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ANALYSING GENDER REPRESENTATION IN PRIMARY, GRADE-V AND GRADE-VI MATHEMATICS TEXTBOOKS IN NIGERIA

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A B S T R A C T

The study examines gender representation in primary 5 and 6 mathematics textbooks currently use in Federal Capital Territory (FCT) Abuja- Nigeria. Content Analysis approach that involves Descriptive Statistics tool was used to count the number of male and female characters, and gender neutral characters. The frequency and percentage of male and female gender characters, and gender neutral characters were calculated. The results revealed that there is gender bias representation of male characters than female in the two textbooks but more in primary 5 mathematics textbook. Based on the findings of the study, it was recommended that there is need to create awareness of existence of gender bias in mathematics textbooks through workshops and seminal for teachers, curriculum planner, policy makers and writers.

Keywords: Gender bias, Gender neutral character, Content Analysis, Gender representations, and Grades 5 and 6 Mathematics textbooks.

INTRODUCTION

Gender bias in learning materials such as textbooks has been a global issue in research over the years both in developed and undeveloped countries (Oyebola, 2003; Carthon, 2003; McDonnell, 2007; Plumm, 2008; Mustapha, 2012; 2013; Ghavbavi and Mousavi, 2012; Zilimu, 2014). Mathematics textbooks are important instrument in teaching and learning mathematics at all levels of education in Nigeria. They are used by both the teachers and the students, and the same time Mathematics textbooks are powerful representation of the curriculum and the pedagogical practices of education from primary to tertiary levels. It is revealed that Mathematics textbooks are embedded with gender discrimination in the form of stereotypical roles, omissions, or degradations (Moroava and Novotna,2013) Therefore, there is the need mathematics instructional materials should provide balance gender representation in illustrations and texts that will help male and females to relate to the material presented (Tietz, 2007). Gender biased representation in textbooks continue to exist despite the (CEDAW) condemnation of textbooks that are stereotypical on gender role (Mkuchu, 2004).

It is however sad to note that gender bias in school textbooks takes many forms and it is subtle and difficult to detect. It is embedded in the content of the texts and pictures (Brugeilles and Cromer,2009) It further creates and sustains a view of the world in which male activity and male persons are primary importance and of greatest value, while female activity and female persons are marginalised, made invisible or downgraded (Davies,1995).

Modibe (2012) argues that textbooks need to be reviewed with gender perspectives in order to provide balance and gender sensitive education to all children. He further emphasizes that authors of textbooks should be fully aware of the negative effects of stereotypes and gender bias to students when writing a textbook.

Students spend most of their lives in school using mathematics textbooks. They learn basic skills and also formulate attitudes and behaviour from what they have read in the textbooks. Sadker and Zittleman, (2007) found out that 75% of the child's class work and 90% of the homework is from the textbooks and the teachers

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take their decisions from the textbooks (Baldwin 1992 cited in Blumberg 2007), and a pupil reads more than 32,000 pages of textbooks from elementary to high school level (Khurshi *et al.,* 2010), in which they internalized what they read and see as suitable potentials and attitudes which are associated with being masculine and feminine through socialization within the family (Bahiyah *et al.,* 2008).

Some scholars are of the same view as of Cameron that "a biased representation of female and male can lead to students' sense of what is normal for women and men in the society, in other words, the content of the textbook helps reinforce gender as social division and perpetuate inequalities between men and women" (Gharbavi and Mousavi, 2012).

Shah, (2012); Chanzanagh *et al.,* (2011); Lee and Collins, (2009); Mineshima, (2008) investigate gender representation in English Language textbooks in Pakistan, Iran, and Hong Kong. The researchers both used content analysis. The results revealed that there are more male characters than female characters in both texts and illustrations in Pakistan and Iran English textbooks. But on contrary, the findings of Lee and Collins, (2009) and Mineshima, (2008) in Hong Kong English language textbooks indicate that there is equal number of male and female characters in the textbooks and they are of ratio 1.1.14. The findings of Mineshima revealed that there are equal numbers of male and female characters in the textbook.

Tang *et al.* (2010); Sunar, (2011) determine gender representation in mathematics and science textbooks in China and UK. The results also show that there were 515 (55.3%) male and 416 (44.7%) female characters in the four volumes of mathematics textbooks used. At the same time the findings of Science textbook indicate that 87% male characters and 23% female characters appeared in text and illustrations. They conclude that there is gender bias in both mathematics and science textbooks used in China and UK

Mohamad *et al,* (2012); Amini and Birjandi, (2012); Mustapha, (2012); Mukudan and Nimehcisalem,(2008); Oyebola, (2003) examined gender representation in Malaysia English languages and Nigeria English language, social studies and Primary science textbooks. The results revealed that all the four textbooks are embedded with gender bias against female characters in texts and illustrations. These results mean that there is gender bias on the ground as a reality.

