Gender Influence on Student Perception of The Nigerian Further Mathematics Curriculum Content Difficulty

OTIKOR MARK SANDERSON[1], ZALMON IBAAN GOGO[2], DASO PETER OJIMBA[3]

[1] Post Graduate School, Ignatius Ajuru University of Education, Port Harcourt, Nigeria

[2, 3] Department of Mathematics/Statistics, Faculty of Natural and Applied Sciences, Ignatius Ajuru University of Education, Port Harcourt, Nigeria

Abstract- The study investigated the influence of gender on student perception of the Further Mathematics curriculum content difficulty. The descriptive survey research design was adopted for the study. The study was conducted in Gokana local government area of Rivers State with a population of sixty (60) senior secondary class three students offering Further Mathematics from the twelve (12) public senior secondary schools in the area. Census sampling technique was used to select the sample of 60 students used for the study. The instrument for data collection was the researchers' made and validated Further Mathematics Curriculum Content Difficulty Assessment Questionnaire (FMCCDAQ). The test and retest method and Pearson's Product Moment Correlation (PPMC) were used to obtain 0.73 reliability coefficient of the FMCCDAQ. Six research questions and six hypotheses guided the study. Mean and standard deviation and independent sample t-test were used for data analysis. The study found out that both the male and the female students perceived the pure mathematics, coordinate geometry, statistics, mechanics and operations research contents of the Further Mathematics Curriculum (FMC) difficult to learn but gender had no significant influence on the perception of students on the FMC content difficulty. The study among others recommended that Further Mathematics teachers should employ diagnostic and remedial instructional strategies and active learning approaches to teach the male and the female students to remediate perceived learning difficulties in the Further Mathematics curriculum contents.

Indexed Terms- Gender, influence, perception, further, Mathematics, curriculum, content, difficulty

I. INTRODUCTION

Mathematics is one of the compulsory subjects in the school curriculum. Mathematics education is compulsory at pre-basic, basic and post basic levels of education in Nigeria. The compulsory teaching and learning of Mathematics reveal the importance of the subject to nation building. Mathematics has been one of the most important teaching subjects in schools. Approximately one quarter of the periods in a week in school time table is used for Mathematics instruction with double periods in most cases. Despite the importance given to Mathematics and the much time allotted to Mathematics instruction, students still perceived Mathematics as a very difficult subject to learn. Teachers find it difficult teaching Mathematics despite the use of innovative instructional methods and materials because students have problem learning the subject. Mathematics teaching is faced with so many problems (Ekwueme, 2013). Wonu and Zalmon (2019) classified current issues or problems in Mathematics education into curricular, pedagogical, technological, environmental/socio-cultural, psychological and governmental issues. Odili (2006) classified issues in Mathematics education in schools today as mathematical, pedagogical and psychological issues. Gender issue is one of the issues in contemporary Mathematics education practice and research. There has been a growing concern and demand for gender parity or gender balance in several fields of study including Mathematics. Gender disparity in Mathematics learning is one of the challenges in Mathematics instruction.

Gender is a term used to describe human beings on the basis of sex and refers to the male and the female beings (Zalmon, 2021). Gender depicts sex attributes such as masculine and feminine. According to Abdullahi (2017), gender is the physical or social conditions of being either male or female. The issue of parity and disparity in the performance of the male and the female students in Mathematics has formed an important focus of research for some years now (Umoinyang & Ekwueme, 2005). Researchers in Mathematics Education have variance views on the influence of gender on the performance of students in Mathematics. Alio and Harbor-Peters (2000) detected gender disparity in the performance of secondary school students in Mathematics. Umoinyang and Ekwueme (2005) reported that gender differences in Mathematics learning factors influence Mathematics learning and performance in secondary schools. Oloda (2017) reported that there is gender disparity in the academic performance of students in Mathematics periodic tests and terminal examination with the male students performing significantly better than their friends' counterparts. Zalmon et al. (2020) analysed student Mathematics grading in the senior secondary certificate examinations conducted by the West African Examination Council (WAEC) and the National Examination Council (NECO) and reported that the female students had a higher grade than their male counterpart in West African Senior Secondary Certificate Examination (WASSCE) while in National Senior Secondary Certificate Examination (NSSCE), the male students had a higher grade than their female counterpart but there was no significant difference between the male and the female students Mathematics grades in both examinations.

