

ASSESSING GENDER EQUITY IN MIDDLE LEVEL SCIENCE TEXTBOOKS IN PAKISTAN

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Abstract

The gap between male and female students' representation in science is being bridged up rapidly. Resultantly, science is no longer a male oriented subject. This demands fairly equal gender representation in their science textbooks. Gender equity in science education has always been and still is a major concern of educational researchers throughout the world. This study aims to explore the same phenomenon in Pakistani perspective. Latest editions of general science textbooks of Punjab textbook board for class 6, 7 and 8 (middle level) are analyzed to address the gender equity issues. Text and illustrations given in the textbooks are examined to learn whether or not males and females have been given equal representation. The roles are also discussed in which both the groups are exhibited in the books. This document analysis is an attempt to present a clear picture of the appropriateness level of the science textbooks for both girls and boys. Educational implications are also discussed.

Keywords: Gender, equity, portrayal, textbook

Introduction

The issue of gender equity is crucial to be addressed in science textbooks as science is considered to be a field in which women have always been in minority. Female scientists are rarely mentioned in the history of science. Female students are proved to be having less positive attitude towards science as compared to male students (Adamson, Foster, Roark & Reed, 1998; Dawson, 2000; Iqbal, Shahzad & Sohail, 2010; Jones, Howe & Rua 2000; Kubilius & Turner, 2002; Lee, 1998; Mallow, 1994; Ornstein, 2005; Osborne, 2003; Pell, Iqbal & Sohail, 2010; Weinburgh, 1995). The researchers are also evident of polarization of female students' interest in Biological Sciences and male students' interest in Physical Sciences (Adamson, et al., 1998; Cameron, 1989; Farenga & Joyce, 1999; Hughes, 2001; Iqbal et al., 2010; Miller, Blessing & Schwartz, 2006; Murphey & Whitelegg, 2006; National Science Board, 2002; NSF, 1999; Osborne & Collins, 2000).

In order to incline female students towards science, their equal portrayal in science textbooks may prove to be a fruitful attempt. Gender

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equity in textbooks is still a cause of concern all over the world as a mounting body of research from different countries is evident that females are still underrepresented and unequally portrayed in textbooks. This gender bias in education is defined by Chung (2000) as “reinforcement of sex-stereotypes and the overt or less overt discriminatory treatment of girls in schools that disadvantage girls” (p.4). Whereas stereotypes are viewed as “generalized beliefs about certain groups of people based on their belonging to certain gender, ethnic group, religion and race”(Montenegro, n.d, p. 4).

This issue has captured the attention of educational authorities in Pakistan and became a part of Education for All (EFA) project which aimed at inclusion of both male and female students in education. One of the major concerns for EFA is “Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls’ full and equal access to and achievement in basic education of good quality” (Government of Pakistan, 2002, p. 20). Government of Pakistan (2002) further claims that “the Ministry of Education will continue to pay attention to eliminating gender bias in textbooks and curriculum” (p.32) and “gender stereotypes will be replaced by positive portrayal of women in textbooks” (p. 98).

Gender equity is not only the heart of EFA but also of Millennium Development Goals (MDG). The Millennium Development Goals Report (2010) flaunts its 3rd goal in these words, “Promote gender equality and empower women” (p.20) and its target 1 is to “eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015” (p.20). This gender disparity can be reduced through gender parity in textbooks. Gender equity in textbooks will make female students feel that they are also given equal importance and equal representation and they are equally expected to be a part of education system. Gender impartiality in Science textbooks will let female students think themselves as prospective and potential scientists.

“A textbook is often the ‘official’ history of a nation, especially if the state is responsible for creating or contracting the text. It is important to question what the official histories say about a nation, its people and its relation to others” (Firestone, 2000, p.2). He ascertains that through textbooks, “a specific if unconscious gender message is carried to girls and boys that tells them what is valued in society about themselves and

what opportunities are available to them as women and men” (p.1). When this message is not carried out fairly, both of them cannot realize their identities and their potentials. Blumberg (2007) criticizes gender stereotypes in textbooks as they hamper the vision of girls about “who they are and what they can become” (p.4)

Walford (1980) contends that textbooks play vital role in “encouraging the view that science is a boys’ subject more than a girls’ subject” (p.51). He highlights the need to alter “the clear masculine face that science presents” (p.52). Elgar (2004) is of the view that “lack of female examples in science textbooks can imply to children that science subjects are not the normal pursuits of girls and women” (p.879). The higher educational authorities agree that fair portrayal of both genders in text books can prove to be one of the successful approaches which can make us accomplish the above mentioned goals.