Statement of the Problem: Gender bias in school mathematics textbooks in Nigeria is of great concerned to both mathematics educators as well as researchers. The "textbooks stand at the heart of the educational enterprise; teachers therefore rely on them to set the parameter of instruction to impact basic educational content" (Fouls, 2010). Gendered texts used by the teachers make the students to feel that teachers are intentionally using the differences because of their gender (Deshler and Burroughs, 2013). Blumberg, (2007) observed that gender bias in textbooks and teachers differential treatment of students have not been given adequate .attention by scholars.

There is gender imbalance in science, technology and mathematics (STM) which is still reflecting in Nigeria mathematics textbooks (Odebode, 2010). However, there are other studies on gender bias on other subjects such as social studies, primary science textbooks Oyebo, (2003), English language textbooks (Mustapha, 2012; 2013) in Nigeria but little or no studies on analysing gender representation in primary 5 and 6 mathematics textbooks in Nigeria is lacking. This study was sparked from the recent studies done on gender representation in learning materials in junior secondary school in Nigeria.

Gender representation in mathematics textbooks in Nigeria has not been fully balance There is gender imbalance science, technology and mathematics (STM) which still reflecting in mathematics textbooks in Nigeria (Odebode, 2010) Studies have shown that gender bias in textbooks may influence students' perception of who they are, how they should and may also affects their achievement and career choice (Carthon, 2003).

Purpose of the Study: The purpose the study was to the male examine Primary 5 and 6 mathematics textbooks whether there is gender bias in male and female characters, and gender neutral characters. Also to create awareness to teachers on gender bias issues in learning materials which has negative impact on both male and female students (Cameron, 1990; Carthon, 2003; Hamilton *et al.,* 2006).

Research question: How is gender represented in Primary 5 and 6 mathematics textbooks currently use in public schools in Nigeria in terms of male and female characters and gender neutral characters?

METHODOLOGY

In this study, two mathematics textbooks of primary 5 and 6 were used to determine whether there is gender

bias in male and female characters and gender neutral characters. These textbooks are the most frequently used in public primary schools in Federal Capital Territory (FCT) Abuja-Nigeria identified by Educational Research Centre (ERC) Abuja. The two textbooks Modular Mathematics for Primary 5, and MAN Primary Mathematics (Universal Basic Education Edition is written by different authors. Representation according to Jodelet, (1989) is a form of knowledge that is developed and shared socially with the practical aim, contributing to the construction of a reality common to social whole. Representation .is not the reflection of reality. It reveals a shaping, an ordering of reality which aim not only to explain an established social order but also to legitimate it. (Brugeilles and Cromer, 2009). In this study, Content analysis approach was adopted which involves descriptive Statistical of frequency and percentages. Content analysis simple means what is content in a message. It is seen as a method in which content of message form the basis for drawing inferences and conclusion about content (Nachmias and Nachmias, 1976).

Data Analysis: The data analysis included tallies for existence and frequency of gender characters and gender neutral, were calculated as the number of occurrence per module by unit of mathematics textbooks and percentage was calculated. The modular mathematics textbook of primary 5 used in FCT Basic primary schools has 30 modules of which 19 representing 63.33% of the modules do not have human characters in the texts while 11 (36.67%) modules have human characters. This means that the greatest part of the mathematics text book does not contain human characters. Each of the modules was examined for male, female and gender neutral characters in the text to ascertain the extent of gender inequity. The results of the analysis are presented in Tables 1.

Table 1. Summary results of Gender bias Modular Mathematics for Primary 5 Revised Edition.

