

1950

# Relation of business-sponsored science brochures to current interest of secondary-school pupils

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BOSTON UNIVERSITY

GRADUATE SCHOOL

Thesis

RELATION OF BUSINESS-SPONSORED SCIENCE  
BROCHURES TO CURRENT INTEREST  
OF SECONDARY-SCHOOL PUPILS

Submitted by

EDWARD CARRIGER  
(B.S., Shurtleff College, 1948)

In partial fulfilment of  
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Thesis approved:

John S. Reed First Reader  
Professor of Education

Lawrence Ravick Second Reader  
Professor of Education

This thesis is in cooperation with Miss Laura E. Govoni and Mr. William Lubold, on an evaluation of business-sponsored science brochures.

The data included herein is found in the following Boston University 1950 theses:

Mr. Edward Carriger, "RELATION OF BUSINESS-SPONSORED BROCHURES TO CURRENT INTEREST"

Miss Laura E. Govoni, "AN EVALUATION OF ILLUSTRATIVE MATERIALS IN BUSINESS-SPONSORED SCIENCE PAMPHLETS"

Mr. William Lubold, "AN EVALUATION OF THE GRADE LEVEL OF BUSINESS-SPONSORED TEACHING MATERIAL"

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## Chapter I

### THE PRESENT SITUATION

#### What is known

In 1949 Thomas J. Sinclair made an exhaustive doctorate study of the factors that teachers and school administrators desire in business-sponsored literature. Factors he found in this study<sup>1</sup> were:

- Accuracy, authenticity, reliability
- Advertising minimized
- Appeal to students
- Arranged well
- Attractive
- Colorful
- Complete
- Concise
- Current
- Educational
- Effective
- Factual
- Foster good habits
- Grade level or subject area considered
- Helpful
- Illustrated effectively
- Individual can use
- Informative
- Interesting
- Practical
- Quality
- Readability or understandability
- Suitability
- Supplement or correlate text
- Usability for teaching needs
- Variety
- Well-written

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<sup>1</sup>Thomas J. Sinclair. A Report About Business-sponsored Teaching Aids, F. A. Owen Publishing Company, Dansville, New York, 1949, p. 79

In a conference between representatives of industry and science teachers,<sup>1</sup> the factors discussed were the reading difficulty, subject matter being taught, usefulness in teaching, the latest strides in science, pictorial presentations, references to other literature, amount of advertising to be used, advertising references in literature to other advertising of the sponsor, accuracy of the presentation, sincerity in presenting unbiased data, and the degree of pupil interest in the subject matter.

#### What is being determined

The study<sup>2</sup> and conference<sup>3</sup> give concise statements regarding what has been decided upon by all concerned as the factors influencing the preparation and use of brochures for the classroom. The factors found in the study and by the conference have been determined through an interest by industry and an interest by teachers in wanting the best possible brochures presented to the students. These statements of the factors are exhaustive and are probably complete, but they fail to give any measurements to show which are the primary factors and which are the secondary; and they fail to give any exact measures for

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<sup>1</sup>Advisory Council on Industry-Science Teaching Relations. "Report of Proceedings," Regional Conference on Industry-Science Teaching Relations NSTA, Washington, D. C., September 30, 1949, pp. 13-15

<sup>2</sup>Sinclair, op. cit., p.79

<sup>3</sup>Advisory Council, ibid

evaluating each factor while the sponsors are preparing the brochures for publication.

#### Need for present determination

It had been found that the criteria which people use to determine whether they are going to use literature, that has been prepared for them, is known, but exact measures that can be applied to determine, before publication, the value of the brochures were not found. It would seem that business and industry would like to know what teachers desire in a quantitative manner. Then they would not have to spend time and money on something that can not or will not be used. Teachers probably would like business and industry to give them only material that will be useful to save them time in sorting the useful from the large volumes of material they receive regularly anyway. These desires and needs prompted the National Science Teachers Association to take a positive interest in seeing that something was accomplished.