Research Studies Addressing the Issue of Gender Equity in Textbooks

Different researchers have studied the textbooks used in their countries to highlight the issue of gender disparity globally for example in Sweden (Alexanderson & Wingren, 1998) in Paris (Blumberg, 2007), in Korea and Mexico (Chung, 2000), in Netherlands (Dijkstra, Verdonk & Lagro-Janssen, 2008), in Brunei (Elgar, 2004), in Pacific Rim including, Latin America: Argentina, Mexico, Peru, Chile, Brazil, and Asia: Korea Japan, Thailand, China (Firestone, 2000), in Nepal (Joshi, 1994), in America (Potter & Rosser, 1992). This phenomenon is studied for the text books used in different disciplines such as Medicine (Dijkstra, Verdonk & Lagro-Janssen, 2008), Introductory Psychology and Human Development (Peterson & Kroner, 1992) and teacher education (Zittleman & Sadker, 2003).

Walford (1980) analyzed 13 textbooks of Introductory Science. He studied the images in the books printed in the 1970s. He came across two images of men for every image of women. Bazler and Simonis (1991) examined if chemistry textbooks for high school were having gender parity. They compared 7 old textbooks of early 1970s with the recent editions. They discovered some development in situation. The gender ratio improved from 5:1 to 3:1. Articulation their apprehension, they pronounce: “if texts lack images of science-involved women and minorities, students may view science as an activity that excludes most people” (p. 354).

Peterson and Kroner (1992) analyzed the latest editions of human development and introductory psychology textbooks. They found that females were still negatively portrayed and were underrepresented as far as theory, work and behaviors were concerned. Potter and Rosser (1992) explored the reasons of girls' lack of interest in science by analyzing the textbooks of life science in America. There was no proof of chauvinist language i.e. use of 'he' for both the sexes. There was no evidence of occupational stereotypes in the text. For instance, nurse was never supposed to be only female and scientist was never thought to be a male alone. On the other hand, a considerable bias was there in textbook images supportive of males. These biased illustrations indicate that "males are the norm" (p.677).

Alexanderson and Wingren (1998) analyzed the content of textbooks on medicine used in a university of Sweden. They also found males to be used as norm which females are to be compared with. They also highlight the hidden psychosocial and biological differences between members of both the sex groups. They contend that students will face problems during their medical practice due to these shortcomings in textbooks.

Chung (2000) studied the textbooks being taught at primary level in Korea and Mexico to explore the roles assigned to females and males and other gender related issues. They found numerous images of females in the conventional roles "of mother and homemaker, doing the cooking and the housework in the home, and of vendor at outdoor markets, while men are outdoors" (p.21). They declared that "gender stereotypes lower girls' self esteem and limit girls and boys to certain modes of behavior, course of study, and career choices, thereby preventing girls and boys from realizing their full potential" (p.2).

Zittleman and Sadker (2002) studied current editions of 23 textbooks on teacher education comprising five key areas. They realized that even after a long period of discussion on gender issues in textbooks and consumption of government recourses to confiscate this gender bias, only three percent of space was given to gender related issues in those textbooks and no female scientist was mentioned in there.

Paivandi (2008) studied textbooks in Iran to expose intolerance and discrimination. They realized that females are "accorded little importance as individuals, and their contributions to society outside the

home are largely ignored” (p.1). Women are not presented as independent individuals. Rather than portraying women as autonomous individuals, they are shown as “man’s wife, mother, sister, or daughter” (p.2). Home is women’s first priority and their role as a professional outside the home is considered to be secondary. They are shown in working environment only in 21% of the illustrations. Ratio of male and female authors is also breathtaking. There are ten male authors for one female authoress. On the whole “gender discrimination permeates Iran’s textbooks”. Dijkstra, Verdonk and Lagro-Janssen (2008) came across gender bias in medical textbooks in Netherlands. The books are unable to prepare prospective doctors for medical profession as they are deficient in psychosocial and somatic knowledge.

A meta-analysis conducted by Blumberg (2007) regarding content analyses of the textbooks revealed many interesting facts. He ascertains that approximately every piece of textbook content analysis summed up with the same story of unfair gender portrayal irrespective of (a) the country/region in which the researchers carried out the analyses, (b) its income, (c) the level of instruction for which the books were analyzed (from primary to higher education), (d) the subject matter (Social Studies, Science, Mathematics, etc.) and (e) the date of publication. The homogeneity in their findings is also awesome: “(a) under-representation of females, (b) use of male words to mean all of humanity, (c) traditional gender stereotypes about the activities of males and females in the occupational sphere and in the domestic sphere, (d) traditional stereotypes about the traits and activities of males and females, and so on” (p.33).

