

## **Content Analysis of Fourth, Fifth and Sixth Grade Elementary Science Textbooks Based on William Romey Technique**

**Amir Hossein Gholami<sup>1</sup>, Mitra Heidari<sup>2</sup>, Zahra Zarei<sup>3</sup>**

<sup>1</sup> Undergraduate student, Department of Educational Sciences, Shahid Bahonar Campus, Birjand, Farhangian University, South Khorasan, Iran.

<sup>2</sup> Undergraduate student, Department of Educational Sciences, Imam Sajjad Campus, Farhangian University Birjand, South Khorasan, Iran.

<sup>3</sup> Ph.D. Student in Educational Management, Faculty of Educational Sciences and Psychology, Shiraz University, Shiraz, Fars, Iran.

### **Abstract**

**Objectives:** The purpose of this study was to examine the content of experimental science textbooks for fourth, fifth, and sixth grade elementary school students in the academic year 2020 in terms of textbook activity, activities, and images using William Romey's formula.

**Methods:** This study's method is content analysis, and its goal is to be one of the applied studies. The statistical population consists of the aforementioned textbooks, whose pages were chosen as a sample and analyzed in accordance with the study's objectives. William Romey's formula is used to analyze text, images, and activities based on active and inactive categories, and the learner engagement index is calculated in each case.

**Results:** The fourth-grade experimental science textbook has a text engagement coefficient of 0.53, activity of 1.1, and images of 0.6, indicating that they are all active, respectively. The fifth-grade experimental science textbook is inactive, active, and active, with a text engagement coefficient of 22.0, activity 1, and images of 0.8, respectively. The sixth - grade experimental science textbook is inactive, active, and active, with text engagement coefficients of 0.30, 1.3, and 1.5, respectively.

**Conclusion:** According to the coefficients obtained from the books in question, the fourth-grade experimental science book in the field of text, activity, images are active, active and active, respectively. Fifth grade experimental science in the field of text, activity, images are inactive, active and active respectively. The sixth-grade experimental science textbook is inactive, active and active in the field of text, activity, and images, respectively.

**Keywords:** Content Analysis, William Romey, Experimental Science, Active and Inactive (passive).

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<sup>1\*</sup> Corresponding Author Email: *amirqolamii8042@gmail.com*

## Introduction

To update textbook content, the country's education system requires an expert review. Educational techniques in societies must change as a result of the need for and expansion of teaching resources. Managers and coaches play a critical role in these transformations (Rezaei, 2021). Iran's education system is centralized, with curricula limited to a single textbook that is used throughout the country (Mashayekh, 1996). The textbook is a useful tool that teachers and students can use to teach and learn (Altbich 1991, quoted by Nourian, 2008). Because textbooks are so important in determining policy and educational content, and because they are one of the most important factors in how to learn, they are the center of attention (Aliabadi and Nil Nafs, 2013). As a result, when creating an effective textbook, learning and educational activities should be adjusted to complement one another and match students' talents so that the learner develops the desired behavioral pattern (Samiei, 2013).

Content selection is the answer to the question of what should be learned; Because if the book and content are not in line with general and specific goals, they will not achieve the desired goals (Rais Dana, 2007). The main goal of a content analysis is to discover the relationship between goals and content in order to improve existing content; thus, one of the reasons for content analysis is to recognize its elements and aspects (Yarmohammadian, 2002).

Experimental science is one of the educational textbooks whose content has undergone significant changes in recent years. The book of experimental sciences was created for the elementary course with the goal of cultivating scientific literacy and teaching research skills (Rahimzadeh et al., 2016). Content analysis highlights the content's flaws and emphasizes the need for a standardized and consistent curriculum. Countries that were pioneers in the development of educational standards or curriculum frameworks consistently performed well in the Thames test (Badrian et al., 2006). Researchers use content analysis to evaluate the achievements of human social communication in the form of documents (Sediq Sarvestani, 1996). Content analysis is the study of actual phenomena with the goal of prediction, in which comparison becomes an empirical tendency free of bias. Content analysis, according to Weber and Kripindorf, is a systematic and repetitive method that is coded using specific rules and the compression of more words and words in the text into smaller subsets. According to Wemplet, content analysis is more than just a word and sentence counting game; it focuses on intentions, meanings, and consequences, and the content of phrases and words (quoted by Zeighami et al., 2008).

