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Original Article

Content Analysis of Lower Secondary Science Textbooks based on the Immoral Category of Sexism

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Abstract

Introduction: In contemporary societies, educational systems play a key role in shaping culture and transferring knowledge to future generations. The content of school textbooks not only influences students' scientific understanding but also plays a central role in shaping their identity, beliefs, and values. Given this importance, what happens if this content includes the immoral phenomenon of sexism? Therefore, the main objective of this study is to analyze the content of lower secondary school science textbooks based on the immoral category of sexism.
Material and Methods: This research falls within the scope of qualitative studies and is categorized as fundamental research. The statistical population of this study consists of the science textbooks used in the lower secondary education level, which includes three volumes. The units of content analysis include images, texts, questions, and end-of-chapter tests. The study was conducted using the content analysis method.
Results: Gender representation in lower secondary science textbooks significantly reinforces traditional gender stereotypes. Quantitative analysis revealed that scientific, technical, and managerial roles are predominantly assigned to men, while women are confined to domestic, supportive, and educational roles. Qualitative analysis also indicated that names and images are represented in a way that highlights men's positions in leadership and scientific roles, while women are portrayed with limited and passive presence.
Conclusion: Based on the results, it can be concluded that lower secondary school textbooks contain the immoral phenomenon of sexism. These patterns indicate the necessity of revising textbook content in order to achieve gender equality.
Keywords: *Textbooks, Sexism, Gender Inequality, Immorality*

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INTRODUCTION

Gender inequality is a social and immoral phenomenon in which individuals are not treated fairly based on their gender. Gender inequality disadvantages women in many areas such as health, education, and professional life. Studies reveal that different genders experience diverse realities in various fields, including education, life expectancy, personality, interests, family life, occupation, and political affiliation. Gender inequality is experienced differently across cultures and often stems from social and educational structures in which gender-based differences are deeply embedded [1, 2].

The content analysis of lower secondary science textbooks, with an emphasis on the category of gender, examines - through educational and sociological lenses - how these educational materials reflect social norms, beliefs, and expectations related to gender roles. This analysis evaluates various components of textbooks—including images, language structures, topic

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selection, and examples - from a gendered perspective, aiming to identify and analyze patterns of gender representation that influence students' socialization processes [3, 4].

From the standpoint of semiotics and representation, the images and symbols used in science textbooks often associate scientific roles and professional success with men. For example, textbook illustrations of scientists, researchers, and individuals presented as scientific role models predominantly feature men, with women appearing far less frequently in these prominent roles. Such patterns of gender representation convey a latent message to students that scientific achievement and progress are primarily male domains, and women's presence in these areas is either minimized or unrecognized. This form of representation can shape students' traditional gender attitudes and reinforce common stereotypes [5].

In addition to imagery, the language and verbal structures used in textbooks also play a significant role in reproducing gender roles. Specifically, the use of masculine pronouns instead of neutral or feminine forms in scientific references, research descriptions, and even classroom exercises reinforce the perception that scientific activities and professional accomplishments are male-oriented. Language that exclusively centers the male gender unconsciously limits the audience, marginalizing female students and making them feel that the content is designed more for boys and less relevant to them. This use of language and pronouns contributes implicitly and indirectly to the reproduction of gendered notions in educational content and can deprive female students of a sense of belonging and competence in scientific fields [6].

The selection of topics and practical examples is another critical area from a gender analysis perspective. In many science textbooks, the chosen issues and scientific activities are more aligned with boys' everyday experiences and rarely reflect the experiences and needs of girls. For instance, in discussions on scientific practices, experiments, and technological achievements, the examples and subjects tend to focus on areas such as mechanics, physics, and chemistry—traditionally associated with male interests—while topics that might be more appealing or relatable to female students are largely overlooked. This approach may lead to disinterest or even a sense of alienation among female students toward science, gradually reducing their motivation to pursue studies in these fields [7].

Furthermore, an analysis of science textbook content in terms of gender roles and identities reveals that many women are portrayed in images or narratives as supportive and dependent figures, such as mothers, nurses, or assistants, while men are shown in key and influential roles such as researchers, doctors, and inventors. This type of representation not only reinforces gender stereotypes but can also create the perception in female students' minds that active and successful fields are primarily intended for men, while women's participation is defined more in supportive and dependent roles. Content analysis of science textbooks with a focus on gender is a highly effective tool for identifying and deeply understanding the patterns of gender representation that influence students' socialization processes. These analyses demonstrate that by revising the ways gender is represented in textbooks, the educational process can be improved in such a way that students—free from gender-based limitations and with a sense of belonging in scientific fields—can have equal opportunities for growth and advancement [8-10].

