0	
b. Content about behavior	2 ± 0.0	2 ± 0.0	
c. Scope is limited	1 ± 0.7	1.5 ± 0.6	
d. Summary or review included	1 ± 0.7	1.2 ± 0.5	
<b>2- Literacy demand</b>			
a. Reading grade level	2 ± 0.0	2 ± 0.0	
b. Writing style, active voice	1 ± 0.5	1.5 ± 0.7	
c. Vocabulary uses common words	2 ± 0.0	2 ± 0.0	
d. Context is given first	1 ± 0.4	2 ± 0.0	
e. Learning aids via "road signs"	1 ± 0.8	1.8 ± 0.3	
<b>3- Graphics</b>			
a. Cover graphic shows purpose	2 ± 0.0	2 ± 0.0	
b. Type of graphics	2 ± 0.0	2 ± 0.0	
c. Relevance of illustrations	1 ± 0.5	2 ± 0	0.011
d. List, tables, etc. explained	1 ± 0.6	1 ± 0.5	
e. Captions used for graphics	2 ± 0.0	2 ± 0.0	
<b>4- Layout and typography</b>			
a. Layout factors	2 ± 0.0	2 ± 0.0	
b. Typography	2 ± 0.0	2 ± 0.0	
c. Subheads (chunking) used	2 ± 0.0	2 ± 0.0	
<b>5- Learning stimulation, motivation</b>			
a. Interaction used	2 ± 0.0	2 ± 0.0	
b. Behaviors are modeled and specific	1 ± 0.3	2 ± 0.0	
c. Motivation-self-efficacy	2 ± 0.0	2 ± 0.0	
<b>6- Cultural appropriateness</b>			
a. Match in logic, language, experience	2 ± 0.0	2 ± 0.0	
b. Cultural image and examples	2 ± 0.0	2 ± 0.0	
<b>Total score earned by SAM</b>	36	41	
<b>Percentage points earned by SAM</b>	81	93	Superior media

Abbreviation: SAM, suitability assessment of materials.

<sup>a</sup>Values are expressed as mean ± SD.

by health care professionals. The value of the SAM is that it can be used to identify specific elements that should be modified before education materials provided to the target group.

The findings indicated that the printed materials were well-matched after evaluation by the RAM and the SAM checklist and they were in accordance with the characteristics of the Adolescents. Compliance with these recommendations may increase the likelihood of consumer com-

prehension.

### Acknowledgments

Researchers would like to thank the research deputy of Shahid Sadoughi University of Medical Sciences, which financially supported this research and all of the individuals who participated in this study.

**Table 4.** Results of the Assessment Poster SAM Score Check List Before and After Tailoring<sup>a</sup>

SAM Item and Description	Score Before Tailoring	Score After Tailoring	P Value
<b>1- Content</b>			
a. Purpose is evident	2 ± 0.0	2 ± 0.0	
b. Content about behavior	2 ± 0.0	2 ± 0.0	
c. Scope is limited	2 ± 0.0	2 ± 0.0	
d. Summary or review included	2 ± 0.0	2 ± 0.0	
<b>2- Literacy demand</b>			
a. Reading grade level	1 ± 0.6	1.5 ± 0.5	
b. Writing style, active voice	1 ± 0.7	1.5 ± 0.5	
c. Vocabulary uses common words	2 ± 0.0	2 ± 0.0	
d. Context is given first	2 ± 0.0	2 ± 0.0	
e. Learning aids via "road signs"	2 ± 0.0	2 ± 0.0	
<b>3- Graphics</b>			
a. Cover graphic shows purpose	2 ± 0.0	2 ± 0.0	
b. Type of graphics	2 ± 0.0	2 ± 0.0	
c. Relevance of illustrations	2 ± 0.0	2 ± 0.0	0.044
d. List, tables, etc. explained	0.0 ± 0	1 ± 0.4	
e. Captions used for graphics	2 ± 0.0	2 ± 0.0	
<b>4- Layout and typography</b>			
a. Layout factors	2 ± 0.0	2 ± 0.0	
b. Typography	2 ± 0.0	2 ± 0.0	
c. Subheads (chunking) used	2 ± 0.0	2 ± 0.0	
<b>5- Learning stimulation, motivation</b>			
a. Interaction used	1 ± 0.6	2 ± 0.0	
b. Behaviors are modeled and specific	0 ± 0.0	2 ± 0.0	
c. Motivation-self-efficacy	0 ± 0.0	1 ± 0.4	
<b>6- Cultural appropriateness</b>			
a. Match in logic, language, experience	0 ± 0.0	2 ± 0.0	
b. Cultural image and examples	0 ± 0.0	2 ± 0.0	
<b>Total score earned by SAM</b>	35	41	
<b>Percentage points earned by SAM</b>	79	93	Superior media

Abbreviation: SAM, suitability assessment of materials.

<sup>a</sup>Values are expressed as mean ± SD.

## Footnotes

**Authors' Contribution:** Study concept and design, acquisition of data, analysis of data, and drafting of the manuscript: Reza Sadeghi, Hossein Fallahzadeh, and Seyed Saeed Mazloomi Mahmoodabad; study concept, design and interpretation of data: Mohsen Rezaeian and Narges Khanjani; critical revision of the manuscript and statistical analysis: Narges Khanjani and Reza Sadeghi.

**Conflict of Interests:** The authors declare that they have

no conflict of interest.

**Funding/Support:** Research deputy of Shahid Sadoughi University of Medical Sciences.

**Patient Consent:** The aim of the study was explained to the participants and written informed consent was obtained from the participants.

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