Content analysis, according to Holstie, is a method for determining research results by determining the personal characteristics of a message in an objective and systematic manner. He believes that this definition connects three criteria: the method of content analysis must be objective and systematic, and it must have theoretical support if it is to be different from similar data retrieval, cataloging (Holsti, 1994). Content analysis, according to Krelinger, is a method of studying and analyzing communication in a systematic, objective manner with the goal of measuring variables (Rajardi and Dominic, 2005). A systematic method, according to Asa Berger, is created by measuring the amount of something in a random sample of communication forms (Asa Berger, 2004). Text content analysis is used to determine the author's values, goals, and culture; in other words, the text's unconscious cognition and the text's owner are taken into account (Freud, 1989). Bernard Berelson outlined the goals of content analysis in five areas in a division:

1. Describing the main features of the message content
2. Describing the formal features of the message content
3. Inferring the concepts intended by content creators
4. Inferring the audiences' impression of the message by its content

5. Predicting the effects of content on audiences (McNamara, 2003, quoted by Ghaedi et al., 2016).

According to Merton, there are three types of content analysis:

1. **Descriptive content analysis:** A description and quantitative explanation of all elements of a text, such as words, proverbs, sentences, and paragraphs.
2. **Inferential content analysis:** Inferential content analysis is a continuation and extension of descriptive content analysis because it accepts the assumption that there is a relationship between the obvious features inside and outside the text. This method is used to not only describe the content of the text, but also to draw conclusions from it.
3. **Communicative content analysis:** Based on the communication content, communicative content analysis aims to produce results about the sender's intention, its effect on the recipient, and the communication status. Communicative content analysis looks at aspects of the communication process, its origins, and nonverbal and verbal cues rather than a specific unit.

The content analysis method can be applied to three types of research problems:

1. Documentary evidence is the only source of data for researchers.
2. Lack of direct data access
3. Completing the data input (Allen & Reser, 1990)

Motamednejad divides content analysis applications into two categories in his book "News Content Analysis":

1. Application in social sciences, politics, psychology, sociology
2. Implementation of content analysis into mass media content; The applications of content analysis in this case are divided into five categories:
  1. The content of the message and its features
  2. The thought and policy of the messenger
  3. Conduct research in the direction of the message's intended recipient.
  4. Mass culture research
  5. Research in the field of mass media communication (Motamednejad, 1977).

Content analysis methods are divided into two categories in terms of general classification:

1. **Quantitative:** A brief analysis of a large amount of data.
2. **Qualitative:** Detailed and composite data are analyzed qualitatively (Fazeli, 1997).

In 1986, William Romey, an education expert, published "Research Techniques in Science Education," a quantitative method in which students assess the amount of learning in the learning process. Despite the fact that this method does not account for all dimensions, it is one of the most effective methods for determining student activation. This method examines the course and laboratory content's explicit content. The goal of William Romey's method is to see if the book in question actively engages readers in learning. (Hosseini et al., 2019).

### *Research Background*

In their study "Investigating the active and inactive content of the fifth grade elementary heavenly gift book based on the technique of William Romey," Hadi Mosleh Amirdehi et al. (2019) found that the text has a coefficient of engagement of 0.09, indicating that the text is dynamic and active, and the book's questions have a coefficient of engagement of 1.42, indicating that the book's questions are active, and the images have a coefficient of 0.88, which attest to its being active respectively.

Dal Khal and Mohaddes (2018) concluded that the text is inactive in a study titled Content Analysis of the Fourth Grade Elementary Social Studies Textbook (2015), which used William Romey's technique to analyze the content of the social studies textbook. An inactive book is one that hasn't been read in a long time. The student participates in activities on a hands-on basis. One of the research books in which the student has no active role in learning is one like this. In a study titled Content Analysis of the sixth-grade elementary experimental science textbook using William Romey technique and providing information and suggestions to planners to improve and modify this book, Karimi et al. (2015) The student engagement coefficient has been divided into three components based on this analysis: "text, images, and questions." Because the community was small, there was no need for sampling, and the entire contents of the book were chosen and analyzed as a group. The results showed that the text and images were actively presented with a coefficient of involvement of 0.86 and 0.67, respectively, and provides the ground for their active exploration, research and practice. While questions with a coefficient of involvement of 4 are actively presented.

Wahhabi et al. (2015) used William Romey's method to conduct a content analysis of the Book of Experimental Sciences in the fifth grade of elementary school. The text had a coefficient of engagement of 0.95, while the images had a coefficient of 0.28, indicating that the book is active in the field of text but inactive in the field of images. Fathi et al. (2014) analyzed the content of the fourth-grade elementary experimental science textbook using William Romey's technique in the academic year 1990-91. Based on the results of this analysis, students' involvement in the three components of the book's text, images, and questions has been considered based on four hypotheses: the book's texts and questions are active, and the images in the book of experimental sciences are active. The fourth grade of elementary school is inactive, and the content of the fourth-grade elementary science book is lacking in research value and critical thinking, with verbal sentences that are longer than comprehensible.

