

How Do Pre-Service Primary School Teachers Evaluate Gender Equality in Primary School Science Textbooks?

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Abstract

Textbooks play a key role in shaping students' images of society and its actors. Based on the importance of this active role, in this study, third and fourth grade primary school science textbooks were examined in terms of gender equality by female pre-service primary school teachers who will become the practitioners using these textbooks. Thus, this research aims at revealing the experiences of pre-service primary school teachers based on their examination of primary school science textbooks and the evaluations used in their textbook reviews. The research was conducted using a phenomenology research design in the context of a qualitative method. Ten female pre-service primary school teachers participated in the study, which lasted seven weeks, and the data were collected through a textbook review report and a semi-structured interview form. A content analysis method was used to assess the data. The results of the study were discussed within the framework of five main themes: gender distribution, gender roles and stereotypes, the role of the teacher, the role of the textbooks, and science textbook evaluation tendencies. Suggestions were made based on these reviews.

Keywords

Gender equality • Primary school science textbooks • Textbook review

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Gender, which we cannot choose when we enter the world, is a biological concept. There are some roles that societies choose and impose on the concept of gender, and these affect our lives to a varying extent. [Oakley \(2005\)](#) defines gender as the socially unequal division between masculinity and femininity. The gender roles created by this division are social categories that determine how men and women should think, speak, dress, and interact ([Misra & Strader, 2013](#)). This society, which consists of the social categories into which a baby is born, shape the child in behavior patterns that are deemed appropriate for women and men ([Gümüőğlu, 2008](#)), and often these are not equally distributed in societies. This situation, known as gender inequality, can have many sociological reasons ([Yang & Aldrich, 2014](#)). Education policies play an active role in shaping this dynamic process that has emerged from the past to the present in the form of unequal distribution of social roles. Gender equality, where education policies are decisive, is considered within the framework of fundamental human rights and is seen as a prerequisite for sustainable and human-centered development ([United Nations Educational, Scientific and Cultural Organization \[UNESCO\], 2021](#)).

Children who observe social roles attributed to men and women prior to primary school may have these roles reinforced through the educational system. These roles may manifest in ways that empower children or make them feel powerless ([Freire & Macedo, 1998](#)). It is a known fact that the information learned by children who start school constitutes one of the main elements of the socialization process, and that its effect not only remains with the student and the school but also affects the whole society ([Güvenli & Tanrıöver, 2009](#)). Gender roles are important for individuals in the socialization process, and schools and textbooks are of great importance in the formation of these roles. School, as the main place where cultural and social values are transmitted and reproduced, is an institution where gender identities mature ([Sönmez & Dikmenli, 2021](#)). In addition, curriculum design and textbooks are the most obvious areas where gender bias can be detected ([Delamont, 2012](#)). Research on gender roles has also revealed that common social stereotypes ([Dökmen, 2015](#)) are often reinforced in school texts ([Anderson & Hamilton, 2005](#); [Blumberg, 2008](#); [Chick, 2006](#); [Evans & Davies, 2000](#); [Jassey 1998](#); [Law & Chan, 2004](#); [Lee & Collins, 2009](#); [Taylor, 2003](#)). However, in studies examining gender roles in textbooks from the early years of the republic to the present day in Turkey, women and men shared the duties and responsibilities equally and the importance of women in every field was emphasized until the 1950s ([Gümüőğlu, 2008](#)). In studies conducted from 1950 to the present day, it has been determined that women are responsible for housework and childcare, while men provide for the house and keep the family together ([Gümüőğlu, 2008](#); [Helvacioğlu, 1996](#); [Sönmez & Dikmenli, 2021](#)). Thus, gender bias in textbooks is recognized as an invisible barrier to equality in education ([Blumberg, 2008](#)).

Textbooks play a key role in shaping students' images of the world and its actors ([MacDonald, 1976](#)). The visual and written content of textbooks often contain sexist elements and this situation is encountered in many books in many branches from the first grade of primary school to the last year of high school ([Özdemir & Karaboğa, 2019](#)). Although these stereotypes exist at all age levels, children become aware of their gender categories at an early age ([Jackson & Warin, 2000](#)). Therefore, the primary school years, when many academic and social elements are encountered for the first time, are an important period in developing a conscious perception of gender roles. Moreover, children are exposed to a wide variety of subject matter in the primary school curriculum, which is crucial in shaping students' social values ([Law & Chan, 2004](#)). Children meet the stereotypes of the adult world through

books and become candidates for the adult world through these stereotypes (Çatalcalı Soyer, 2009). For this reason, within the scope of this research, textbooks belonging to the primary school grades, which are considered to have an active role in the development of social stereotypes, are the main focus. The components of this key concept are the classroom teacher candidates who will be the users of the science textbooks taught in the primary schools in Turkey.