Oji and Abonyi (2017) evaluated the influence of gender and class level on Mathematics test anxiety inventory for secondary school students and found out that the males have lower anxiety scores than the females, indicating that more females than males have high Mathematics anxiety. Umoinyang and Ekwueme (2005) revealed that students' attitude towards Mathematics preference of number and numeration, and trigonometry are gender related. The researchers noted with surprise that girls have a more positive attitude towards learning Mathematics which is a subject generally acclaimed as masculine. In their views, one would have expected the attitude of boys to be significantly higher than that of the girls because of the widely acclaimed under representation of females in a range of technical, scientific and engineering fields for which Mathematics is a basic prerequisite. But they acknowledged that the female students might have seen the challenge in meeting up with their male counterparts improved their attitude towards Mathematics as a gateway to technical, scientific and engineering fields. Umoinyang and Ekwueme (2005) observed that the preference of content is directly related to perception of difficulty and for boys and girls to differentially prefer some content areas of Mathematics means that they hold varying view of their difficulty. They revealed that the male students have preference for number and numeration and trigonometry more than the female students. However, both boys and girls have equal preference for algebraic processes, statistics and probability without having any preference for plane geometry and mensuration.
Musa, et al. (2015) investigated the relationship between personality characteristics such as gender and academic achievement in Mathematics and found out that there was statistically significant relationship between gender and Mathematics achievements. The implication of this finding is that gender influences significantly, the performance of students in Mathematics.

Zalmon, et al. (2017) revealed that students perceived 33% of the senior secondary education Mathematics curriculum content difficult, with content difficulty higher among the females than the males but there was no significant difference on the gender perception of the students. The researchers noted that number and numeration, algebraic processes and statistics were not perceived difficult by the students but perceived geometry and introductory calculus themes of the senior secondary Mathematics curriculum difficult to learn. The students' perception of the most difficult theme of the curriculum was introductory calculus. The male students perceived introductory calculus to be more difficult to learn than the female students. Algebraic processes and number and numeration were the easiest themes of the senior secondary Mathematics curriculum for the male and the female students respectively. Daso, et al. (2021) comparatively assessed the extent of student and teacher perception of content difficulty in the Further Mathematics Curriculum (FMC) and found out that students perceived all the FMC themes of pure mathematics, coordinate geometry, statistics, mechanics and operations research difficult to learn. Teachers perceived all the themes of the FMC easy to teach. Also, there was significant difference between student and teacher perception of the FMC content difficulty. Zalmon and George (2020) assessed the extent of students' perception of content difficulty in the Nigerian Further Mathematics curriculum and found out that students perceived 88.20% of the Further Mathematics curriculum content difficult to learn with learning difficulties in all the FMC themes of pure mathematics, coordinate geometry, statistics, mechanics and operations research indicating poor FMC implementation. However, this study seeks to determine the influence of gender on student perception of the Nigerian Further Mathematics curriculum content difficulty.

The Further Mathematics Curriculum (FMC) was first designed in 1985 by the Federal Ministry of Education with three broad themes of pure mathematics, mechanics and statistics and three objectives (Nigerian Educational Research and Development Council (NERDC), 2012). The FMC was reviewed in 2007 by the NERDC with coordinate geometry and operations research added to the previous themes. The five themes of the FMC are pure mathematics, mechanics, statistics, coordinate geometry and operations research. The implementation of the curriculum commenced in the year 2011 (NERDC, 2012). It is more than a decade now since its implementation and this study seeks to determine the influence of gender on student perception of the Nigerian FMC content difficulty.

- Statement of the Problem

Gender disparity or parity in learning is one of the contemporary issues in Mathematics Education research. Researchers in Mathematics Education have variance views on the influence of gender on the performance of students in Mathematics. Several research reports have also revealed abysmal performance of senior secondary students in General Mathematics in external examinations with students perceiving some contents of the Further Mathematics curriculum difficult to learn. However, there are few literatures on the male and the female student perception of the Further Mathematics curriculum content difficulty. To close this literature gap, this study investigated the influence of gender on student perception of the Further Mathematics curriculum content difficulty and provided answer to the question: is there any significant difference between the male and the female student perception of content difficulty in the Further Mathematics curriculum?