The active and inactive content of the Heavenly Gift Book and the fourth-grade workbook were investigated by Dehghani (2004). The results of this study show that the book's text and images were compiled in a passive method with a coefficient of involvement of 0.25 and 0.31, respectively, and the questions of the two were compiled in an active method with a coefficient of involvement of 0.57. Dehghani et al. (2015) used William Romey's method to investigate the degree of activation or inactivity of the book Science and Mathematics, published in 91-92. The math book scores 0.85 in the text engagement index, 0.30 in the pictures, and 13.26 in the questions, while the various sciences engagement book scores 0.84 in the text engagement index, 0.19 in the pictures, and 9 questions, and the math book scores 0.84 in the text engagement index, 0.30 in the pictures, and 13.26 in the questions. And science, both actively and passively in the field of text and in the field of questions, causes widespread exhaustion.

Ghasempour et al. (2013) found that while William Romey's degree of student involvement with the text and images of the science book was desirable in the analysis of the book, the coefficients obtained in the field of book questions were higher than William Romey's. According to the findings of Javadipour (1995) research, the index of book engagement with students in the first, second, and third years is 0.29, 0.13, and 0.09, respectively, and the index of student engagement with book questions in the first, second, and third years is 1.08, 0.48, and 0.25, and the index of student engagement with images in the first, second, and third years is 1, 0 and 0.25, respectively. It has been more than satisfactory.

Based on content analysis of various textbooks, it can be concluded that the degree of active and inactive text, images, and questions in various textbooks varies. The majority of textbooks and questions in elementary science textbooks are active, and some books have active text and illustrations while others do not. For example, in the fourth-grade book *Heavenly Gifts*, the text and images are inactive, but the questions are active, and the book engages students well, but the text and images of this book do not have an appropriate coefficient of engagement. In this study, an attempt was made to re-examine the content of the mentioned books in order to determine whether or not the content had changed since the previous ones. According to the research, the content of the books is better than before, but more general corrections are still needed, which, despite various analyses from the start, are expected to improve the situation even more.

### Method

William Romey's method of analysis and technique were employed in this study. William Romey employs his quantitative method to examine the curriculum's explicit content. He divided the textbook's content into text, images, diagrams, and activities, with the analysis unit in the text section (text and sentence registration unit), the images, images and diagrams section, and the book activities in the activity section. The William Romey method divides categories into three parts: 1- active, 2- passive, and 3- neutral (Yarmohammadian, 2002).

The current study's statistical population is experimental science textbooks for fourth, fifth, and sixth grades published in the year 2020. To determine the text engagement coefficient and to obtain the coefficient of images, 10 pages of the fourth book, 10 pages of the fifth book, 10 pages of the sixth book were selected at random. In the activities section, 10 pages of the fourth book, 10 pages of the fifth book, 10 pages of the sixth book were selected at random, and a total of 753 sentences, 30 images, and 30 activities were checked and analyzed. The validity and reliability of the research have been checked by two external evaluators. 250 sentences in the text section, 10 pictures, and 10 activities in the pictures and activities section of the entire book have been suggested and selected using William Romey's method for determining the coefficient of mental engagement of the text.

The formula presented by William Romey is used to analyze the text, images, activities, and questions in his method, which is described below:

#### 1. Coding text:

Table 1. Text coding components, shapes and diagrams based on William Romey technique

| Row | Code | Type of sentences<br>in texts | Shape categories and diagrams                                                                                                                                   |
|-----|------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | A    | Facts                         | Graphs and pictures that accurately describe the purpose.                                                                                                       |
| 2   | B    | Results                       | Graphs or images that require mental activity or the use of supplementary information in order for the learner to comprehend the purpose of the image or graph. |
| 3   | C    | Definitions                   | Images that depict the stages that must be followed and the tools that must be used to complete a task.                                                         |
| 4   | D    | Answered questions            | Images or diagrams that do not fall into any of the above categories.                                                                                           |

A.B.C.D categories are considered inactive categories, while E.F.G.H categories are considered active categories; the sum of active categories can be divided by the sum of inactive categories to calculate the coefficient of mental engagement of the text.

$$\frac{e + f + g + h}{a + b + c + d}$$

### 2. Coding shapes and patterns:

Table 2. Coding components of shapes and diagrams based on the technique of William Romey

| Row | Code | Categories                                                                                                                                                          |
|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | A    | Graphs and pictures that accurately describe the purpose.                                                                                                           |
| 2   | B    | Graphs or images that necessitate mental activity or the use of supplementary information in order for the learner to comprehend the purpose of the image or graph. |
| 3   | C    | Images that depict the steps that must be followed and the tools that must be used to complete a task.                                                              |
| 4   | D    | Images or diagrams that do not fall into any of the above categories.                                                                                               |

Category A is inactive, category B is active, and categories C and D are neutral, according to the above categories. As a result, shapes and diagrams are divided into active and inactive categories in order to calculate the coefficient of mental engagement. Formula  $:\frac{b}{a}$

### 3. Coding of book activities:

The number of activities in the selected pages divided by the number of pages; Formula  $:\frac{a}{n}$

## Results

Question 1: How active is the text of the experimental science textbook for fourth graders?