The National Science Teachers Association made a survey of the brochures issued during the school year 1948-1949 to determine which brochures were being used and by whom among the teachers. The questions used in this survey<sup>1</sup> were in the following major areas: extent of use of the business-sponsored

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<sup>1</sup>Advisory Council on Industry-Science Teaching Relations. "How Science Teachers Use Business-Sponsored Teaching Aids," NSTA Washington, D. C., February 25, 1950

teaching aids in different science subjects, values of the packet service, including the brochures, to teachers and pupils in different types of schools, teaching techniques employed in the use of business-sponsored aids and the extent of application of these techniques, and the ideal characteristics of a business-sponsored teaching aid. From this questionnaire survey the NSTA was able to obtain a list of the best-liked and least-liked brochures of the group issued in 1948-1949. With this information Miss Govoni, Mr. Lubold, and the writer undertook the task of determining some of the criteria that can be applied to the brochures to show that the best-liked had characteristics that could be measured to give a quantitative basis for preparing future brochures. Obviously all of the influencing factors could not be evaluated in one school year unless full time could be devoted to the task; therefore, only a few of the factors were evaluated, leaving the remainder for other groups to evaluate.

#### Statement of problem

The problem is to determine criteria which can be used in the preparation of brochures for use in science classes in the public schools. Miss Govoni established criteria for the extent of use of pictorial presentations in varied forms, and the value of each type of presentation used by the authors of the brochures being evaluated. Mr. Lubold determined the reading difficulty that is the most recommendable for all, except

special purpose publications which are to be used in only one type of situation. The writer determined the effect of current interest on the value of the brochures, the value of references, the value of a glossary, and the effect of having teaching aids included. The solution of this multiple problem will yield some suggested criteria for use in evaluating future brochures.

Chapter II  
THE EVALUATIONS

Methods used

In seeking correlations between illustrations and the popularity of the brochures concerned in this study, Miss Govoni first read each one carefully to determine whether or not the illustrations contained the same subject matter as the written word. Every pamphlet was found to satisfy this criterion. After becoming acquainted with the brochures in this way, a picture-index was then devised in an effort to find out if there was any correlation of the number of pictures with the number of pages, the ratio between black-and-white and colored pictures, the number of toned pictures and the number of pages, and the number of figures (maps, charts, graphs) and the number of pages.

In classifying the pictures Miss Govoni defined a colored picture as one with more than one color other than white. Pictures with one color other than white were considered to be toned illustrations. A distinction was also made between black-and-white photographs and drawings.

The various pictorial devices were classified according to the definitions found in Visualizing the Curriculum. The picture-index was applied to all the visual materials reviewed.

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<sup>1</sup>Charles F. Hoban, Samuel B. Zisman. Visualizing the Curriculum, Dreyden Press Incorporated, New York, 1937

Mr. Lubold determined the reading difficulty of the brochures by use of the Flesch<sup>1</sup> yardstick formula. The use of the formula required the following data:

- a. selection of 100-word samples of each of 10% of the total number of pages in the item
- b. computation of the average sentence length for the complete brochure using the samples as average
- c. computation of the number of affixes per 100 words
- d. computation of the average number of personal references per 100 words
- e. computation of the difficulty score.

The data were then interpreted on the following basis:

Difficulty Score	Sentence Length (words)	Affixes	Personal References	Potential Audience
up to 1	8 or less	22 or less	19	fourth
1 to 2	11	26	14	fifth
2 to 3	14	31	10	sixth
3 to 4	17	37	6	seventh eighth
4 to 5	21	42	4	high school
5 to 6	25	46	3	high school college
6 or more	29 or more	54 or more	2 or less	college

In determining the relationship of current interest to the desirability of the brochures, the writer read the brochures carefully to determine the subjects discussed in each brochure. Using the knowledge so obtained he went to the Readers Guide to Periodical Literature to determine the number of articles that had been published in the periodical literature on the same subjects between May 1947 and November 1949. With this information a correlation (between the number of articles found having the same subject matter as the brochures among those chosen

<sup>1</sup>Flesch, Rudolf. The Art of Plain Talk, Harper & Bros., N.Y., 1946

as the best-liked and the number of articles found having the same subject matter as the brochures among those chosen as the least-liked) was made to determine statistically the effect of interest, in general, on interest in the brochures.