In Turkey, with a decision made by the Ministry of National Education (MoNE), textbooks have been distributed free of charge to students since the 2003-2004 academic year. The content of textbooks is prepared under the control of the Ministry of National Education and supervised by the Ministry of National Education. Misrepresentations in science textbooks have a serious impact on students' general perceptions of the subject (Akerson et al., 2008; McDonald & Abd-El-Khalick, 2017). UNESCO (2021) aims to increase the number of women scientists internationally, and to promote them to management positions with equal opportunities. UNESCO further promotes STEM (science, technology, engineering and mathematics) education to girls at an early age so that they can have equal opportunities at all levels, as they will become future role models for girls. Moreover, societal stereotypes and the gender biases they propagate may be preventing girls and women who would excel in STEM disciplines from pursuing appropriate education, employment, and career success (Hand et al., 2017). Therefore, science textbooks have an important mission in increasing the representation of girls in all areas of society.

When the literature is examined, research on science textbooks can be found. These studies are based on examining science textbooks in terms of visual design principles (Uçar & Özerbaş, 2016), nature of science components (Duruk & Akgün, 2020), scientific process skills (Abd-El-Khalick et al., 2017; Chua et al. 2019), analysis of science concepts (Brito et al., 2005), compliance with the curriculum (Karamustafaoglu & Üstün, 2004; Yıldız Yılmaz & Tabaru, 2017) and science activities (Bakırcı & Öçsoy, 2017). Eroğlu-Doğan et al. (2020), in their mega-analysis, state that studies on science textbooks in national and international literature are examined in terms of including the nature of science, and scientific literacy, the appropriateness of the content to the results of scientific research, the order of the subjects and the visual elements used in the books. Therefore, there have been no studies in Turkey that examine science textbooks in terms of gender roles. Since they are thought to have a decisive role in reflecting gender equality, science textbooks, especially at the primary school level, are a main component of this study.

The other main component of the research is the pre-service primary school teachers who will instruct the science courses in primary school and employ the science textbooks. Indeed, Hand et al. (2017), who examined gender role bias, found that teachers exhibited a subtle bias by attributing more masculine characteristics to a scientist and feminine characteristics to the humanities. For this reason, creating a perspective on gender roles and stereotypes in pre-service primary school teachers before they begin teaching is a focal element of the study. Accordingly, in this study, 3rd and 4th grade science textbooks were analyzed by female pre-service primary school teachers in terms of gender roles. Based on these explanations, the aim of the study is to reveal the experiences of pre-service primary school teachers based on their examination of gender factors in science textbooks and their tendency to evaluate them in the context of gender equality.

Method

Research Design

This study was conducted using a phenomenological method within the scope of qualitative research. The main purpose of phenomenological studies is to provide a more general understanding and evaluation of a phenomenon or situation based on lived experiences (Creswell, 2013; Miller, 2003). Phenomenology primarily seeks to describe the world experienced by individuals to discover the common meanings underlying the phenomenon and to explain the essence of lived experiences (Baker et al., 1992). In order to define the essence, this method advocates bracketing, i.e., keeping the subjective experience separate from previous meanings as if using a bracket (Creswell, 2013; Groenewald, 2004; Moustakas, 1994). Within the scope of this study, concepts such as "gender roles," "gender inequality," and "social stereotypes" that pre-service primary school teachers encounter in primary school science textbooks were bracketed and kept separate from all other elements in the textbooks. Aligned with this, the focus was on pre-service primary school teachers' experiences of gender equality in the analysis of primary school science textbooks and their general thoughts on textbook evaluation.

Participants

The study group in this research consisted of ten pre-service primary school teachers studying in the department of education of a university in Turkey in the 2022-2023 academic year. The size of the study group in phenomenological studies varies between 10 and 15 people (Starks & Trinidad, 2007). The ages of the participants were between 19-21 years old. The participants were selected among 18 students who took the elective course, Analyzing Textbooks in Primary School, for one semester. Gender was decisive in this selection, and all participants were female. The reason for this is that women are the individuals who feel and experience gender inequality more in society. Thus, it was aimed at integrating their daily lives as female pre-service teachers with their observations of textbooks and to create an intellectual experience.