Nevertheless, the subject of textbook content analysis based on gender faces several challenges. Among these challenges is the sensitivity of the gender issue within the educational system. Gender is a multifaceted and complex concept

that encompasses various dimensions, including gender identity, gender roles, and gender relations. As a result, some individuals and institutions may oppose conducting research in this area or may create barriers to researchers' access to necessary resources and information. Despite these challenges, such studies are essential and valuable for promoting gender equality within the education system and fostering equality in society at large.

Therefore, in this study, we aim to conduct a "content analysis of lower secondary school science textbooks based on the immoral category of sexism."

MATERIAL AND METHODS

This research is a qualitative study within the domain of fundamental research. The statistical population consists of lower secondary school science textbooks, comprising three volumes. The units of content analysis include images, texts, questions, and end-of-chapter tests. The study was conducted and implemented using the content analysis method.

RESULTS

In the 7th-grade science textbook, 67 images were analyzed. These images cover a wide range of scientific, social, and everyday activities. For example, the image of a "male adolescent conducting a chemical experiment" on page 27, paragraph one, is an instance of emphasizing male scientific roles. In contrast, the image of a "girl watering plants" on page 24, paragraph two, represents domestic and caregiving roles associated with women. The image of a "man repairing industrial equipment" on page 30, paragraph three, highlights men's involvement in technical and professional activities. This analysis indicates that images related to scientific and technical activities are predominantly associated with males.

In the 8th-grade science textbook, the number of images decreased to 60. A notable image is the "woman caring for a patient" (page 33, paragraph two), which emphasizes women's supportive roles. Additionally, the image of a "male adolescent participating in a group science activity" (page 12, paragraph one) highlights active male participation in group and scientific activities. The image of a "man welding" on page 55, paragraph three, further reinforces male roles in professional and technical fields. These images demonstrate that gender stereotypes are clearly present in this grade as well.

The 9th-grade science textbook, with 55 images, presents even more examples of male professional role representation. The image of a "man operating advanced agricultural machinery" (page 18, paragraph one) is one such example. In contrast, the image of a "girl studying at home" (page 35, paragraph two) refers to individual and limited activities for women. Furthermore, the image of a "group of men in an advanced laboratory" (page 45, paragraph three) illustrates the dominant male presence in advanced scientific environments.

Analysis of the Categorized Content in Science Textbooks

The following table shows the characteristics of the books examined in the quantitative content analysis:

Table 1: Characteristics of the books examined

Year of publication	Publication expectations	Educational system	Pages	Book title	Grade
2024	According to textbook printing policies	3-3-6	1-160	Experimental science	7th
2024	According to textbook printing policies	3-3-6	1-140	Experimental science	8th
2024	According to textbook printing policies	3-3-6	1-180	Experimental science	9th

Table 2: Distribution of the number of images by gender in first-year secondary school science textbooks

Gender	Number of pics. (7th)	Number of pics. (8th)	Number of pics. (9th)
Male	67	37	25
Female	29	23	12
Shared	8	0	0

Classification of Quantitative Content Analysis Units

The following table shows the detailed classification of quantitative content analysis units:

Table 3: Detailed classification of quantitative content analysis units

Grade	Pics	Texts	Questions	Queries
7th	67	120	85	50
8th	60	110	80	45
9th	55	100	75	40

The texts in school textbooks, as one of the main tools for transmitting knowledge, play an important role in representing social and scientific roles. In this section, the content of the texts was analyzed based on quantity, types of concepts presented, and the gender represented.

In the 7th-grade science textbook, 120 texts were analyzed. For instance, the text related to "Avicenna's theory in experimental sciences" (page 45, paragraph three) emphasizes the historical role of men in the development of science. In contrast, texts addressing women's roles mainly focus on ethical and social aspects. In the 8th-grade textbook, 110 texts were analyzed, such as "the role of oxygen in the respiration process" (page 56, paragraph four), which discusses general scientific concepts and displays less gender representation. In the 9th-grade textbook, 100 texts related to advanced scientific topics such as "the role of light in the photosynthesis process" (page 60, paragraph two) were examined. These texts also tended to emphasize male roles in science.