In seeking the relationship between references, glossaries, and teaching aids in the best-liked and least-liked brochures the writer made a count of the number of brochures containing each feature. The conclusions to be reached from this survey will be observations without statistical significance.

#### Data on pictorial evaluation

Miss Govoni found that the data useful, in the small sampling available, are the number of pictures in relation to the number of pages; the number of toned pictures in relation to the number of pages; the number of black-and-white pictures to the number of pages; and the number of colored pictures to the number of pages. As a result the only data included here is based on the above relations. The statistical results of the data in Table 1 are tabulated below:

	Total pictures	Toned	Color	Black-and-white
Mean B <sup>1</sup>	36.36	5.00	3.91	14.82
Mean L <sup>2</sup>	35.73	4.53	.067	18.20
S.D. B <sup>1</sup>	38.02	10.44	2.97	12.72
S.D. L <sup>2</sup>	51.88	11.58	.25	17.34
c.r.	-.20	2.24	3.72	-7.03

<sup>1</sup>B signifies the best-liked brochures

<sup>2</sup>L signifies the least-liked brochures

The critical ratios of 2.24 and 3.72 are high enough to be of significance.

Data on reading difficulty

Mr. Lubold found the data on reading difficulty to be that summarized in Table 2. The statistical treatment of the data gives the following facts:

	Sentence Length	Affixes	Personal References	Difficulty Score
Mean B <sup>1</sup>	18.27	25.20	2.17	3.24
Mean L <sup>2</sup>	21.32	29.43	1.31	3.93
S.D. B <sup>1</sup>	7.08	6.82	1.77	1.34
S.D. L <sup>2</sup>	3.49	7.22	1.31	.89
c. r.	1.26	1.46	-.69	1.40

<sup>1</sup>B signifies the best-liked brochures

<sup>2</sup>L signifies the least-liked brochures

Table 1

## PICTORIAL EVALUATION OF BROCHURES

Brochure <sup>1</sup>	Drawings	Figures	Toned	Color	Photographs	
B1 <sup>2</sup>	8	0	0	0	0	
B2	0	0	0	0	7	
B3	0	1	0	0	14	
B4	12	0	0	0	14	
B5	0	0	0	0	65	
B6	85	0	0	32	0	
B7	0	2	0	0	0	
B8	0	0	0	0	0	
B9	6	0	7	11	27	
B10	20	2	36	0	36	
B11	0	0	11	0	0	
Total	141	5	54	43	163	
L1 <sup>2</sup>	33	0	0	0	39	
L2	0	3	0	0	2	
L3	0	0	0	0	60	
L4	0	1	0	0	0	
L5	2	7	0	0	22	
L6	85	0	32	0	46	
L7	0	0	0	0	0	
L8	14	0	0	0	17	
L9	0	0	0	0	12	
L10	5	1	0	0	39	
L11	0	0	36	0	10	
L12	5	0	0	0	11	
L13	0	1	0	1	19	
L14	8	1	0	0	5	
L15	12	0	0	0	0	
Total	165	14	68	1	288	
Mean B			5.00	3.91	14.82	Total 36.36
Mean L			4.53	.067	18.20	35.73
S.D. B			10.44	2.97	12.72	38.02
S.D. L			11.58	.25	17.34	51.88
c.r.			2.24	3.72	-7.03	-.20