Research Instruments

Textbook Review Reports

Within the scope of the research, textbook reviews were used to reveal the experiences and evaluations of pre-service primary school teachers about gender roles in texts and visuals in primary school science textbooks. Pre-service primary school teachers reported their findings on the distribution of gender roles in primary school science textbooks. The researcher made no restrictions in the creation of these reports. The pre-service teachers were asked to examine and interpret all situations that could constitute an "inequality" toward gender equality. Thus, this study aimed to determine in which themes the pre-service teachers' evaluations of the concept of gender equality and the tendencies of these evaluations were concentrated.

Semi-structured Interview Form

Another data collection tool used in the study was the semi-structured interview. The questions asked in the interview aimed at revealing the experiences of pre-service teachers in the process of examining primary school

science textbooks and their thoughts about them. The interview form was analyzed by three experts from the fields of science education, classroom education, and psychology. The interview consisting of six questions was revised and finalized as a result of the evaluation of the field experts. For example, the question "Do you think there is an inequality in primary school science textbooks in terms of scientific activities and gender distribution? Can you explain?" was revised as "Do you think there is an inequality in primary school science textbooks in terms of science-specific activities and gender distribution? Can you explain?" This was in line with the opinions of the science education expert.

Research Process

The research process was conducted in three phases. The first phase included two weeks of theoretical and conceptual trainings and the introduction of science textbooks. The second phase was a three-week process in which pre-service teachers prepared their review and evaluation reports. In the third phase, the pre-service teachers were interviewed and their evaluation reports were analyzed. During the first stage, the [MoNE guidelines \(2022\)](#), which include methods to follow in the examination of textbooks, educational tools, and their electronic content, were introduced to the pre-service primary school teachers taking the four-hour Primary School Textbook Review course in. In this context, four basic criteria in the guide were evaluated and discussed. These included "compliance with the Constitution and legislation," "scientific competence," "being capable of meeting the acquisitions within the scope of the education and training program and planning the visuals and content design in a way to support learning," and "being suitable for the developmental characteristics of the student."

In regard to evaluation criteria in the examination to be made in terms of conformity with the Constitution and legislation, [MoNE guidelines \(2022\)](#) indicated:

"The principle of social equality must be observed in the processing of subjects or examples, in the description of people and in the presentation of events."

"...it should be prepared with an approach that supports fundamental human rights and freedoms and rejects all forms of discrimination by observing the principle of equality."

Discussions on the criteria were deepened. Subsequently, the 3rd and 4th grade science textbooks of MEB, ATA and Ipek Yolu Publishing Houses, which were prepared under the supervision of MEB, were introduced. In the second stage, pre-service teachers were asked to examine the texts and visuals of the textbooks of two different publishers from each grade level. Thus, each pre-service teacher analyzed four different books. The pre-service teachers were asked to report their analyses and findings in the context of gender equality. The researcher did not set any criteria in the creation of these reports and pre-service teachers' reports were preferred to be unstructured. Student teachers were asked to examine all situations that could create an "inequality" towards gender. Thus, it was also aimed to determine which themes they felt determined the concept of gender equality and where these were concentrated. In the last stage of the research process, the reports based on the analyses were examined and the incomprehensible statements or issues were corrected by interviewing the relevant pre-service teacher. Next, interviews were conducted with each pre-service teacher, each lasting from 15 to 20 minutes. When comments were

unclear or the interviewee moved away from the focus topic, the researcher led the process by using guiding statements.

Data Analysis

Within the scope of the research, the textbook review reports and semi-structured interview forms prepared by pre-service teachers were analyzed using the content analysis method to reveal in detail the relationships between phenomena and concepts (Yıldırım & Şimsek, 2008). In this context, firstly, a content analysis form was created by the researcher for the content analysis of the textbook review reports. The relevant literature (Arslan-Özer et al., 2019; Ruiz-Cecilia et al., 2021; Law & Chan, 2004; Lee, 2018; Yang et al., 2014) was utilized to create the content analysis form. Apart from the criteria included in this form, a separate category was created for other determinations made by the pre-service teacher. However, in cases where there was no determination for the criterion, the form was excluded.