- Aim and Objectives of the Study

The study investigated the influence of gender on student perception of the Further Mathematics Curriculum (FMC) content difficulty. The objectives of the study are to:

1. Assess the difference in the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC.
2. Determine the difference in the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC.
3. Ascertain the difference in the mean rating of the male and the female student perception of the statistics content difficulty in the FMC.
4. Find out the difference in the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC.
5. Evaluate the difference in the mean rating of the male and the female student perception of the operations research content difficulty in the FMC.
6. Assess the difference in the mean rating of the male and the female student perception of the FMC content difficulty.

- Research Questions

Six research questions guided the study:

1. What is the difference in the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC?
2. What is the difference in the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC?
3. What is difference in the mean rating of the male and the female student perception of the statistics content difficulty in the FMC?
4. What is the difference in the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC?
5. What is the difference in the mean rating of the male and the female student perception of the operations research content difficulty in the FMC?
6. What is the difference in the mean rating of the male and the female student perception of the FMC content difficulty?

- Hypotheses

Six hypotheses were formulated and tested at 0.05 significant level to guide the study as follows:

1. There is no significant difference between the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC.
2. There is no significant difference between the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC.
3. There is no significant difference between the mean rating of the male and the female student perception of the statistics content difficulty in the FMC.
4. There is no significant difference between the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC.
5. There is no significant difference between the mean rating of the male and the female student perception of the operations research content difficulty in the FMC.
6. There is no significant difference between the mean rating of the male and the female student perception of the FMC content difficulty.

II. METHODOLOGY

The descriptive survey research design was adopted for the study. The study was conducted in Gokana local government area of Rivers State with a population of 60 (male 32; female 28) senior secondary class three students offering Further Mathematics from the twelve (12) public senior secondary schools in the area. The senior secondary class three students constituted the population of the study because the study is interested in assessing the perception of difficulty of students who had been taught all or most of the Further Mathematics curriculum content. Further Mathematics is optional and few schools and students offer the subject. Census sampling technique was used to select the 60 sample size used for the study. The instrument for data collection was the researchers made Further Mathematics Curriculum Content Difficulty Assessment Questionnaire (FMCCDAQ). The FMCCDAQ consisted of 263 content items patterned after the four point Likert like scale of Very Difficult (VD) – 4 points, Difficult (D) – 3 points, Easy (E) – 2 points and Very Easy (VE) – 1 point with a mean criterion cut-off mark of 2.50. The decision rule was: Difficult content (mean$\geq$ 2.50); Easy content (mean$<$ 2.50). The FMCCDAQ had two sections. Section A and section B. Section A was used to illicit demographic information from the respondents such as class and gender while section B was used to obtain the response of the respondents on their perception of the Further Mathematics curriculum content difficulty based on the five themes of the curriculum: pure mathematics, coordinate geometry, statistics, mechanics and operations research. Three experts in Curriculum Studies and Educational Technology validated the instrument face and content wise. The test and retest method and Pearson's Product Moment Correlation (PPMC) were used to obtain 0.73 reliability coefficient of the FMCCDAQ. The FMCCDAQ was administered by the researchers with the assistants of the Further Mathematics teachers. Mean, standard deviation, and t-test were used for data analysis. The six research questions were answered with Mean (M) and Standard Deviation (SD) while the six hypotheses were tested with t-test.

III. RESULTS

Research question one: What is the difference in the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC?