The content analysis data of the text units of the fourth-grade elementary experimental science textbook are presented in Table (3). Categories A, B, C, D are inactive categories, categories E, F, G.H are active categories, and categories I, J are neutral categories, according to the table. The number of categories is recorded in the table, and their frequency is calculated at the end.

Table 3. Text analysis of a fourth-grade experimental science textbook using William Romey's method

| Row | Category | 2-7 | 11-17 | 20-26 | 30-34 | 40-45 | 50-54 | 60-63 | 70-72 | 80-86 | 90-94 | Abundance |
|-----|----------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
| 1   | A        | 11  | 13    | 14    | 14    | 13    | 13    | 19    | 16    | 14    | 15    | 142       |
| 2   | B        | -   | 2     | 2     | -     | 2     | -     | 1     | -     | -     | -     | 7         |
| 3   | C        | 1   | -     | 2     | 2     | 1     | 2     | 1     | 1     | -     | 1     | 11        |
| 4   | D        | 1   | -     | -     | -     | -     | -     | -     | -     | 1     | -     | 2         |
| 5   | E        | 1   | -     | -     | 1     | -     | 1     | -     | -     | -     | -     | 3         |
| 6   | F        | -   | 3     | 2     | 2     | 3     | 2     | -     | -     | 4     | 2     | 18        |
| 7   | G        | 5   | 2     | 1     | 1     | 1     | 1     | 1     | 2     | 1     | 2     | 17        |
| 8   | H        | 5   | 5     | 4     | 5     | 5     | 6     | 3     | 6     | 5     | 5     | 49        |
| 9   | I        | 1   | -     | -     | -     | -     | -     | -     | -     | -     | -     | 1         |
| 10  | J        | -   | -     | -     | -     | -     | -     | -     | -     | -     | -     | 0         |

### Statistical calculation of text data

Calculating the text engagement index:  $\frac{e+f+g+h}{a+b+c+d} = \frac{3+18+17+49}{142+7+11+2} = \frac{87}{162} = 0/53$

The engagement coefficient, calculated statistically, is 0.53, which is calculated by dividing the sum of active and inactive components.

The first question yielded the following results: According to the coefficient of engagement obtained for the text of 0.53, this coefficient is higher than William Romey's minimum amount of 0.4. As a result, the experimental sciences text in the fourth-grade elementary textbook is active.

*Question 2: How active are the activities in the experimental science textbook for fourth graders?*

The content analysis data of the activities in the fourth-grade elementary experimental science textbook are presented in Table (3). A number of pages are chosen at random from the table, and the number of activities on each page is counted and recorded in the table.

Table 4. Activity Analysis of the Fourth Grade Experimental Science Book Based on the Method of William Romey

|      |    |    |    |    |    |    |    |    |    |     |
|------|----|----|----|----|----|----|----|----|----|-----|
| Page | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| No.  | 1  | 1  | 1  | 2  | 1  | 1  | 1  | 1  | 1  | 1   |

Calculation of text activities on a statistical basis

Calculation of the activity engagement index:  $\frac{a}{n} = \frac{11}{10} = 1.1$

The engagement coefficient is 1/1, which is calculated by dividing the number of activities by the number of pages, according to the statistical analysis of the data. The answer to the second question is that the coefficient of engagement for activities is 1/4 higher than the minimum amount set by William Romey, which is 0.4, and 1/4 lower than the maximum amount set, which is 1.5. As a result, the activities in the fourth-grade experimental science textbook are satisfactory.

*Question 3: In the fourth-grade experimental science textbook, how active are the images?*

The content analysis data of the image units of the fourth elementary experimental science book are presented in Table (4). Category A is inactive, category B is active, and categories C and D are inactive, according to the table.

Table 5. Analysis of images in the fourth-grade experimental science textbook based on the method of William Romey

|   |   |    |    |    |    |    |    |    |    |     |
|---|---|----|----|----|----|----|----|----|----|-----|
|   | 7 | 22 | 27 | 35 | 42 | 57 | 66 | 72 | 86 | 101 |
| A |   |    | *  | *  |    | *  | *  | *  |    | *   |
| B | * | *  |    |    | *  |    |    |    | *  |     |
| C |   |    |    |    |    |    |    |    |    |     |
| D |   |    |    |    |    |    |    |    |    |     |

*Image statistical calculation*

Calculation of the image engagement index:  $\frac{b}{a} = \frac{4}{6} = 0.6$

The engagement coefficient for the images was 0.6, which was calculated by dividing the sum of active categories by the sum of inactive categories, according to the statistical analysis of the data. The third question yielded the following result: the coefficient of engagement obtained for images 0.6 is higher than the minimum coefficient determined by William Romey. As a result, the images in the fourth-grade science book are active.