In the analysis of the semi-structured interview forms, first, all of the interviews were transferred to Microsoft Office Word and transcripts of the interview data of each pre-service teacher were prepared and examined in detail by the researcher. In this process, the researcher was accompanied by an expert classroom teacher with a master's degree in science education. Data obtained from both data collection tools were transferred to the coding scheme by considering similar and different situations in the content analysis form and interview transcripts. The data obtained from both data collection tools were read from beginning to end by the researcher and the expert classroom teacher, and the coding schemes were compared. In this comparison, categories and themes best representing the coding were created for similar coding. In cases where there were differences, these codes were re-read and recorded under the relevant categories by reaching a consensus (Miles & Huberman, 1994). In the coding scheme, teacher statements for the relevant codes were included in order to share them in the presentation of the findings. In fact, in the phenomenological design, the researcher analyzed important meanings and sentences through the text obtained from the interviews, and emphasized the meanings of experiences according to individuals by supporting the analysis with quotations (Çapar & Ceylan, 2022).

Ethics and Credibility

Approval, dated May 23, 2023 and numbered E.520593, was obtained from the Scientific Ethics Evaluation Board of Selcuk University Faculty of Education in order to conduct the research. Within the scope of ethical principles, code names were given as PT1, PT2, T3... PT10 in order to maintain participant anonymity, and these code names were used in the entire reporting process of the study.

The equivalent of internal validity in the positivist paradigm in qualitative research is credibility (Merriam & Tisdell, 2015). Credibility is a process that provides important evidence that valid and reliable results are obtained in qualitative research (Glesne, 2012), and, in this study, evidence of the measures taken was presented. The researcher first reviewed the relevant literature in the development of both the content analysis form used in the evaluation of the textbook review report and the semi-structured interview form, thus aiming to provide a reference point for the reader (Yin, 2009) by preparing evaluation tools that included previously defined concepts applied in the literature.

The researcher avoided in-depth discussions and used objective statements in the introduction of concepts and documents related to gender inequality, social stereotypes, and gender roles in order to avoid influencing the participants (Guba, 1981).

Another measure taken to increase the credibility of the research was data triangulation. Triangulation is the use of different methods and data sources together to cross-check data and interpretations (Denzin & Lincoln, 2011). This was aimed at clarifying and verifying the data obtained from the textbook review report prepared by the pre-service teachers through interviews. In order to support participant honesty (Arastaman et al., 2018), a voluntary participation form was distributed to ten female pre-service teachers taking the Primary School Textbook Review course and their consent was obtained for participation in the study. The participants were informed about all the processes of the research before the interviews and it was stated that they had the right to withdraw from the research at any time. To further ensure trustworthiness of the research, inter-coder reliability was employed. In this context, the researcher opened the data to the supervision of a colleague (a field expert in classroom education) who was not involved in the research and received support during the coding process (Lincoln & Guba, 1986). Miles and Huberman (1994) state that definitions become clearer when researchers code using the same dataset. During the coding process, the researcher joined a classroom education field expert from time to time to discuss the similarities and differences of codes, categories, and themes. For this study, the percentage of agreement between the coders was calculated (88%). Re-evaluations were made for cases in which consensus was needed.

Results

In this section, textbook review reports and semi-structured interview forms were analyzed in order to reveal the experiences of pre-service primary school teachers regarding gender equality in primary school science textbooks and to determine the tendencies of their evaluations; the findings obtained in line with these data were presented. Based on the codes and categories obtained from data analysis, the following five main themes were reached: gender distributions, gender roles and stereotypes, the role of the teacher, the role of textbooks, and science textbook evaluation tendencies.

Under the theme *gender distribution*, pre-service teachers' findings were evaluated in two categories, i.e., the number of women/men in the visuals and in-text content in the textbooks and the gender distribution of children. The pre-service teachers found that the proportion of women and men in primary school science textbooks was close to each other and that there was a reasonable balance in the number of boys and girls. However, they also reported that in some written texts and some visuals, they came across situations where the number of boys and girls were not balanced. Some statements from pre-service teachers' reports and interviews related to this category are given below.

There is a reasonable balance in the visuals in terms of the number of male and female students. (PT7, Textbook Review Report)

According to the general evaluation of the books, there is no gap between the number of girls and boys. However, on some pages there are sometimes only male figures and their actions. (PT10, Textbook Review Report)

The visuals used in the textbook review report of PT7, respectively, are given below.