Table 1: Mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC

S/N	Pure Mathematics	Male (n=32)		Female (n=28)	
		Mean	SD	Mean	SD
1.	Definition of sets	1.66	0.70	1.50	0.64
2.	Set notation methods	2.38	1.29	2.39	0.99
3.	Null set	2.31	1.26	2.75	1.00
4.	Singleton set	2.31	1.26	2.61	0.92
5.	Finite and infinite set	2.03	0.97	1.93	0.66
6.	Subsets	1.72	0.85	2.00	1.15
7.	Universal set	1.44	0.67	1.57	0.79
8.	Power set	1.81	0.74	2.11	0.92
9.	Union of sets	1.72	0.81	1.68	0.72
10.	Intersection of set	1.47	0.67	1.79	0.74
11.	Complements of set	1.84	0.72	1.96	0.92
12.	Number of element in a set	2.00	0.80	2.39	1.13
13.	Venn diagram and applications up to 3 set problem	2.44	1.11	2.25	0.97
14.	Definition of binary operation	2.13	1.10	2.04	0.92
15.	Association law of binary operation	2.63	1.10	2.50	1.04
16.	Commutative law of binary operation	2.56	1.05	2.39	1.13
17.	Distributive law of binary operation	2.59	1.13	2.61	1.20
18.	Laws of complementation as insets	2.75	0.98	3.18	0.94
19.	Identify elements	2.66	0.83	2.86	1.01
20.	Inverse of an element	2.84	0.88	3.21	0.88
21.	Multiplication tables of binary operation	2.28	1.05	2.71	1.12
22.	Definition of indices	1.91	1.03	2.11	1.07
23.	Multiplicative laws of indices	1.88	0.83	2.25	1.11
24.	Divisional law of indices	2.19	0.93	2.39	1.20
25.	Power law of indices	2.13	0.98	2.39	1.26
26.	Zero power law of indices	2.16	0.95	2.25	1.17
27.	Negative power law of indices	2.44	1.22	2.21	1.07
28.	Inverse power law of indices	2.41	1.01	2.39	1.03
29.	Applications of indices, solution of indicial equations up to quadratic equation	3.09	1.17	2.79	1.20
30.	Logarithms	1.69	0.59	1.86	0.76
31.	Definition of logarithm	1.50	0.57	1.93	0.72
32.	Multiplicative laws of logarithm	2.16	0.77	2.18	0.72
33.	Divisional law of logarithm	2.31	0.97	2.36	0.83
34.	Power law of logarithm	2.50	0.84	2.21	0.99
35.	Logarithm of number in the same base	2.41	0.95	2.68	1.06
36.	Logarithm of number equal to 1	2.81	0.93	2.82	0.77
37.	Logarithm of a number equal to zero	2.75	0.95	2.82	0.77
38.	Change of base of logarithm	2.44	1.08	2.64	1.06
39.	Definition of surds	2.25	0.92	2.50	0.92
40.	Rules for manipulating surds ($\sqrt{ab}$)	2.72	0.96	3.43	0.74
41.	Multiplicative rule of surds ($\sqrt{ab}$)	2.84	0.92	3.18	0.98
42.	Divisional rule of surds ($\sqrt{ab}$)	2.97	0.93	3.36	0.91

43.	Power rule of surds (√ab)	2.69	0.90	3.04	1.00
44.	Inverse power rule of surd	2.97	0.97	3.54	0.88
45.	Rationalization of the denominator	2.91	1.12	3.64	0.68
46.	Definition of function	2.91	1.12	3.57	0.69
47.	One to one function	2.69	1.15	3.39	0.79
48.	Onto function	2.84	0.99	3.50	0.84
49.	Inverse function	2.81	0.97	3.43	0.88
50.	Identify function	2.94	0.91	3.43	0.84
51.	Constant function	2.72	0.99	3.29	1.05
52.	Circular function	2.94	0.84	3.32	1.02
53.	Logarithmic function	2.50	0.80	2.89	1.03
54.	Experiential function	2.69	0.97	2.93	1.12
55.	Composite function	3.00	0.88	3.29	1.01
56.	Application of functions	3.09	0.89	3.14	1.11
57.	Solutions of problems of function	3.09	0.96	3.14	0.97
58.	Definition of sequence	2.31	0.93	2.57	1.17
59.	The nth them of a sequence	1.81	0.93	2.50	1.14
60.	Definition of series	2.06	0.88	2.82	1.22
61.	The nth term of a series	1.97	0.90	2.68	1.25
62.	Arithmetic and geometric progressive	2.09	1.03	2.93	1.27
63.	Linear inequalities in one variable	2.28	1.05	3.07	1.18
64.	Linear inequalities in two variables	2.44	1.08	3.11	1.20
65.	Graphs of linear inequalities in two variables	2.88	0.91	3.32	1.02
66.	Quadratic inequalities	2.81	0.78	3.04	0.79
67.	Inequalities in two dimensions	3.06	0.91	3.25	0.75
68.	Calculating devices	3.16	0.88	3.29	0.71
69.	Abacus calculating devices	2.53	1.11	3.29	0.76
70.	Decimal system	2.28	0.77	2.57	0.84
71.	Binary system	2.31	0.90	2.64	1.06
72.	Flow charts	2.97	1.09	3.50	0.75
73.	Application of flow charts	3.00	1.05	3.36	0.87
74.	Trigonometric ratios of 30^0, 45^0,60^0	2.97	1.06	3.39	0.83
75.	Application of trigonometric ratio of 30^0, 45^0, 60^0	3.22	1.04	3.61	0.69
76.	Knowledge of six trigonometric functions of angles of any magnitude (sine, cosine, tangent secant cosecant cotangent)	2.94	1.13	3.43	0.84
77.	Range or specified trigonometry	3.19	0.82	3.43	0.79
78.	Domain of specified trigonometry	3.06	0.91	3.32	0.90
79.	Graphs of trigonometric ratios with emphasis on their amplitude and periodicity	2.97	0.97	3.57	0.69
80.	Relationship between graphs of t trigonometric ratios (y= a sin (bx) +c, y= a cos (bx) + c, y=a+ tan (bx) +c	3.22	0.94	3.61	0.69
81.	Graphs of inverse by ratios	3.22	0.91	3.32	0.90
82.	Solutions of simple equation involving the six trigonometric function	2.72	1.11	3.32	0.90
83.	Proofs of simple trigonometric identities ($\sin^2 x$ + $\cos^2 x=1$, $\sec^2 x = 1+ \tan^2 x$	3.03	1.03	3.11	1.20
84.	Sum of roots of quadratic equation ($\alpha+\beta=-b/a$)	2.91	1.03	2.50	1.07