<sup>1</sup>Numerical order has no rank significance

<sup>2</sup>B and L signify the same as on the preceding page

Table 2  
READING DIFFICULTY OF BROCHURES

Brochure <sup>1</sup>	Sentence Length	Affixes	Personal References	Difficulty Score
B9 <sup>2</sup>	23.2	25.2	3.2	3.74
B5	21.3	27.2	0.9	3.73
B8	21.9	36.6	2.3	4.45
B3	21.3	32.1	0.6	4.05
B2	26.9	33.8	1.6	4.92
B6	15.9	18.0	4.5	2.22
B10	11.5	19.3	3.9	1.83
B11	17.0	22.2	5.5	2.57
B1	00.0	00.0	0.0	0.00
B7	24.1	34.8	0.3	4.72
B4	17.9	28.0	1.1	3.40
L9 <sup>2</sup>	26.8	38.6	0.7	5.31
L11	18.1	23.4	5.0	2.81
L8	25.8	35.6	0.4	5.05
L10	21.8	32.2	2.0	4.12
L7	22.7	17.5	0.3	3.49
L4	27.7	28.9	1.2	4.80
L15	19.4	25.6	0.1	3.47
L5	20.9	36.7	0.8	4.40
L3	19.1	33.4	1.4	3.85
L1	16.6	23.4	1.2	2.93
L6	17.7	19.5	3.6	2.69
L13	19.1	27.4	1.1	3.46
L14	17.1	21.4	1.3	2.80
L12	24.6	40.6	0.0	5.23
L2	22.4	37.2	0.5	4.51
Mean B	18.27	25.20	2.17	3.24
Mean L	21.32	29.43	1.31	3.93
S.D. B	7.08	6.82	1.77	1.34
S. D. L	3.49	7.22	1.31	0.89
c.r.	1.26	1.46	-0.69	1.40

<sup>1</sup>Numerical order has no rank significance

<sup>2</sup>B and L mean the same as on page 8

### Data on current-interest relations

The data obtained by Mr. Carriger is found in Table 3. References and teaching aids were found in less than half of either group of brochures, while there was no glossary in any of the brochures. The data obtained regarding the popularity lended itself to the following statistics:

	Articles Related to Best-liked Brochures	Articles Related to Least-liked Brochures
Mean	234.09	46.6
S.D.	241.8	44.7
c.r. (between best-liked and least-liked)	2.422	

The critical ratio of 2.422 is high enough to be significant.

Table 3

## SUBJECT CONTENT EVALUATION OF BROCHURES

Brochure	Current Articles	Brochure	Current Articles
B8 <sup>1</sup>	972	L3 <sup>1</sup>	171
B6	317	L10	95
B9	186	L11	89
B3	186	L1	89
B2	186	L9	56
B4	179	L2	44
B7	155	L8	35
B11	139	L5	32
B10	87	L14	22
B1	84	L6	21
B5	84	L13	12
		L12	12
		L7	9
		L15	8
		L4	4
Mean 234.09		Mean 46.60	
S.D. 241.8		S.D. 44.7	
	c.r. 2.422		

References <sup>2</sup>	Teaching Aids <sup>2</sup>	Glossary
B8	B4	None
B9	B5	
B4	L3	
L3	L1	
L1	L2	
L2	L8	
L14	L14	
L6	L13	
L13	L12	
L12		
L7		

<sup>1</sup>B and L mean the same as on page 8

<sup>2</sup>The numerical order has no rank significance

### Chapter III

#### THE RESULTS

##### Factors<sup>1</sup> and their effects

The first factor considered was the pictorial evaluation of the brochures. On the basis of data found in Table 1 and the critical ratio derived from this data it would seem that pictures are not seriously considered by the evaluating teachers to be helpful in making a brochure more popular or more useful. However, in separating the pictorial presentations into their various types it would seem that the use of tone and of color, with a critical ratio of 2.24 and 3.72, respectively, can be very useful in enhancing the desirability of the brochures.