Table 6. Number, percentage of text, books and activities of the fourth-grade experimental sciences textbook

| Component | Abundance | Percentage | coefficient of engagement |
|-----------|-----------|------------|---------------------------|
| Text      | 250       | 92.25      | 0.53                      |
| Activity  | 11        | 4.05       | 1.1                       |
| Images    | 10        | 3.69       | 0.6                       |

*Question 4: How active is the text of the experimental science textbook for fifth graders?*

The content analysis data of the text units of the fifth-grade elementary experimental science textbook are presented in Table (6). Categories A, B, C, D are inactive categories, categories E, F, G.H are active categories, and categories I, J are neutral categories, according to the table. The number of categories is recorded in the table, and their frequency is calculated at the end.

Table 7. Analysis of the text of the fifth-grade book of experimental sciences based on the method of William Romey

| Row | Category | 1-16 | 18-26 | 27-36 | 37-41 | 43-47 | 50-57 | 60-72 | 73-81 | 82-91 | 92-98 | Abundance |
|-----|----------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
| 1   | A        | 17   | 16    | 12    | 16    | 14    | 19    | 17    | 16    | 12    | 15    | 154       |
| 2   | B        | 1    | 1     | 1     | -     | 1     | 3     | 1     | 3     | 5     | 2     | 18        |
| 3   | C        | 2    | 2     | 1     | 3     | 3     | -     | 1     | 1     | 2     | 4     | 19        |
| 4   | D        | -    | 2     | -     | -     | 5     | 1     | -     | 2     | -     | 4     | 14        |
| 5   | E        | 1    | -     | -     | -     | -     | -     | -     | -     | 1     | -     | 2         |
| 6   | F        | 1    | 1     | 5     | -     | -     | -     | -     | 1     | 1     | -     | 9         |
| 7   | G        | 1    | 2     | 5     | -     | 1     | -     | -     | -     | -     | -     | 9         |
| 8   | H        | 2    | -     | 5     | 6     | 1     | 2     | 5     | 2     | 4     | -     | 27        |
| 9   | I        | -    | 1     | -     | -     | -     | -     | -     | -     | -     | -     | 1         |
| 10  | J        | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | 0         |

*Statistical calculation of text data*

Calculating the text engagement index:  $\frac{e+f+g+h}{a+b+c+d} = \frac{2+9+9+27}{154+18+19+14} = \frac{47}{205} = 0/22$

Based on the statistical calculation of the data, the engagement coefficient is 0.22, which is obtained by dividing the sum of active and inactive components.

The result of looking into the fourth question is that the engagement coefficient for the text, which was 0.22, is less than the minimum amount set by William Romey. As a result, the fifth-grade elementary experimental science textbook's text is no longer active.

*Question 5: How active are the activities in the experimental science textbook for fifth graders?*

The content analysis data of the activities in the fifth-grade elementary experimental science textbook are presented in Table (7). A number of pages are chosen at random from the table, and the number of activities on each page is counted and recorded in the table.



Table 8. Analysis of the activities of the fifth-grade experimental science textbook based on the method of William Romey

|      |   |    |    |    |    |    |    |    |    |    |
|------|---|----|----|----|----|----|----|----|----|----|
| Page | 6 | 16 | 26 | 36 | 46 | 56 | 66 | 76 | 86 | 96 |
| No.  | 2 | 1  | 0  | 1  | 1  | 1  | 2  | 1  | 0  | 1  |

*Calculation of text activities on a statistical basis*

Calculate the activity engagement index:  $\frac{a}{n} = \frac{10}{10} = 1$

The engagement coefficient is 1, which is obtained by dividing the number of activities by the number of pages, based on statistical calculations of the data. Examining the fifth question yielded the following results: According to Table 7, the coefficient of engagement obtained for activities is 1, which is higher than William Romey's minimum value of 0.4 and lower than his maximum value of 1.5. As a result, the fifth-grade experimental science textbook's activities are at a satisfactory level.

*Question 6: In the fifth-grade experimental science textbook, how active are the images?*

The content analysis data for the image units of the fifth elementary experimental science textbook are shown in Table (8). Category A is inactive, category B is active, and categories C and D are inactive, according to the table.