Gender equity in science education has always been and still is a major concern of educational researchers throughout the world. This study aims to explore the gender equity in middle level science textbooks in Pakistan. Text and illustrations given in the textbooks are examined to learn whether or not males and females have been given equal representation. The roles are also discussed in which both the groups are exhibited in the books.

Method and Procedure

Punjab textbook board Lahore published science textbooks for middle level school students (class 6, 7 & 8) with the approval from ministry of Education, Pakistan in the period 2001-2003. Number of pages in these textbooks ranged from 168 to 196. There are 19, 16 and 16

chapters in textbook for grade 6, 7 & 8 respectively. 19 chapters in textbook for class 6 are: characteristics of living things, cell-unit of life, organization of life, environment, continuity of life, element, compound, mixture, structure of atom, solution, mass & volume, simple machine, atmospheric pressure, heat, light, sound, electricity, electromagnet, structure of earth, the moon. 16 chapters in textbook for class 7 are: working of a plant, working of human body, environment, continuity of life, atom and its structure, elements, some common gasses, water- a common compound, pressure and simple machines, heat, light, sound, electricity, magnetic field, ocean, solar system. 16 chapters in textbook for class 8 are: classification of living organisms, plant kingdom, animal kingdom, environment, continuity of life, symbols and formulae, chemical change and chemical bonds, acids-bases and salts, carbon and its compounds, manufacture of useful products/from common raw materials, liquid pressure, thermal expansion, light, electricity and magnetism, rocks, galaxies and stars.

There are colorful photographs, diagrams and tables in these books. To determine whether or not males and females are fairly portrayed in these textbooks, text and illustrations are analyzed. Most of the illustrations were clear to indicate male or female figure. In only a few instances their figure was ambiguous so they were not included in the analysis. As far as analysis of the text is concerned, number of instances of nouns and pronouns were counted.

Findings

Table-1: Nouns used in the Text regarding Gender

Nouns	Grade 6	Grade 7	Grade 8	Total
Man (for mankind)	4	9	15	28
Man (for a scientist)	2	-	-	2
Scientist's names (male)	4	11	5	20
Astronomer's name (male)	-	-	1	1
Male	2	-	3	5
Female	2	-	4	6
Laborer	-	-	1	1
Army	-	-	1	1
Women	1	-	-	1
Brother	2	-	3	5
Sister	2	-	3	5
Mother	2	-	3	5

Father	2	-	3	5
Boy	1	-	-	1
Child (for female)	1	-	-	1
Authors' names (male)	7	12	8	27
Authors' names (female)	8	5	1	14
Editors' names (male)	2	3	2	7
Editors' names (female)	2	1	1	4
Total	44	41	54	139

Table 1 includes the nouns as they appeared in the text. In 28 instances the word “man” was used for mankind including male and female. The nouns ‘boy’ and ‘child’ are taken from an example from a play ground which depicts gender bias. In this example ‘boy’ is used for male and ‘child’ is used for female. The text is, “A fat boy is sitting near the fulcrum. The small child, too, intends to swing. Should she sit at position A or B to enjoy swing easily?” (Science 6, 2001, p.107). Overall number of male authors and editors is almost double of the female authoresses and editors. There were only male scientists and astronomers mentioned in the text.

Table-2: Number of Nouns used for Males and Females

Textbooks	Male	Female
Grade 6	26	18
Grade 7	35	6
Grade 8	42	12
Total	103	36

Table 2 shows that overall male nouns are three-fold to female nouns. Less gender disparity is visible in text book for grade 6 because almost equal number of female authors (7 male and 8 female) and editors (2 male and two female) are involved in developing the textbook. Gender bias increases with the increase in number of male authors of the textbooks.

Table-3: Pronouns used to represent Gender

Pronouns	Grade 6	Grade 7	Grade 8	Total
He	2 (for scientists)	2 (for scientists)	2 (for scientists)	6 (for scientists)
		1 (for laborer)	1 (for hunter)	4 (miscellaneous)
			1 (for farmer)	
			1 (for mankind)	
His	2 (for mankind)		6 (for mankind)	8 (for mankind)
	1 (for astronaut)			1 (for astronaut)
Him		1 (for laborer)		1 (for laborer)
She	1 (for a girl)			1 (for a girl)
Total	5	4	11	21

Table 3 shows that female pronoun appeared only once as compare to male pronouns which appeared 20 times more.