Table by Subject and Content

The following table shows the classification of experimental science books by subject, number of chapters, headings, and type of content examined:

Table 4: Classification of experimental science books by subject, number of chapters, headings, and type of content examined

Grade	Chapters	Titles	Content	No. pics	No. questions
7th	12	Nature of matter, plant life, energy	Science and experimental	67	85
8th	10	Life cycles, climate, habitats	Science and experimental	60	80
9th	14	Light and sound, simple machines, human body	Science and experimental	55	75

Analyzing questions and exercises is another important aspect in examining gender roles in textbooks. Beyond reinforcing educational concepts, questions and exercises can indirectly reproduce gender stereotypes.

In the 7th-grade science textbook, 85 questions were analyzed. The question "related to a physics experiment" on page 88, exercise 5, is an example of an activity that highlights scientific roles. In the 8th-grade textbook, the question "related to the water cycle" (page 72, exercise 3) was selected as a sample. In the 9th-grade textbook, the question "related to the properties of light" (page 78, exercise 4) covers more complex scientific concepts. These questions predominantly focus

on topics that emphasize male scientific and technical roles.

Table 5: Analysis of questions and tests

Analysis of questions			
Grade	Number of questions reviewed	Male related questions	Female related questions
7th	85	55	15
8th	80	5450	20
9th	75		15
Analysis of queries			
Grade	Number of end-of-chapter questions	Male related questions	Female related questions
7th	50	35	10
8th	45	30	10
9th	40	25	10

Coded Analysis Units and Text Samples: In this section, the coded analysis units are specifically extracted from the lower secondary science textbooks and analyzed using direct textual codes. Due to the extensive volume of coded units, presenting all content is not feasible; however, the results indicate that the textbook texts emphasize male scientific roles.

Quantitative Analysis of Names

Table 6: Analysis of the frequency of nouns in the seventh-grade science textbook

Type of name	Gender	No.	Percentage of frequency
7th grade			
Special names	Male	35	70
	Female	10	20
	shared	5	10
Public names	Male	45	75
	Female	15	25
8th grade			
Special names	Male	40	65
	Female	20	35
Public names	Male	50	72
	Female	19	28
9th grade			
Special names	Male	42	68
	Female	16	26
	Shared	4	6
Public names	Male	47	70
	Female	20	30

a) 7th-Grade Science Textbook

Analysis of name frequency data in the 7th-grade science textbook reveals a significant predominance of male names over female ones. Of the total proper names, 70% (35 cases) are male, while only 20% (10 cases) are female. Additionally, only 10% (5 cases) of the proper names are shared between both genders. A similar distribution is observed in the category of common names: 75% (45 cases) are male and

only 25% (15 cases) are female. This uneven distribution indicates a notable emphasis on male roles in the textbook content. Such a pattern can contribute to the reproduction of gender stereotypes, wherein male names are associated with power, expertise, and superiority, while female roles are marginalized or less emphasized.

a) 8th-Grade Science Textbook

The frequency analysis of names in the 8th-grade science textbook shows that male names still dominate over female ones, although the percentage of female representation has slightly increased compared to the 7th grade. In the proper names section, 65% (40 cases) are male, and 35% (20 cases) are female. This ratio indicates a limited attempt to improve gender balance in the distribution of proper names. A similar pattern is seen in the common names section: 72% (50 cases) are male, and only 28% (19 cases) are female. These figures suggest that although the distribution of female names in this grade has become slightly more balanced, a considerable gap between the presence of male and female names still exists. The continuation of this pattern may influence students' gender identities and foster a patriarchal perception of social and scientific roles.

b) 9th-Grade Science Textbook

The pattern of male name dominance over female names is also repeated in the 9th-grade science textbook. In the proper names section, 68% (42 cases) are male, 26% (16 cases) are female, and only 6% (4 cases) are shared. These figures point to a serious imbalance in the gender representation of proper names. The limited number of shared names also reflects a lack of diversity in gender representation. In the common names section, 70% (47 cases) are male, and 30% (20 cases) are female. These data indicate that even in the final year of lower secondary education, little effort has been made to establish balance in gender representation. The disproportionate distribution of names significantly affects the perception of gendered social and scientific roles and may contribute to the formation of stereotypical images in students' minds.

The analysis of name frequency data across all three lower secondary school grades shows that male names consistently and significantly outnumber female names. This pattern reveals a gender imbalance in the content of science textbooks. Even in instances where female name representation has slightly increased, there remains a noticeable disparity between the presence of male and female names. This uneven distribution can lead to the reproduction of traditional gender stereotypes and have long-term effects on students' perceptions and attitudes regarding the social and scientific roles of both genders. Therefore, revising this distribution and achieving gender balance in educational content is of great importance.