Table 9. Analysis of the fifth-grade experimental science textbook based on the method of William Romey

|   |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|
|   | 12 | 18 | 24 | 30 | 39 | 43 | 51 | 65 | 73 | 97 |
| A |    |    | *  |    | *  | *  | *  |    | *  |    |
| B |    | *  |    | *  |    |    |    | *  |    | *  |
| C | *  |    |    |    |    |    |    |    |    |    |
| D |    |    |    |    |    |    |    |    |    |    |

*Image statistical calculation*

Calculation of the image engagement index:  $\frac{b}{a} = \frac{4}{5} = 0.8$

The engagement coefficient for the images was 0.8, which was calculated by dividing the sum of active categories by the sum of inactive categories, according to the statistical analysis of the data. The seventh question yielded the following result: the coefficient of engagement obtained for the images, 0.8, is less than the minimum coefficient determined by William Romey. As a result, the images in the fourth-grade science textbook are inactive.

Table 10. Number, percentage of text, books and activities of the fifth-grade experimental sciences textbook

| Result   | Abundance | Percentage | coefficient of engagement |
|----------|-----------|------------|---------------------------|
| Text     | 253       | 92.67      | 0.22                      |
| Activity | 10        | 3.66       | 1                         |
| Images   | 10        | 3.66       | 0.8                       |

*Question 7: How active is the text of the experimental science textbook for sixth graders?*

The content analysis data of the text units of the sixth-grade elementary experimental science textbook are presented in Table ten. Categories A, B, C, D are inactive categories, categories E, F,

G.H are active categories, and categories I, J are neutral categories, according to the table. The number of categories is recorded in the table, and their frequency is calculated at the end.

Table 11. Analysis of the text of the sixth-grade book of experimental sciences based on the method of William Romey.

| Row | Category | 8-20 | 21-28 | 32-41 | 42-50 | 51-61 | 65-72 | 74-78 | 80-84 | 90-95 | 98-102 | Abundance |
|-----|----------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-----------|
| 1   | A        | 10   | 14    | 13    | 11    | 8     | 16    | 13    | 17    | 5     | 18     | 125       |
| 2   | B        | 1    | 2     | 6     | 5     | 4     | 3     | 1     | 2     | 4     | -      | 28        |
| 3   | C        | 2    | 5     | 2     | 3     | 4     | -     | 2     | 2     | 3     | -      | 23        |
| 4   | D        | 3    | 2     | 4     | 4     | -     | 2     | 1     | -     | -     | -      | 16        |
| 5   | E        | -    | -     | -     | -     | -     | -     | -     | -     | -     | -      | 0         |
| 6   | F        | -    | 2     | -     | -     | 5     | 3     | 2     | -     | 1     | 6      | 19        |
| 7   | G        | -    | -     | -     | -     | -     | -     | 6     | -     | -     | -      | 6         |
| 8   | H        | 9    | -     | -     | 2     | 4     | 1     | -     | 4     | 12    | 1      | 33        |
| 9   | I        | -    | -     | -     | -     | -     | -     | -     | -     | -     | -      | 0         |
| 10  | J        | -    | -     | -     | -     | -     | -     | -     | -     | -     | -      | 0         |

#### Text data statistical calculation

The text engagement index is calculated as follows:  $\frac{e+f+g+h}{a+b+c+d} = \frac{0+19+6+33}{125+28+23+16} = \frac{58}{192} = 0/30$

The engagement coefficient, which is calculated by dividing the sum of active and inactive components, is 0.30, according to the statistical analysis of the data. The result of looking into the seventh question is that the coefficient of engagement for the text is 0.30, which is less than the minimum amount set by William Romey. As a result, the sixth-grade elementary experimental science textbook's text is inactive.

#### Question 8: How active are the activities in the experimental science textbook for fifth graders?

The content analysis data for the activities in the sixth-grade elementary experimental science textbook is shown in Table 11. A number of pages are chosen at random from the table, and the number of activities on each page is counted and recorded in the table.

Table 12. Activity Analysis of a Sixth Grade Experimental Science Book Using William Romey's Method

| Page | 9 | 19 | 29 | 39 | 49 | 59 | 69 | 79 | 89 | 99 |
|------|---|----|----|----|----|----|----|----|----|----|
| No.  | 1 | 1  | 3  | 1  | 0  | 4  | 0  | 1  | 1  | 1  |

#### Calculation of text activities on a statistical basis

Calculate the activity engagement index:  $\frac{a}{n} = \frac{13}{10} = 1.3$

The engagement coefficient, calculated statistically, is 1.3, which is calculated by dividing the number of activities by the number of pages. The eighth question's conclusion is as follows: This coefficient is less than the minimum amount set by William Romey, which is 0.4, and less than the maximum amount set, which is 1.5, according to the coefficient of engagement obtained regarding activities, 1.3. As a result, the sixth-grade experimental science textbook's activities are at a satisfactory level.