Table-4: Number of Pronouns used for Males and Females

Textbooks	Male	Female
Grade 6	5	1
Grade 7	4	0
Grade 8	11	0
Total	20	1

Table 4 is showing clear gender biases in using pronouns as female pronoun emerged only once whereas male pronoun emerged 20 times.

Table-5: Number of Illustrations Depicting Gender

Textbooks	Male	Female
Grade 6	58	15
Grade 7	9	1
Grade 8	21	3
Total	88	19

In illustrations gender disparity becomes even more prominent. Table 5 reflects that there are more than four illustrations showing male figures for every illustration depicting females.

Table-6: Number of Illustrations Omitted from Analysis

Textbooks	Description	Total
Grade 6	2 (babies), 1 (astronaut)	3
Grade 7	7 (human body functions and skeleton), 2 (diver), 3 (hikers),	12
Grade 8	1 (a market full of people), 1 (surgeon), 1 (fire fighter), 1 (swimmer)	4
Total		19

Illustrations mentioned in table 6 are omitted because they were not clear enough to be classified as male or female as some were wearing clothes particular to their activities. In case of babies, their gender could not be determined due to their indistinguishable features. Illustrations of human body functions demonstrated only human skeletons which were not identifiable for gender.

It is worth mentioning here that sex neutral terms were also used in the text. They are scientists, geologists, paleontologists, astronomers, people, no body, children, parents, offspring, person, teacher, philosopher, farmer, class fellow, doctor, factory workers, human(s), human beings, human body systems, human body parts and human related issues. Pronouns such as we, they and you are also used in the

textbooks at many places. Most of the times activities are narrated in imperative sentences or passive voice are used to avoid gender bias.

The roles are also discussed in which both the groups are exhibited in the books. Males are allocated the roles of hunter, loader, farmer, painter, car washer, surgeon, fire fighter, wood cutter, astronaut, scientist, gardener, passenger and driver. They are also shown to be engaged in experiments in laboratory setting and outdoor jobs. The females are portrayed as showing their dress, washing clothes and cleaning floor. They are assigned the roles of mother and sisters performing domestic chores only. They are exposed to be involved in their domestic chores most of the times. For instance, “you must have seen women using fans to dry the wet floor” (Science 6, 2001, p.129). There is no provision for them to be an active participant of outdoor life in which they could be involved in some profession to contribute towards economical cause.

Discussion

Our science textbooks are presenting the same gender portrayal today as it has ever been presented in previous content analysis. “The clear masculines face that science” (Walford, 1980, p.52) presented still persists. Science is not yet considered to be “the normal pursuits of girls and women” (Elgar, 2004, p.879). Elgar (2004) interviewed five female scientists to get their opinion regarding the impact gender disparity has on children studying the textbooks. He quoted one of the interviewees:

It definitely matters. Students learn from these books. We should convey the message to our students that we are all equal. Showing pictures of males only is not a good start. And in the lower secondary years children are at an impressionable age (P. 889).

The present study reveals that gender inequity still persists as it was before the commitment by Ministry of Education (2002) that it will “continue to pay attention to eliminating gender bias in textbooks and curriculum” (p.32) and “gender stereotypes will be replaced by positive portrayal of women in textbooks” (p. 98). A huge gap between male and female portrayal in science textbook is evident in this study. As far as text is concerned the usage of nouns and pronouns collectively is about four times more in case of males than females. Illustrations also demonstrate the same ratio. These results are almost consistent with

those of Elgar (2004). The Pakistani workforce is getting gender diverse. Females are entering the fields in which they were considered to be aliens before. Although they are becoming engineers, doctors, pilots and scientists now yet this face of females is not shown in textbooks. A commonly visible role in daily life is of a driver which a large number of females are used to play. But all the females are shown as passengers travelling in cars, buses, and rikshaws carrying their babies. Not even a single lady is shown to be driving among 38 persons who are travelling (Science 6, 2001).

Textbook may be an indicator of the roles assigned by society to both the gender groups. Therefore, science textbooks, if they give equal and fair gender representation can encourage females to adopt careers in science and go side by side with men in this field. While revising the present editions of science textbooks gender issue must be taken into consideration. This content analysis can be helpful for curriculum planners in this regard. As teachers and students both are the direct stakeholders of gender issue in textbook, their opinion in this regard must be sought. In future, the research studies must explore what teachers and students think about gender inequalities in their textbooks and what role teachers can play to minimize the effect of these biases. Comparative studies must be conducted to get the clear picture of this phenomenon as it exists now as compared to past.

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