85.	Product of roots of quadratic equation (α β= c/a	2.63	0.79	2.43	1.03
86.	Finding quadratic equation given sum and products of roots (x^2- (sum of roots) + product) = 0	2.72	0.85	2.54	1.07
87.	Condition for quadratic equation to have equal roots (b^2 =4ac)	3.16	0.85	3.11	1.26
88.	Condition for quadratic equation to have real roots (b^2>4ac)	3.16	1.08	3.21	1.07
89.	Condition for quadratic equation to have no roots (b^2< 4ac)	3.06	1.05	2.96	1.04
90.	Condition for given line to intersect a curve	3.00	1.08	2.86	1.04
91.	Condition for given line to be tangent to curve	2.84	0.99	2.96	0.92
92.	Condition for given line not to intersect a curve	2.81	1.00	2.89	1.03
93.	Solution of problems on roots quadratic equation	2.84	1.05	2.93	1.12
94.	Definition of polynomials	2.66	1.12	2.89	1.13
95.	Division of polynomials by a polynomial of lesser degree	3.03	1.09	3.32	1.02
96.	Remainder theorem	2.88	1.10	3.50	0.84
97.	Factorization of polynomial	2.53	1.14	3.39	0.92
98.	Roots of cubic equation	2.94	1.08	3.32	0.86
99.	Sum of roots	2.56	0.91	3.11	0.83
100.	Product of roots	2.53	0.92	2.93	0.81
101.	Sum of products of two roots	2.66	0.97	3.07	0.86
102.	Logical reasoning	2.84	0.99	3.11	0.92
103.	Definition of statement	2.59	1.13	2.93	0.98
104.	Negation of statement	2.72	1.05	2.96	0.79
105.	Contra-positive of statement	2.63	1.16	3.14	0.80
106.	Antecedents and consequence of statement	2.84	1.08	3.32	0.98
107.	Conditional statement	2.63	1.18	3.36	0.95
108.	Fundamental issues in intelligent system	2.94	0.95	3.54	0.88
109.	Fundamental definition	2.88	0.98	3.39	0.99
	Modeling the world	2.94	1.11	3.32	1.06
110.	Introduction to propositional and predicate logical resolution	3.28	0.92	3.57	0.96
111.	Introduction to theorem proving	3.13	1.04	3.43	1.07
112.	Pascal triangle	3.00	1.16	3.46	1.00
113.	Binomial expansion of $(a+b)^n$ where n is the positive integer	3.03	0.90	3.32	1.02
114.	Binomial expansion of $(a+b^{)-n}$ where n is the negative integer	2.94	0.95	3.32	1.02
115.	Binomial expansion of $(a+b)^{1/n}$ where 1/n is the fractional value	3.06	0.88	3.61	0.69
116.	Finding the nth term	2.53	0.92	3.25	1.00
117.	Application of binomial expansion	2.91	1.00	3.46	0.79
118.	Limits of a function	2.94	1.13	3.61	0.74
119.	Differentiation of polynomial	2.94	1.01	3.75	0.59
120.	Differentiation of transcendental functions such as sin x, e^{ax}, log 3x	2.91	0.96	3.68	0.67
121.	Product rule of differentiation	2.94	1.01	3.57	0.79