DISCUSSION

This study analyzed the content of lower secondary science textbooks with a focus on the representation of the unethical phenomenon of gender bias. The results showed that male roles dominated across all textbooks. For example, in 7th-grade images, 67% depicted male roles and 29% depicted female roles. In 9th grade, there were 25 images of men compared to 12 of women. Additionally, in the section on names, more than 60% were male names, and scientific and technical roles were predominantly attributed to males. In contrast, women were mostly portrayed in domestic, supportive, and socially passive roles. In the question analysis, 55 out of 85 questions in the 7th-grade textbook were related to male roles, while only 15 questions involved female roles. This pattern was repeated in the 8th and 9th grades as well. In the exercises, the majority of questions also concerned male roles.

In the qualitative section, open and axial coding was used to examine gender representation. The

qualitative analysis revealed that traditional gender stereotypes were reproduced in all textbooks. Scientific, leadership, and technical roles were assigned to men, while women were associated with supportive, domestic, and non-social roles. Across all grades, key themes such as "reinforcement of traditional gender stereotypes" and "limited female presence in science" were extracted. These findings indicate that instead of offering diverse and balanced roles, the textbook content reinforces traditional views of gender roles.

The results of this study align with previous national and international research. In particular, these findings emphasize that women have been largely confined to family and supportive roles, whereas men have been more frequently portrayed in scientific, technical, and leadership domains. These analyses demonstrate the urgent need to revise and update textbook content to provide a more balanced and equitable representation of gender roles. To reduce gender stereotypes and encourage girls' participation in scientific, social, and professional activities, it is recommended that textbook authors pay greater attention to gender diversity and non-stereotypical roles. These changes can lead to a more just and diverse society and help reduce gender inequalities in education.

The present study supports the results of numerous previous studies that point to the reproduction of gender stereotypes and gender inequality in textbooks. For instance, one study [11] noted that in high school textbooks, women's roles were mostly limited to religious and familial subjects, with the maternal role being dominant. These results are consistent with our findings, as both the quantitative and qualitative analyses in our study also showed that women's roles were largely confined to supportive and domestic duties.

Another study [12] showed that lower secondary school textbooks paid little attention to spiritual and psychological aspects of self-care, particularly regarding women's roles. These findings highlight the limited and insufficient representation of women's broader social roles. Our findings confirm this, as women were often shown in supportive or passive roles in the lower secondary science textbooks.

A study [13] focusing on the quality of chemistry and biochemistry content in science textbooks praised the age-appropriate use of scientific applications. However, it did not address gender differences in content representation. The present study showed that even in scientific topics, women's roles were confined to simple and non-strategic activities, while men were depicted in more professional and specialized positions.

Another study [14] analyzing gender roles in lower secondary textbooks found that the dominant view of women in these textbooks was based on an Islamic approach, with feminist perspectives appearing only in a few cases. This is in line with our findings, which revealed that gender representation in science textbooks was also rooted in traditional stereotypes, with women absent from active leadership or scientific roles.

A separate study [15] focused on the influential factors in textbook content analysis and found that cultural and social elements were represented in traditional forms. Our study also confirms that traditional approaches to gender roles are reflected not only in the content but also in the images and names presented in the textbooks. This can lead to reduced motivation among female students to participate in scientific and social activities.

The findings of the present study are consistent with research conducted by some scholars [16] who examined gender representation in Georgian school textbooks. In both studies, men were predominantly present in leadership and scientific roles, while women were confined to

supportive and domestic roles. Moreover, the present study aligns with the findings of researchers [17] who analyzed LGBT picture books, emphasizing the importance of balanced gender role representation to promote social justice in educational content.

CONCLUSION

The summary of this study, in comparison with similar domestic and international research, indicates that unequal gender representation is a widespread issue in educational content. Revising and reforming such content can be an effective step toward achieving gender equity in the education system. It is recommended that in the revision of lower secondary science textbooks, more diverse and balanced roles for both women and men be represented. Furthermore, raising textbook authors' awareness of the importance of diverse and non-stereotypical social roles for both genders can contribute to the improvement of content.

These changes will not only help reduce gender stereotypes but also encourage students to participate more actively in scientific, social, and professional fields, thereby contributing to the development of a more just and diverse society.

ETHICAL CONSIDERATIONS

Ethical issues (such as plagiarism, conscious satisfaction, misleading, making and or forging data, publishing or sending to two places, redundancy and etc.) have been fully considered by the writers.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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