Chapter	Topic	Frequency and percentage of individual and collective characters in the text						Total	
		Male		Female		Neutral			
		Freq.	%	Freq	%	Freq	%	N	%
Module 3	Decimal fraction	14	53.85	9	34.61	3	11.54	26	100
Module 4	percentages	12	50.00	6	25.00	6	25.00	24	100
Module 5	Ratio	15	45.45	14	42.42	4	12.12	33	100
Module 6	Addition and Subtraction	14	45.16	10	32.26	7	25.58	31	100
Module 9	Division	5	41.67	1	8.33	6	50.00	12	100
Module 11	Ratios and percentage revision	16	55.17	8	27.59	5	17.24	29	100
Module 12	Simple problems on percentages	21	60.00	3	8.57	11	31.43	35	100
Module 13	Open sentence	3	50.00	2	33.33	1	16.67	6	100
Module 14	Money	25	69.44	3	8.33	8	22.22	36	100
Module 19	Weights	3	17.65	8	47.06	6	35.29	17	100
Module 20	Average speed	15	60.00	4	16.00	6	24.00	25	100
Grand total		143	51.19	68	24.82	63	22.99	274	100

Source: Modular Mathematics for Primary 5 (2010)

In module 3,of the mathematics textbook there is 53.85% of male characters, 34.61% of female characters and 11.54% neutral characters used. In conclusion, there is gender imbalance of characters in favour of males. Therefore, there is gender inequity in module 3. In other words, male characters are predominately in the textbook with only few female and neutral characters.

The analysis in Module 4 indicates there is imbalance of male female and neutral characters of 25% respectively against 50% male characters. The results of module 5 consisted of 45.45% of male characters, 42.42% female characters and 12.12% neutral characters. We concluded that gender inequity manifested in the module in favour of males. Analysis of module 6 on the topic addition and subtraction indicated that 14 characters representing 45.16% of male, 32.26% female characters and the rest 25.58% for gender neutral characters were used.

It is important to note that in Module 9 the results show that neutral characters in the text are predominately

with 50% while 41.67% and 8.33% represents male and female characters respectively. We can conclude that there is gender equity in this very particular modular out of 11 modules that have human characters.

The results of analysis of module 11 shows 55.17% of male character in the text, 27.59% of female characters while 17.24% of neutral characters. It can be concluded that the module is dominated by male character than female characters and it uses few gender neutral characters. This mean there gender inequity in the module.

Analysis of module 12, shows that 60%, 8.57% are male and female characters respectively, while 31.43% gender neutral characters. It can be concluded there is no gender equity. This mean that male characters are the dominate of the module in the texts. Also 50% of male characters, 33.33% of female characters are present in the text while there is 16.67% of gender neutral character. This means gender inequity is manifesting in favour of the male characters.

The results of the analysis of module 14 and 19 shows that 69.44%,17.65% representing male characters, 8.33%, 47.06% representing female characters in modules 14 and 19. While 22.22% 35.29% are gender neutral characters for the two modules. The last module has more gender neutral characters than the first. It means that gender inequity is manifesting in the two modules only that gender neutral characters are more in the second module than the first.

The topic on average speed in module 20 indicated that 60% male characters,16% female characters while 24% representing gender neutral characters in the texts of the last module that have human characters. This however mean that male characters are the dominate and which implies that gender inequity is manifesting.

Table 2 shows the number of frequencies of gender bias in characters of males, female and gender neutral that is contains in Grade 6 MAN Primary Mathematics textbook of Grade 6 used in FCT primary schools. It has 28 modules of which 16 (57.14%) which representing human characters in the text while 12 (42.86%) modules do not have human characters. This means that the greatest part of the mathematics text book contains human characters. Each of the modules is examined for male, female and gender neutral characters in the texts to ascertain the extent of gender inequity. The results of the analysis are presented in Tables 2.

In module 3, the analysis results show that 3 (100%) representing gender neutral characters, and there is no male or female characters. This mean there is gender equity in the module and the reason can be that the writer of the module may be aware of gender equity issue in mathematics. Furthermore, in module 4 shows that 60 male characters representing 61.22%, 20 (20.41%) and 18 (18.37%) of female and gender neutral characters. The results show there is gender bias in favour of males in the module.

Module 5 shows 3 (27.27%) male and female characters each and 5 (45.45%) gender neutral characters in the texts. This means there is balance between male and female characters present in the particular module. In other words, there is gender equity in the texts; the reason can be that the writer of the unit is aware of the gender equity issue in mathematics. Similarly, module 6 has the highest percentage of male characters of 70.83%, and 15.28% of female characters while 13.89% for gender neutral characters. This therefore means gender inequity is manifesting in the module.

The analyses of modules 7 and 9 results show that 8 (88.89%; 6 (50.00%) males characters and 1 (11.11%; 6 (50.00%) gender neutral characters. This implies that gender bias in the characters is in favour males and no single female character existing in the units. However, the writer used half of the gender neutral in the second module unlike the first. The results of module 11 representing 21 (70.00%) male characters, 4 (13.33%) female characters and 5 (16.67%) gender neutral characters; this means that gender bias is in favour of male characters in the texts. It implies that gender inequity manifesting in the module 11 of grade 6 mathematics textbook.

