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Are Women Still Out of the Picture? A 30-year Follow Up on Sex Discrimination in Science Text

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Abstract Textbooks are a fundamental part of classroom instruction. Over 90% of teachers have reported using textbooks in some form [1]. Exposure to textbook material can influence student's self-concept. Having illustrations that only represent one group prevents diverse role modeling. Providing diverse illustrations increases students capacity to develop self-concept [2]. For example, highlighting female illustrations in a textbook increases a female reader's self-concept in that subject. Historically science textbooks have been found to be gender bias, showing males more frequency than females [3]. A review of illustrations in high school chemistry textbooks from the 2010s found that male illustrations continue to be used more frequently than female illustrations. The difference in total frequency of male and female illustrations was statistically significantly in high school chemistry textbooks from the 2010s. However, five of the seven chemistry textbooks from the 2010s did not differ significantly in male and female illustration frequency. Illustrations in chemistry textbooks from the 2010s did not exhibit stereotyping, with one gender performing science-related actions more frequently than another. Although high school chemistry textbooks from the 2010s had a reduced gender ratio compared with chemistry textbooks from the 1970s and 1980s, gender bias still existed.

Keywords: *chemistry, education, gender bias, textbook, equity*

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1. Introduction

It has been just over 30 years since the study by Bazler [2] found that a majority of high school chemistry textbooks were gender biased. The article "Are Women out of the Picture?" (1990), provided recommendations to promote gender fairness in science textbooks. Textbooks are an integral part of classroom instruction. Over 90% of teachers report using textbooks as a primary resource in their classroom [1]. However subliminal messages can promote discrimination and stereotyping. Studies from the 1970s and 1980s found that men appear 4x-5x more often than women in the illustrations used in high school chemistry textbooks. This gives the false impression that males are more competent in science than females.

1.1. The Story of Textbooks

Our study's primary purpose was to provide a longitualization follow-up to the studies conducted in the 1970s and 1980s. By replicating the methodology of the previous studies, we generated trends in gender representation in high school chemistry textbooks.

Our study addressed the following questions: Are there overall gender differences in illustrations from previous high school chemistry textbooks to editions from the 2010s? Is there a significant difference between the relative frequencies of adult male and adult female named or unnamed figures when comparing textbooks from the 2010s to previous chemistry textbooks? Is there a significant difference between the frequency of male and female youth illustrations when comparing textbooks from the 2010s to previous chemistry textbooks? Is there a significant difference in the frequency of male and female illustrations between high school chemistry textbooks from the 2010s?

Is there a significant difference in the number of science-related actions performed by males and females in high school chemistry textbooks from the 2010s?

1.2. Sample Population

The previous studies of gender representation in the 1970s and 1980s looked at 7 high school chemistry textbooks, that were believed to represent 60%-70% of the total high school chemistry textbook market. Our replicate study looked at seven of the best-selling high school chemistry textbooks from the top four textbook publishing

companies in the United States. One textbook from the 1980s study was selected for a reliability study.

2. Methods

The methodology used in this study was replicated from the study by Heikkinen (1973). We developed frequency charts for the number of:

(1) named adult male and named adult female illustrations.

(2) unnamed adult male and unnamed adult female illustrations.

(3) youth male and youth female illustrations.

(4) science-related actions of male and female illustrations.

Named adult figures tend to signify a person of significance in chemistry. A void of named adult male or female figures would give the impression that one gender has not made a significant contribution to the field of chemistry. Unnamed adult figures mostly show people engaged in the process of science. Youth figures are significant because they promote the development of self-concept for students, the idea that chemistry is not something limited to adults but for those of all ages. Gender neutral or indistinguishable figures were not included in the count. Lastly, the number of male and female illustrations engaged in science were tallied. The purpose of this comparison was to assess if one gender was more likely to be engaged in science than another.

3. Discussion

We discovered significant changes in the direction of gender fairness. Gender illustration frequencies in high school chemistry textbooks from the 2010s were different than chemistry textbooks from the 1970s and 1980s (Figure 1). The overall trend showed a slight decrease in the frequency of male illustrations and an increase of female illustrations. The frequency of male and female subgroups (named adult, unnamed adult, youth) in high school chemistry textbooks from the 2010s were statistically compared to chemistry textbooks from the 1970s and 1980s. The only significant difference in editions from the 2010s was found when comparing the frequency of named adult males. The frequency of named adult males was significantly less than chemistry textbooks from the 1980s and the 1970s. The remaining subgroups were not significantly different when comparing illustration frequencies in chemistry textbooks from the 1970s and/or the 1980s.