122.	Quotient rule of differentiation	2.69	0.93	3.39	0.99
123.	Function of function	2.81	0.86	3.11	1.17
124.	Application of differentiation to rate of change	3.03	0.97	3.25	1.14
125.	Application of differentiation to gradient	2.94	0.98	3.14	1.08
126.	Application of differentiation to maximum and minimum values	2.81	1.03	3.43	0.88
127.	Application of differentiation to equation of motion	2.81	1.00	3.46	0.79
128.	Higher derivative	2.94	1.05	3.61	0.79
129.	Differentiation implicit function	3.22	0.94	3.64	0.78
130.	Matrices as linear transformations	3.19	0.93	3.61	0.79
131.	Determinants	3.19	0.97	3.46	0.88
132.	Solutions of 2 and 3 simultaneous equations	2.59	0.87	3.00	1.05
133.	Proper rational functions with denominators as linear factors (distinct and repeated) and others	3.13	0.91	3.43	0.96
134.	Understand integration as the reverse process of differentiation	3.25	0.92	3.64	0.83
135.	Integration of algebraic polynomials including 1/x, logarithmic functions	3.16	0.81	3.64	0.83
136.	Definite integrals and application to kinematics apply to v-t and s-t graphs	3.25	0.88	3.71	0.60
137.	Areas under the curve	2.84	0.99	3.50	0.88
138.	Trapezoidal rule	2.97	1.09	3.39	0.88
	Volume of solids of revolution	2.97	0.97	3.43	0.88
	Mean	2.67	0.97	3.00	0.94

Difference: M= 0.33; SD= 0.03

Data in table 1 indicated that the content of pure mathematics is difficult to both sexes but the difference in the mean rating of the male (M=2.67; SD=0.97) and the female (M=3.00; SD=0.94) student perception of the pure mathematics content difficulty in the FMC is small (M=0.33; SD=0.03).

Research question two: What is the difference in the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC?

Table 2: Mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC

S/N		Male (n=32)		Female (n=28)	
		Mean		Mean	
	Coordinate geometry		SD		SD
1.	Mid-point of a line segment	2.88	1.04	3.36	0.99
2.	Gradient of a straight line	2.84	1.14	3.25	1.08
3.	Distance between two points	2.56	1.05	3.18	1.09
4.	Condition for parallelism	2.88	1.10	3.43	0.88
5.	Condition for perpendicularity	2.81	1.00	3.36	0.78
6.	Equation of a line	2.81	1.00	3.32	0.90
7.	Transform relationship into linear form	2.69	1.09	3.29	0.90
8.	Areas of triangles and quadrilateral	2.94	0.95	3.36	0.78
9.	Definition of circle	2.34	0.97	3.00	1.05
10.	Equation of circle given center and radius	2.69	0.93	3.14	1.04

11.	General equation of a circle	2.84	0.99	3.11	1.13
12.	Finding center and radius of a given circle	2.69	1.03	3.07	1.21
13.	Finding equation of a circle given the end point of the diameter	3.13	0.91	3.04	1.20
14.	Equation of circle passing through 3 points	3.47	0.88	3.32	1.19
15.	Equation of tangent to a circle	3.16	0.85	3.07	1.18
16.	Length of tangent to a circle	3.22	0.87	3.39	0.83
17.	Equation of parabola in rectangular Cartesian coordinate	3.09	0.78	3.39	0.83
18.	Equation of ellipse in rectangular Cartesian coordinate	3.16	0.77	3.36	0.83
19.	Parametric equation	3.31	0.86	3.43	0.84
	Mean	2.92	0.96	3.26	0.99

Difference: M= 0.34; SD= 0.03

Data in table 2 showed that the content of coordinate geometry is difficult with both sexes but the difference in the mean rating of the male (M=2.92; SD=0.96) and the female (M=3.26; SD=0.99) student perception of the coordinate geometry content difficulty in the FMC is small (M=0.34; SD=0.03).