The second factor considered was that of the reading difficulty of the brochures. On the basis of statistical evidence it appears that teachers do not show any significant preference as to the degree of difficulty they prefer. However, the results do show that sentence length and the use of affixes appear to have the greatest bearing, with personal references insignificant. This would lead to the conclusion that the short sentences with as few compound words as possible would probably be preferable, especially if the material is to go to

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<sup>1</sup>Factors discussed in Chapter II

teachers of junior high school or grade school classes.

The third factor considered was subject content. It could be presupposed that this will be the first with the publisher although it is third in this study. Therefore, it is significant to note that there is apparently a very positive relationship between what is in the publications for the general public and what teachers would like to have in the publications or brochures that are in the classrooms. This conclusion is reached on the basis of a critical ratio of 2.422 which gives strength to statistical significance of the relationship between desirability and public interest in the subject matter.

The other factors considered (references, glossaries, teaching aids) appeared so seldom that it is impossible to reach any conclusions regarding their effect on the popularity of the brochures.

#### Suggestions to future editors of brochures

When preparing pictorial aids to accompany the printed material, color should be used where feasible, and accuracy and detail should be sought for at all times. This study shows that the evaluating teachers apparently like colored pictures while they will overlook a plain graph as being too uninteresting. This is not anything outside of most teachers' experiences, but it does buttress the idea with facts we have found.

When preparing a brochure for a group it should be readable by the persons for whom it is intended or it will not hold their attention no matter how much they would like to read it.

The most significant factors to observe in reducing the reading difficulty are the use of long sentences where shorter ones will be as descriptive, the use of compound words where simple words will be as effective, and within the whole vocabulary experiences of the youthful readers.

To help the brochure reach more people more effectively it should have many references to that body of subject matter that is most publicized at the time. This leads to the observation that the more general the subject of the brochure the more attention it is going to get and the more useful it will be to the teachers and pupils in the schools that are using the business-sponsored materials.

It will not make the brochure any more popular on the whole in all probability, but it may make the sponsor more popular with many users if there are occasionally references to other material, a list of suggested ways for the teacher to use the material, and a glossary of the technical terms that are used.

#### Suggestions for further study

In the realm of pictorial study there is much to be done in determining the effects of different types of subjects on the effectiveness of a picture. Some studies could profitably be done as to the type of pictorial presentation which actually captures the reader and on what type could have been omitted because it was not noticed.

A study might be made as to the extent of use of the bro-

chures as teaching aids and by which grades they are often used as direct reference material by the students.

## BIBLIOGRAPHY

## Previous studies

Sinclair, Thomas A. A Report About Business-Sponsored Teaching Aids, F. A. Owen Publishing Company, Dansville, New York, 1949

Advisory Council on Industry-Science Teaching Relations.

"Report of Proceedings Regional Conference on Industry-Science Teaching Relations," National Science Teachers Association, Washington, D. C., 1949

Advisory Council on Industry-Science Teaching Relations.

"How Science Teachers Use Business-Sponsored Teaching Aids," National Science Teachers Association, Washington, D. C., 1950

## Present study

Flesch, Rudolf. The Art of Plain Talk, Harper and Brothers, New York, 1946

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Young, Norman A. "Color in Advertising", Thesis 1947, Boston University, Boston

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## THESIS ABSTRACT

This study was endeavored in an effort to obtain quantitative data regarding the factors that affect the popularity of business-sponsored science brochures. The problem resulted from a questionnaire survey sent to science teachers throughout the United States. This study was done by the National Science Teachers Association, and from it they obtained a list of the best-liked and least-liked brochures issued in the years 1948 - 1949. From this information, the writers gathered statistical data, from which criteria was determined which could be applied to the preparation of future brochures.

The factors studied include: graphic representation, reading difficulty, relation to current interest, references to other materials, and usefulness of material to teacher and pupil.

The various pictorial devices were classified according to the definitions found in Visualizing the Curriculum.<sup>1</sup> A picture-index was devised to find correlation between the number of pictures, (black and white, colored and toned) to the number of pages.