Figure 1. Third grade science textbook MEB Publications

Although attention is paid to the ratio of the number of men and women in the visuals, the roles assigned to them in the texts of the visuals are meaningful. For example, in the image below, children go on a picnic with their teachers. The mothers are the ones accompanying the children. The teacher is male. Murat is picking flowers for his mother and the children are eating the food prepared by their mothers. (PT3, Textbook Review Report)



Murat, sınıf arkadaşları ve öğretmeniyle pikniğe gitti. Gittikleri yer çok güzeldi. Renk renk çiçekler vardı. Her yerden kuş sesleri geliyordu. Sanki kuşlar şarkı söylüyordu.

Murat, gördüğü rengârenk çiçeklerden annesine bir demet hazırlamak istedi. Ancak çiçekleri toplarken eline diken battı. Murat'ın eli acıdı. Ama bu acı kısa sürede geçti. Topladığı çiçekleri güzel bir demet yaptı ve kokladı. "Bu çiçekler çok güzel kokuyor." dedi.

Murat ve arkadaşları acıkmuşlardı. **Annelerinin onlar için hazırladığı yiyecekleri yemeye başladılar.** Murat, annesinin yaptığı kurabiye yi çok beğenerek yedi.

Figure 2. Third grade science textbook MEB Publications

There are three categories under the theme *gender roles and stereotypes*. These are: roles attributed to women and men, stereotypes formed by roles, and gender inequality. In their textbook reviews, pre-service teachers reported that the roles attributed to men and women in primary school science textbooks were different, that these roles were not equally distributed, and that stereotypes were included in this direction. They found that the roles attributed to women were mostly focused on home and childcare, while the roles attributed to men were mostly focused on

actions requiring power and work outside the home. However, it was also reported that there are male figures who do the work at home, albeit to a lesser extent. In addition, pre-service teachers stated that they came across remarkable findings regarding the role distribution of girls and boys. Based on the pre-service teachers' reports, the girl child is with the mother and helps her, especially in household chores. Based on the roles represented by women and girls, the stereotype that women are only child-bearers and caregivers is felt in society. Although there were roles in which women and girls were more powerful and represented in every field, but these were not sufficient. In addition, pre-service teachers identified and expressed that the roles of women and men representing professions were not equally distributed and that some professions were specific to a certain gender. Based on these determinations and expressions, the professional role of teaching was attributed to women in the books; however, scientists were represented by men. Individuals who drove vehicles and engaged in sports, such as soccer, basketball, and tennis were primarily men. There were a few examples of female engineers and doctors. Interviews with pre-service teachers supported the points they identified in their reports. In fact, pre-service teachers stated that they saw and experienced these stereotypes and gender roles in their real lives. Excerpts from the determinations and opinions of pre-service teachers regarding the theme of gender roles and stereotypes and subcategories are presented below.

There is a story of electricity around us in the kitchen in the 4th grade electric vehicles unit. Again, the role of a kitchen worker is assigned to women and the girl child. Moreover, when I examine the text related to the picture, the girl is taught how to prepare the dinner table. The stereotype of women being responsible for housework is passed on to the next generation (PT2, Textbook Review Report)

From past to present, it seems as if the advantages provided by electric vehicles have always made women's work easier. The woman uses the mixer; the woman washes the laundry that she used to wash by hand, but now she washes it with a machine. On the other hand, men play soccer, drive the car, and do scientific research. (PT5, Textbook Review Report)

Although it is found in all publications, there is a serious deficiency in terms of gender equality in Anka Publications 3rd grade science textbook. All the work related to home and children has almost become a woman's duty. (PT7, Textbook Review Report)

When I examined the gender roles in science textbooks, some things did not surprise me at all. Because as a woman, I am already exposed to these stereotypes in the society. We need to change this perception. (PT1, Interview).

The visuals and texts of the visuals used in the textbook review report of PT5 and PT3, respectively, are given below.