Research question three: What is difference in the mean rating of the male and the female student perception of the statistics content difficulty in the FMC?

Table 3: Mean rating of the male and the female student perception of the statistics content difficulty in the FMC

S/N		Male (n=32)		Female (n=28)	
	Statistics	Mean	SD	Mean	SD
1.	Mean	2.16	0.99	2.39	1.07
2.	Mode	1.88	0.79	2.39	1.07
3.	Median	2.03	0.97	2.64	0.95
4.	Deciles	2.63	1.13	2.89	1.03
5.	Percentile	2.53	1.16	3.04	1.00
6.	Quartiles	2.34	1.07	2.75	1.00
7.	Range	2.06	0.88	2.50	0.88
8.	Inter-quartiles	2.75	1.02	3.07	0.81
9.	Mean deviation	2.34	1.07	2.54	1.00
10.	Standard deviation	2.34	0.90	2.57	0.96
11.	Coefficient of variation	2.38	1.01	2.75	1.04
12.	Classical	3.19	0.93	3.54	0.84
13.	Frequential	3.03	1.00	3.50	0.84
14.	Axiomative approaches to probability	3.09	0.93	3.57	0.84
15.	Sample space	3.09	1.00	3.61	0.83
16.	Event space	2.94	0.98	3.39	0.92
17.	Mutually exclusive event	3.19	1.00	3.46	0.92
18.	Independent event	3.00	1.05	3.43	0.92
19.	Conditional event	3.28	0.96	3.50	0.92
20.	Conditional probability	2.88	1.10	3.32	1.12
21.	Probability trees	2.91	1.15	3.11	1.13
22.	Permutation on arrangement	2.72	1.11	3.07	1.18
23.	Cyclic permutation	2.84	1.14	3.21	1.10

24.	Arrangement of identical objects	2.88	1.07	3.11	1.20
25.	Arrangement in which repetitions are allowed	2.84	1.19	3.36	1.13
26.	Introduction to combination on selection	3.13	0.83	3.32	1.12
27.	Conditional arrangements and selection	3.03	0.86	3.21	1.10
28.	Probability arrangement problem involving arrangement and selection	3.06	0.95	3.07	1.15
29.	Variance	3.09	0.96	3.36	0.87
30.	Coefficient of variance of binomial distributions	3.22	0.94	3.32	1.02
31.	Coefficient of variance of Poisson distribution	3.16	0.99	3.36	1.03
32.	Coefficient of variance of normal distributions	3.06	1.08	3.43	0.88
33.	Binomial distribution	3.03	0.90	3.21	0.83
34.	Poisson distribution	3.13	0.83	3.25	0.93
35.	Normal distribution	3.16	0.85	3.54	0.74
36.	Binomial approximations by Poisson distributions	3.03	0.90	3.61	0.74
37.	Normal approximations by binomial distributions	2.94	1.01	3.57	0.74
38.	Concept of correlations as measure of relationship	2.78	1.07	3.46	0.74
39.	Scatter diagrams	3.00	1.02	3.39	0.99
40.	Rank correlation	2.78	1.10	3.36	0.95
41.	Tied ranks	3.06	0.98	3.61	0.63
42.	Classical	2.66	1.10	3.32	0.94
	Mean	2.82	1.00	3.19	0.95

Difference: M= 0.37; SD= 0.05

Data in table 3 showed that the content of statistics is difficult to both sexes but the difference in the mean rating of the male (M=2.82; SD=1.00) and the female (M=3.19; SD=0.95) student perception of the statistics content difficulty in the FMC is small (M=0.37; SD=0.05).

Research question four: What is the difference in the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC?