*Question 9: How active are the images in the sixth-grade experimental science textbook?*

The content analysis data for the image units of the sixth elementary experimental science book are shown in Table (12). Category A is inactive, category B is active, and categories C and D are inactive, according to the table.

Table 13. Analysis of images in the sixth-grade experimental science textbook based on the method of William Romey

|   |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|
|   | 15 | 28 | 35 | 43 | 56 | 63 | 70 | 76 | 88 | 97 |
| A |    | *  | *  |    | *  |    |    | *  |    |    |
| B | *  |    |    | *  |    | *  | *  |    | *  | *  |
| C |    |    |    |    |    |    |    |    |    |    |
| D |    |    |    |    |    |    |    |    |    |    |

### *Image statistical calculation*

Calculating the image engagement index:  $\frac{b}{a} = \frac{6}{4} = 1.5$

The coefficient of engagement for the images, calculated statistically, is 1.5, which is obtained by dividing the sum of active categories by the sum of inactive categories. Examining the ninth question yielded the following results: This coefficient is higher than the minimum coefficient determined by William Romey, according to the coefficient of engagement obtained for image 1.5. As a result, the images in the sixth-grade science textbook are dynamic and active.

Table 14. Number, percentage of text, books and activities of the sixth-grade experimental science textbook

| Result   | Abundance | Percentage | Coefficient of engagement |
|----------|-----------|------------|---------------------------|
| Text     | 250       | 91.57      | 0.30                      |
| Activity | 13        | 4.76       | 1.3                       |
| Images   | 10        | 3.66       | 1.5                       |

## **Results**

Learning is the process of a relatively long-term change in behavior that occurs as a result of experience; thus, learning must be accomplished in a meaningful way. Learning is extremely important in human life, especially when it comes to practical issues (Seif, 2014). The science course is one of those that should be presented or taught in such a way that the student seeks out the course's content and concepts, discovers and experiences them, and generalizes them to new topics that he or she will learn in the future; in this case, parrot-like learning, or curriculum preservation, is avoided. The fourth, fifth, and sixth grade elementary experimental science textbooks were examined from the standpoint of being active or inactive in the research. The results are examined in depth and separately in this article. Questions were posed and examined in order to achieve this goal.

250 sentences, 11 activities, and 10 pictures from a fourth-grade experimental science textbook were examined; according to Tables 2, 3, 4, and 5, the coefficients of engagement of text, activities, and images in the fourth-grade experimental sciences textbook are 0.53, 1.1, and 0.6, respectively. This coefficient of engagement indicates that the text, activities, and images in the fifth-grade science textbook are designed in an active and appealing manner that challenges students rather than simply presenting the content. In the field of text, Et al. (2015) is consistent.

250 sentences, 13 activities, and 10 pictures from a sixth-grade experimental science textbook were examined; the coefficients of engagement of text, activities, and images in the sixth-grade experimental sciences textbook are 0.30, 1.3, and 1.5, respectively, according to Tables 10, 11, 12 and 13. This coefficient of engagement indicates that the text of the sixth grade inactive science textbook, as well as its activities and images, are designed in a way that encourages students to think and explore, and that the findings of this section of the study and those of Karimi et al. (2015) are comparable in terms of images and activities.

#### *Suggestions:*

1. Curriculum planners should reduce the amount of purely scientific concepts and increase the number of concepts with an active aspect, based on the coefficients obtained from the analysis of sentences, activities, and textbook images.
2. It is suggested that teachers use active teaching methods to increase text engagement rates.
3. The teacher can use films and documentaries related to the book's various lessons to teach various concepts and can also show them to the students.