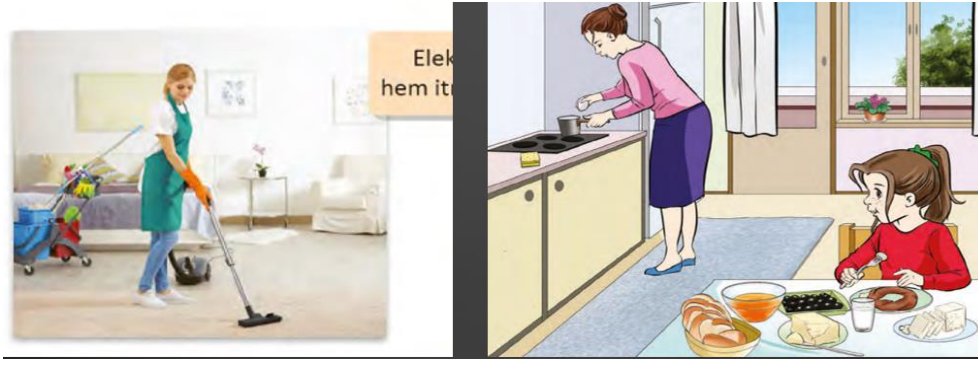


Figure 3. Third grade science textbook (MoNE Publications)



Figure 4. Fourth grade science textbook (ATA Publications) and third grade science textbook (ANKA Publications)

In the theme of *teacher roles*, the determinations and opinions of pre-service teachers are gathered in two different categories. These are the role of the teacher in ensuring gender equality and the correct use of textbooks in terms of gender equality. In both the reports and the interviews, pre-service teachers stated that the teacher has an important mission in ensuring gender equality. They stated that teachers have an important effect on breaking down the stereotypes identified in textbooks, preventing the formation of false stereotypes, ensuring the representation of girls in all areas of society, and adopting gender equality. In addition, another issue reported by pre-service teachers is that textbooks should be used correctly in terms of gender equality and that the teacher has a significant role in this regard. In the interviews, the effective role of the teacher in terms of using textbooks correctly in the context of gender equality was also expressed. Excerpts from the determinations and opinions of pre-service teachers regarding the theme of teacher roles and subcategories are given below.

...For example, in the book there is a professor in all the speech bubbles from beginning to end. And this professor is an old man. The perception this creates in the child is that the professor is old, he is a man, and

science is a male pursuit. The teacher should take measures to eliminate such negative perceptions in the textbook. Therefore, the teacher has a serious responsibility. (PT8, Textbook Review Report)

When I analyze the textbooks, I can say that gender equality is not fully reflected. Considering that the people who prepare the textbooks are teachers, we have a big role in the preparation and implementation of these books. The most important model for the child in the classroom is the teacher. Therefore, the only person who can emphasize gender equality and minimize stereotypes in textbooks is the teacher. (PT6, Interview)

If I hadn't done research on this subject, I probably wouldn't have noticed this sexist attitude in the books when I started working. Therefore, the teacher's having a point of view is an important factor in eliminating negative elements in books and creating an egalitarian atmosphere between girls and boys. (PT8, Interview)

Another theme of the study, *gender equality in textbooks*, has three categories. These are the role of textbooks in reflecting gender equality, the need for revision of textbooks in the context of gender roles, and the training of textbook commissions on gender roles. In their reports on the examination of primary school science textbooks and in the interviews, pre-service teachers mentioned that primary school textbooks were an important factor in the adoption of gender roles by primary school students. The future teachers stated that there were more pictures than text in primary school textbooks and that gender roles in these pictures may be more effective than text content due to the pedagogical characteristics of children. In addition, they emphasized that the examples in the pictures that do not comply with gender equality should be completely removed from the textbooks and that the commissions preparing the textbooks and teachers should receive training in the context of gender equality. Excerpts from the determinations and opinions of pre-service teachers regarding the theme of gender equality in textbooks and subcategories are given below.

When a student in the 3rd grade of primary school opens a book, he first looks at the pictures, not the text. And the picture he sees gives him a message, and I think this message is more permanent than the content of the text. For this reason, if a child sees a woman rolling out dough, preparing food for her child, or sweeping the house, she will take these as her duties over time. For this reason, I think textbooks should be prepared according to very sensitive criteria. (PT1, Interview)

I can say that I encountered more negative examples especially in 3rd grade textbooks than in 4th grade textbooks. But what difference does more or less make? There should not be even a single text or picture that contains gender inequality in textbooks. For this reason, I think the textbooks need to be revised from scratch. (PT9, Interview)

Textbooks show that there are commissions that prepared the book. Publishing houses and communication channels are also indicated. The books are approved by the Ministry of National Education. However, some content and illustrations may need to be objected to. It can be said that the knowledge, awareness and sensitivity of the educators in the commission should be increased, especially on gender equality. (PT7, Textbook Review Report).