In modules 12 and 13 which the results of the analysis shows 10 (66.67%); 33 (73.33%) representing males characters, while 3 (20.00%); 6 (13.33%) females characters and 2 (13.33%); 6 (13.30%) neutral characters in the text. This means gender inequity existing in the two modules and is in favour of male characters. But module 17 shows 3(100%) of neither male characters in the text without female nor gender neutral characters which is in favour of males. Analysis of modules 18 and 19 presents that 4 (40%); 11 (78.57%) males characters, 4 (40%); 2 (14.29) females characters and 2 (20%); 1 (7.69%) neutral characters in the text. This shows that gender inequity is manifesting in the units.

Table 2. The Results of the Extent to which Gender Inequity manifesting in Teaching and Learning Mathematics at Basic Education in Nigeria in terms of mathematics textbooks by individual and collective character in the texts.

Chapter	Topic	Frequency and percentage of individual and collective characters in the text						total	
		Male		Female		Neutral			
		Freq	%	Freq	%	Freq	%	N	%
Module 3	Demography	-		-		3	100	3	100
Module 4	Ratio & percentages	60	61.22	20	20.41	18	18.37	98	100
Module 5	Percentages	3	27.27	3	27.27	5	45.45	11	100
Module 6	addition & subtraction	51	70.83	11	15.28	10	13.89	72	100
Module 7	Multiplication of number	8	88.89	-	-	1	11.11	9	100
Module 9	Division	6	50.00	-	-	6	50.00	12	100
Module 11	Ratios & percentage revision	21	70.00	4	13.33	5	16.67	30	100
Module 12	Order of operations	10	66.67	3	20.00	2	13.33	15	100
Module 13	money	33	73.33	6	13.33	6	13.33	45	100
Module 17	Capacity	3	100	-	-	-	-	3	100
Module 18	Weights	4	40.00	4	40.00	2	20.00	10	100
Module 19	Time & speed	11	78.57	2	14.29	1	7.14	14	100
Module 20	Open sentence	12	92.31	1	7.69	-	-	13	100
Module 22	Heights & distances	5	100	-	-	-	-	5	100
Module 26	Statistics 1	15	41.67	12	33.33	9	25.00	36	100
Module 27	Statistics 2	4	22.22	2	11.11	12	66.67	18	100
Grand total		246	62.44	68	17.26	80	20.30	394	100

Source: Grade 6 MAN Primary Mathematics (Universal Basic Education Edition)

The results of modules 20 and 22 analysis indicates that 12 (92.31%); 5 (100%) representing males characters, 1 (7.69%) female characters. This means there is gender bias in favour of males in both modules. In the same manner, the modules of statistics 1 and2 shows that 15 (41.67%); 4 (22.22%) males characters, 12 (33.33%); 2 (11.11) females characters and 9 (25%); 12 (66.67%) gender neutral characters in the texts. This means gender inequity is manifesting in favour of males and to some extent gender neutral characters are used.

Table 2 analysis shows that, 246 (62.44%) representing male characters while, 68 (17.26%) representing females characters and 80 (20.30%) representing gender neutral characters used in MAN Primary Mathematics Book 6 in the texts. This shows that there is gender bias in the textbook in favour of male characters. Furthermore, the pattern shows gender bias increases as the students move from low level to high level of class. The reason can be that as the students becoming more mature, gender inequity in the texts may not have negative effect on their interest and attitude in mathematics in respective of gender used in the text.

DISCUSSIONS

The results in Tables 1 and 2 revealed there is gender bias representation in the mathematics textbooks which is in line with the results of Oyebola, 2003, Tietz, 2007: Mustapha, 2012, 2013: Habiba Binti Ismail *et al.,* 2011; Bahiyah *et al.*, 2008 which is in favour of male characters. These results are from subjects such as English language, Social studies, Accountancy, primary science textbooks. But on the other hand the findings are contrarily to the findings of Carthon (2003). However, it is interesting to know that the pattern shows gender bias in favour of male characters increase as student move primary 5 to 6. The reason may be that the students are becoming more mature and so the gender bias representation in mathematics textbooks may not have any negative impact on mathematics achievement and career choice related to mathematics.

CONCLUSION AND RECOMMENDATIONS

The present study findings are similar to the most recent findings of content analysis on gender characters and gender roles in English Language, Social Studies, and Science and Accounting textbooks used.by other scholars. Further study could examine the gender representation in primary 3 and 5 mathematics textbooks.

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