#### **References**

- Aliabadi, Khadijeh, Nik Nafs, Saeed (2013). The role of content analysis in the process of teaching and designing textbooks, *World Media Journal*, 8 (2), 150-124.
- Allen, B & Reser, D. (1990). Content Analysis and Information Science Researches, *Library and Information Science Research*, 12 (3).
- Asa Berger, A. (2004). *Methods of media analysis*, translated by Parviz Ejlali, Tehran: Ministry of Culture and Islamic Guidance, Center for Media Studies and Research.
- Badrian, Abed and Rastegar, Tahereh (2006). A comparative study of science education standards in Iran and several successful countries in the TIMSS exam, Research Institute for Curriculum Planning and Innovation.
- Dal Khal, Fatemeh (2018). Content analysis of the book of fourth grade studies (2015) based on the technique of William Romey. Fourth Provincial Scientific Research Conference 'From the Teacher's Perspective'
- Dehghani & Pakmehr (2015). Determination of Active Involvement Learners with Science and Math sixth Grade Books. *Journal of Reasearch in Ciurriculum Planinng*, 2 (20): 74-89.
- Dehghani, Mehdi (2004). The level of activity and inactivity of the Heavenly Gift Book and the fourth-grade elementary workbook. *New Compilations of Islamic Education*, Faculty of Educational Sciences and Psychology, University of Isfahan, 4 (1): 22-1.
- Fathi Hafshjani, Farshideh, Ghaed Amini, Fatemeh, Soltani, Akbar, Ferdowsian, Farahnaz (2003). Review and content analysis of the fourth-grade elementary science textbook with William Romey technique, the first national conference on educational sciences and psychology, Marvdasht, Andisheh Sazan Mobtekar Co.
- Fazeli, N. A. (1376). *Education, Research and Promotion*, Research Index, 1(2): 99-114.
- Freud, S. (1989). *Introduction a La Psychanalyse*, Petit Bibliotheque Payot.
- Ghaedi, Mohammad Reza and Golshani, Alireza (2015). Content analysis methods, from quantitative to qualitative, methods and psychological models, 7 (23), 57-82.
- Ghasempour moghadam, H; Naghizadeh anhar, A & Mazaheri, H (2013). Analysis sixth grade elementary school science textbooks by William Roman technique. Fifth National Conference on Education, Tehtan, University of Teacher Training Tehran.
- Holstey, Al. R (1994). *Content Analysis in Social Sciences and Humanities*, First Edition, Translated by Nader Salarzadeh Amiri, Tehran, Allameh Tabatabai University Press.
- Hosseini, Zeinab Sadat, Ali Nejad, Elahe, Maghsoudi, Sepideh, Nouri, Zahra and Ghasemi, Haditha (2019). Content analysis of the third-grade elementary experimental science textbook based on the method of William Romey.
- Javadipour, M (1995). Evaluation of social book writing guidance school with teachniques William Roman. MA thesis. Allameh Tabatabai Univesity.
- Karimi, Fatemeh, Karimi, Hadi, Omidian, Frank (2014). Content analysis of the sixth-grade elementary experimental science textbook based on the method of William Romey, published in the Second National Conference on Sustainable Development in Educational Sciences and Psychology, Social and Cultural Studies in 2015.
- Mashaykhs, Farideh (1996). *Educational planning process*, Tehran, Madrasa Publications.

- Mosleh Amirdehi, Hadi and Ahmadi Joybari, Maryam (2019). Investigating the active and inactive content of the fifth-grade elementary heavenly gift book based on the technique of William Romey, *Pooyesh Journal of Humanities Education*, Farhangian University, 17.
- Motamed Nejad, K. (1977). *Research Methods in Press Content*, Tehran, Faculty of Communication and Social Sciences Publications.
- Nourian, M. (2008). Investigating how to apply the principle of emphasis in designing images of second and fifth grade textbooks in elementary school, *New Educational Thoughts*, 4 (3), 144-127.
- Raes Dana, Farrokh Laqa (200<sup>v</sup>). *Research and Content of Middle School Mathematics Curriculum*, *Quarterly Journal of Education*, 21: 86-106.
- Rahimzadeh, Shadi, Haji, Bina, Pourgholi, Hamid (2015). *Content Analysis of the Fifth Elementary Experimental Science Book Based on William Romey Method and Fry Readability Formula*.
- Rajerdi, V. Dominic, J. A. (2005). *Research in mass media*, translated by Kavous Seydamami, Tehran, Soroush and the Center for Research and Program Evaluation of Radio and Television.
- Rezaei, Masoumeh (2021). *Content Analysis of Fourth Grade Social Studies by William Romey Method*. Volume II, Number 3. Pages: 123-146
- Samii, Azam (2013). *Content Analysis of the Sixth Elementary Heavenly Gifts from the Perspective of Activity and Inactivity Based on the Method of William Romey*, *Scientific Research Journal*, 3 (2), 136-119.
- Sediq Sarvestani, R.A. (1996). *Application of Content Analysis in Social Sciences*, *Letter of Social Sciences*, University of Tehran, New Volume, 8, 91-114.
- Seif, Ali Akbar (2003). *Psychology of Learning and Education*, Tehran, Doran Publications.
- Shaykhs, F (1996). *Educational planning process*, Tehran, Madrasa Publications.
- Wahhabi Zarrinabadi, Mehdi, Mohammadi F, Mehdi and Najafi, Mehdi (2015). *Content analysis of the fifth book of experimental sciences by William Romey, the third national conference on sustainable development in educational sciences and psychology, social and cultural studies*.
- Yarmohammadian, Mohammad Hussein (2002). *Principles of Curriculum Planning*, Tehran, Book Memorial.
- Zeighami, Reza, Bagheri Nesami, Masoumeh, Haghdoost Oskooi, Seyedeh Fatemeh and Yadavar Nikroush, Mansoureh (2008). *Content Analysis*, *Iranian Nursing Quarterly*, 21 (53), 52-41.