The theme of *science textbook evaluation tendencies* consists of three categories: general evaluation tendencies, science course-specific evaluation tendencies and individual-specific tendencies. It was determined that pre-service teachers used general evaluation patterns in examining science textbooks. In fact, although the pre-service teachers were not given any evaluation criteria at the beginning, they recognized gender equality by using basic evaluation criteria such as gender distributions, gender roles, and stereotypes. However, it was observed that the only issues specific to the science course that pre-service teachers addressed in their reports were scientists and gender roles. It was determined that pre-service teachers did not consider issues such as STEM professions, scientific research, and actions in laboratory environments as evaluation criteria in terms of gender roles in analyzing science textbooks. In addition, pre-service teachers also had evaluations that were not included in the content analysis form, such as evaluating book commissions, MoNE textbook control mechanisms, and MoNE policies.

After the sexist elements I detected in the science textbooks, I was curious about the other textbooks. When I examined them, I saw that there were a lot of stereotypes in other branch textbooks. MoNE has a lot of work to do, because it is the institution that prepares and supervises the books. (PT10, Interview)

Growth and development is given through a female element. Instead, the developmental stages of both male and female individuals could have been presented together. In book preparation commissions, the distribution of male and female commission members should be balanced. These findings suggest that there may be more male members in the commissions. (PT2, Textbook Review Report)

The published Textbook Review Guide has been prepared in detail, but the textbooks should be made more compliant with this guide in terms of gender equality. (PT4, Interview)

Discussion, Conclusion and Suggestions

Currently, we do not yet know what kind of effects textbooks that contain gender biases will have on children. However, we can observe in real life that the stereotypes in textbooks overlap with children's attitudes and behaviors in daily life. The starting point of the study was whether teachers, who are the active implementers of textbooks in schools, are aware of this gender inequality and how they evaluate stereotypes. In this vein, 3rd and 4th grade science textbooks were examined in terms of gender roles by female pre-service primary school teachers, aiming to reveal the experiences and textbook evaluation ideas based on their examinations. The results obtained in this context were discussed in line with the themes.

First, pre-service teachers determined that the number of women and men and the number of girls and boys were in a reasonable balance in both written texts and visuals in science textbooks. However, when considered on the basis of units and subjects, they also stated that there were situations where this balance was not observed. In studies examining textbooks such as Turkish, mathematics, life sciences, social studies, and life sciences in terms of gender factors, it was shown that the number of male figures was higher than the number of female figures (Arslan Özer et al., 2019; Özkan, 2013; [This article should be an added reference](#); Kükrer & Kıbrıs, 2017). Accordingly, it can be seen that primary school science textbooks are better than other textbooks in terms of the balance in the number of

men and women. Since there is no study in Turkey in which science textbooks have been analyzed through gender equality, the determination made by pre-service primary school teachers is unique.

Although the distribution of the number of male-female or female-boy or girl-boy children is balanced, according to the results of the study, the roles attributed to the genders in primary school science textbooks are not equally distributed and there are stereotypes. Roles attributed to women are mostly related to home and childcare, while those attributed to men are related to life outside the home and actions that require power. However, there are men who do the housework or roles in which women and girls are more powerful and these are represented in all areas, but this is still not efficient. It was also evaluated that the roles attributed to girls and boys are not equally distributed. The same inequality applies to the representation of professions. The results of previous studies on stereotypical roles in textbooks of different disciplines are consistent with the results of this study (Atay & Danju, 2012; Başaran, 2019; Bilgin, 2019; Chisholm, 2018; Gümüšoğlu, 2008; Şafak et al., 2006).