The reading difficulty of the brochures was determined by

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<sup>1</sup>Charles F. Hoban, Charles F. Hoban, Jr., Samuel B. Zisman, Visualizing the Curriculum, Dreyden Press Incorporated, New York, 1937.

using the Flesch yardstick formula.<sup>1</sup>

The relationship of current interest to the popularity of the brochures was estimated by referring to the Readers Guide to Periodical Literature and listing the number of articles that had been published in the periodical literature on the same subjects between May, 1947 and November, 1949.

References, glossaries, and teaching aids were listed from each of the pamphlets. The conclusions reached as a result of this part of the study are without statistical significance.

The following is an objective picture of the data obtained from the B, (best-liked) and L, (least-liked) brochures:

#### PICTORIAL EVALUATION OF BROCHURES

	Toned Pictures	Colored	Photographs	Total
Mean B	5.00	3.91	14.82	36.36
Mean L	4.53	.067	18.20	35.73
S. D. B	10.44	2.97	12.72	38.02
S. D. L	11.58	.25	17.34	51.88
c.r.	2.24	3.72	-7.03	-.20

#### READING DIFFICULTY OF BROCHURES

	Sentence Length	Affixes	Personal References	Difficulty Score
Mean B	18.27	25.20	2.17	3.24
Mean L	21.32	29.43	1.31	3.93
S. D. B	7.08	6.82	1.77	1.34
S. D. L	3.49	7.22	1.31	0.89
c.r.	1.26	1.46	-0.69	1.40

<sup>1</sup>Flesch, Rudolf. The Art of Plain Talk, Harper and Brothers, New York, 1946.

SUBJECT CONTENT EVALUATION OF BROCHURES

	Best-Liked Brochures	Least-Liked Brochures
Mean	234.09	46.60
S.D.	241.8	44.7
c.r.	2.422	

Results of the Data

The results of the data were interpreted as follows:

1. The critical ratio derived from the data on the pictorial evaluation of brochures apparently indicates that pictures are not considered as a primary factor in making a brochure more popular. However, in analyzing the various types of graphic and pictorial devices, it would seem that the use of tone and of color enhances the brochure as being more desirable.
2. On the basis of statistical evidence, it appears that teachers do not show any significant preference as to the degree of reading difficulty they prefer. Nevertheless, the results of the data shows that sentence length and the use of affixes appears to have significant bearing, leading to the conclusion that short sentences with as few compound words as possible are probably preferable, especially if the material is to be used below the high school level.
3. It is significant that there is apparently a very positive relationship between what is in the publications for the general public and what teachers prefer in the publications or brochures that are used in the classrooms. This conclusion is made as a result of a critical ratio of 2.422, which gives some

statistical proof of the relationship between desirability of the brochures and public interest in the subject matter they contain.

4. References, glossaries, teaching aids, as factors in the selection of a brochure appeared too seldom in the various pamphlets to make it possible to reach any conclusion as to their effect on popularity.

#### Suggestions Offered to Editors of Brochures

1. In preparing pictorial aids to accompany the written material, color should be used whenever possible, but accuracy in detail should be the primary factor.
2. Colored pictures are apparently preferred to plain graphs.
3. Brochures should be readable by the persons for whom they are intended. The most significant factors to observe in controlling reading difficulty, are the avoidance of long sentences where shorter ones will serve the purpose, the use of simple words rather than complicated compound words, and, in general adapting the vocabulary so that it is within the experience of those who are to read the brochures.
4. To make the brochure more meaningful and complete, it should contain many references to the body of subject matter that is most publicized at the time.
5. With the rising importance of visual aids in teaching, it would seem desirable if each brochure listed suggested ways for the teacher to make use of the material offered.

### Suggestions for Further Study

1. Some studies could profitably be done as to the type of pictorial presentation which actually captures the reader and on which type the reader scarcely notices.
2. A study on the extent of use of the brochures as teaching aids, and in which grades they are often used as direct reference material by the students, might be made.