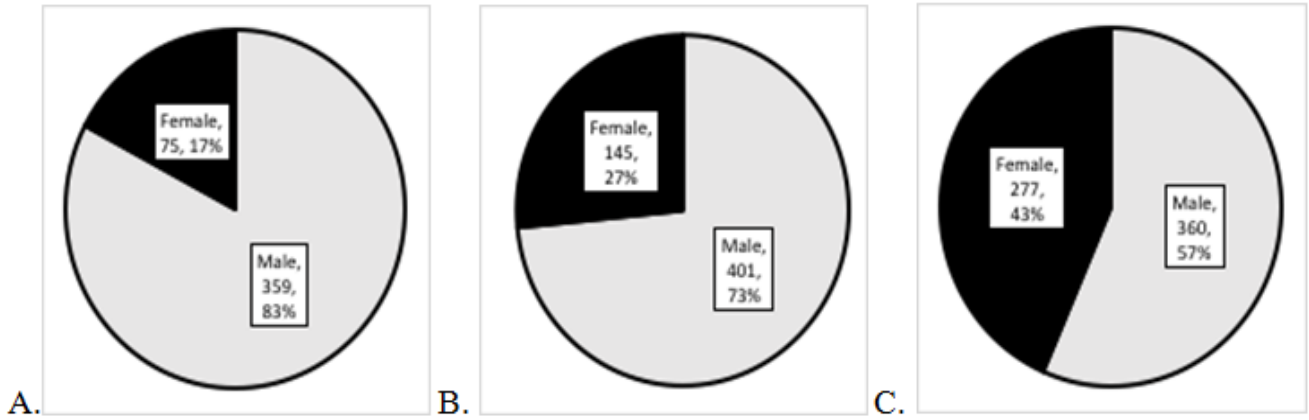

Figure 1. Changes in gender-specific illustrations overtime in high school chemistry textbooks from the 1970s (A), 1980s (B), and 2010s (C)

When examining gender illustrations between high school chemistry textbooks from the 2010s, five of the seven textbooks did not differ significantly in the overall (named adult, unnamed adult, youth) frequency of male and female illustrations (Table 1). However when all male and female illustrations from chemistry textbooks published in the 2010s were statistically compared, a significant difference was found. The number of male and female illustrations engaged in science was quantified and statistically compared in chemistry textbooks from the 2010s. No significant difference was found between male and female illustrations engaged in science.

Table 1. Illustration frequency in High School Chemistry textbooks from the 2010s

Text	Named Adult Male	Named Adult Female	Unnamed Adult Male	Unnamed Adult Female	Male Youth	Female Youth
1.	20	1	21	12	1	0
2.	20	9	34	17	12	23
3.	7	2	4	11	3	3
4.	15	4	75	68	86	76
5.	2	2	10	11	1	0
6.	9	0	5	4	0	1
7.	1	0	19	24	15	9

4. Recommendations

Our study found that gender bias does still exist in high school chemistry textbooks from the 2010s. Although the discrepancy in male and female illustration frequencies is closing, equality has not been reached.

High school chemistry textbooks from the 2010s exhibited far less gender bias than they did in the 1970s and 1980s. A positive is that male and female illustrations did not show bias in their likelihood to be engaged in science. The downside is that gender equity has not yet been reached. Although majority of textbooks from the 2010s were gender fair, illustrations of named male scientists outshines in frequency compared to illustrations of named female scientists.

The results of this study can be used to guide educators when developing and selecting curricular materials. The methodology used in this study can be replicated with ease by any educator or administrator. Not only do we encourage textbooks to be evaluated for gender bias, but also for racial bias. Having resources that reflect the diversity of our population supports equity in the classroom. Equity helps ensure that all students develop self-concept in STEM.

References

[1] Patterson, J. (2019, June 2). Teachers Key: Textbooks Are Being Phased Out. *The Post-Journal*. https://www.post-journal.com/news/page-one/2019/06/teachers-key-textbooks-are-being-phased-out/

[2] Bazler, J.A., & Simonis, D.A. 1990. Are Women Out of the Picture? Sex discrimination in science texts. *The Science Teacher*, 57(9): 24-26.

[3] Heikkinen, H. 1978. Sex bias in chemistry texts: where is woman's place? *The Science Teacher*, (45)1: 16-21.