Another issue that pre-service primary school teachers evaluated in primary school science textbooks was the relationship between scientists and gender roles. Along this line, they determined that all the scientists in the textbooks were male with the exception of Marie Curie. When the literature is examined, all of the examples of scientists in social studies textbooks are male (Demircioğlu & Özalp, 2023; Dündar, 2021). Although there are many women scientists working in natural sciences, the fact that they are not included in the textbooks is seen as an important deficiency and inequality. In addition, it is thought that the inclusion of women scientists in books is important in terms of being role models for girls, because gender roles and stereotypes have a defining and prescriptive effect on an individual's behavior (Prentice & Carranza, 2002). In addition, according to the evaluations of pre-service teachers, individuals who drive vehicles and engage in sports, such as football, basketball, and tennis are mostly male. There were a few examples of female engineers. UNESCO's report titled *Cracking the Code: Education of Girls' and Women in Science, Technology, Engineering, Mathematics (STEM)* states, "Eliminating gender inequality in STEM fields is important for human rights, inclusion and sustainable development" (UNESCO, 2017). In addition, the pre-service teachers stated that these stereotypes and gender roles they encountered in the books were also seen and experienced in their real lives as women. National data also support this basic finding. When the basic labor force indicators produced by the Turkish Statistical Institute (TurkStat) are examined in terms of gender distribution, it is seen that the labor force participation rate of women was 34.3% in 2019, while the labor force participation rate of men was 71.1%. According to 2019 data, the majority of women (54.4%) stated that they do not participate in the labor force, because they are busy with housework (Erikli, 2020).

Another result obtained from the pre-service teachers' evaluations is that teachers play a part in establishing gender roles on the basis of an egalitarian understanding. As a result of their experiences, pre-service teachers believe that teachers have an important mission in preventing gender inequalities and breaking down stereotypes. De Kraker-Pauw et al. (2016) state that teachers' gender role beliefs about boys' and girls' school experiences can perpetuate existing and possibly undesirable situations related to children's dispositions. Law and Chan (2004) indicate that teachers' knowledge and perception of gender stereotypes in children's textbooks is an important factor. Thus, teachers' awareness and perception of stereotypes in elementary school science textbooks is a significant issue

in eliminating these stereotypes. Given this research, pre-service teachers realized that textbooks were an important tool in reflecting gender equality. They stated that there are more pictures than texts in primary school texts, and gender roles in these pictures can be more effective than text content due to the pedagogical characteristics of children. In addition, they emphasized that the examples that do not comply with gender equality, especially in the pictures, should be completely removed from the textbooks and that the commissions preparing the textbooks and teachers should receive training in the context of gender equality. Based on these findings and evaluations, stereotypes in gender roles in textbooks do exist, and in order to eliminate and prevent these, pre-service teachers suggested that conscientious educational policies should be followed. Textbooks play a key role in shaping students' images of the social world and its actors and reinforcing gender-based cultural roles in social life (Aragonés-González et al., 2020; MacDonald, 1976). Therefore, this experience of pre-service primary school teachers regarding the gender factor in textbooks is a targeted situation within the scope of the research.

Another research problem was to determine the pre-service teachers' tendencies towards evaluating primary school science textbooks in terms of gender equality. Accordingly, it was observed that pre-service primary school teachers showed more general and basic evaluation tendencies in analyzing textbooks in terms of gender equality. Moreover, in many studies examining textbooks in terms of gender equality, basic criteria such as gender distribution, stereotypes, actions attributed to genders, and occupations have been used (Arslan-Özer et al., 2019; Ruiz-Cecilia et al., 2021; Law & Chan, 2004; Lee, 2018). It was determined that pre-service teachers did not consider issues such as STEM professions, scientific research, and actions in laboratory environments as evaluation criteria in terms of gender roles when analyzing science textbooks. Considering that each discipline has its own unique nature, it is thought that the knowledge and skills of pre-service primary school teachers regarding the nature of science courses, field-specific skills, and the curriculum structure should be improved. In addition, teachers' beliefs are important in raising girls in science and increasing their representation.

In summary, the results of this study, in which pre-service primary school teachers evaluated primary school science textbooks, show that there are a large number of examples in primary school science textbooks that do not comply with the principle of gender equality. Textbooks, which are provided free of charge by the state, are a valuable educational material for children who do not have access to school or who have limited resources. Textbooks are an important aspect leading to gender equality in education. In fact, textbooks take up almost 80% of classroom time and can lead to lower achievement of girls, especially in poor schools (Blumberg, 2009). Based on the results of the current study, it is recommended that all negative examples be removed from primary school science textbooks on the basis of the principle of gender equality. In addition, it should be recommended that the development and supervision mechanisms of textbooks should be carried out sensitively, and educational policies in this area should be carefully executed. Again, based on the research findings, there is need for additional research in different disciplines to increase the awareness and experience of teachers, who are the effective implementers of textbooks, in terms of gender equality. The intellectual experience gained by pre-service teachers will develop and play an effective role in increasing the representation of girls in society in the future.

Ethics

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