Table 4: Mean rating of the male and the female student perception of the mechanics content difficulty in the FMC

S/N		Male (n=32)		Female (n=28)	
	Mechanics	Mean	SD	Mean	SD
1.	Scalars quantity	2.56	0.98	2.89	1.17
2.	Vectors quantity	2.16	0.99	2.96	1.14
3.	Zero vector	2.38	0.94	2.79	1.13
4.	Negative vector	2.09	0.89	2.57	1.20
5.	Vectors	2.16	0.85	2.50	1.11
6.	Vector addition and subtraction	2.28	1.02	2.64	1.19
7.	Scalar multiplication of vectors	2.16	1.05	2.46	1.26
8.	Magnitude and direction of a vector	2.56	0.95	2.96	1.20
9.	Unit vector	2.41	0.91	3.00	1.05
10.	The triangle law	2.56	1.19	3.07	1.12
11.	The parallelogram law	2.38	1.10	2.82	1.31
12.	Resolution of vectors	2.41	1.10	2.96	1.20
13.	Scalar (dot) product	2.50	1.02	3.14	1.11
14.	Application of scalar (dot) product	2.63	1.18	3.54	0.74

15.	Scalar product of vectors in three dimensions	2.53	1.16	3.36	0.91
16.	Application of scalar product	2.72	1.14	3.36	0.91
17.	Vector or cross product in three dimensions	2.72	1.08	3.43	0.88
18.	Application of cross product	2.97	1.09	3.71	0.60
19.	Newton's law of motion	2.44	1.16	3.21	1.17
20.	Motion along inclined plane	2.75	1.24	3.29	1.21
21.	Motion of connected particles	2.88	1.10	3.11	1.20
22.	Work	2.50	0.98	2.46	1.04
23.	Power	2.28	0.96	2.29	0.85
24.	Energy	2.34	1.04	2.46	1.10
25.	Impulse and momentum	2.44	1.22	3.11	1.10
26.	Projectiles	2.41	1.21	3.04	1.23
27.	Trajectory of projectiles	2.75	1.27	3.21	1.13
28.	Greatest height reached	2.59	1.32	3.32	0.98
29.	Time of flight	2.56	1.27	3.25	1.00
30.	Range	2.25	1.08	2.61	1.13
31.	Projection along inclined plane	2.94	1.19	3.25	1.08
32.	Forces in equilibrium	2.97	1.15	3.25	1.08
33.	Resultant of parallel forces (in the same direction and in opposite directions) acting on a rigid body	3.00	1.14	3.29	1.05
34.	Moment of a force (2 and 3 force) acting at a point	2.81	1.06	3.14	1.11
35.	Polygon of forces	3.03	1.03	3.25	1.00
36.	Resolution of forces of friction	2.72	1.02	2.89	1.10
37.	Application of scalar (dot) product	2.78	1.13	3.25	1.04
	Mean	2.56	1.09	3.02	1.08

Difference: M= 0.46; SD= 0.01

Data in table 4 showed that the content of mechanics is difficult with both sexes but the difference in the mean rating of the male (M=2.56; SD=1.09) and the female (M=3.02; SD=1.08) student perception of the mechanics content difficulty in the FMC is small (M=0.46; SD=0.01).

Research question five: What is the difference in the mean rating of the male and the female student perception of the operations research content difficulty in the FMC?

Table 5: Mean rating of the male and the female student perception of the operations research content difficulty in the FMC

S/N		Male (n=32)		Female (n=28)	
	Operations research	Mean	SD	Mean	SD
1.	Definition of operations research	3.09	1.09	3.36	1.03
2.	History and nature operation research	3.19	0.97	3.32	1.02
3.	Models of operation research	2.94	0.91	3.25	1.04
4.	Linear programming model	3.28	0.89	3.43	1.03
5.	Transportation model (least cost and not west corner)	3.41	0.87	3.61	0.92
6.	Assignment models	3.34	0.94	3.71	0.81
7.	Practical application of the models	3.34	0.90	3.64	0.83
8.	Concept of inventory	3.19	1.00	3.75	0.80
9.	Definition of important terms in inventory	3.13	1.07	3.75	0.80

10.	Holding list	2.81	1.09	3.46	1.10
11.	Demand	3.00	0.88	3.21	1.07
12.	Ordering list	3.06	1.08	3.46	1.00
13.	Computation of optimal quantity (EOQ model)	3.19	1.03	3.68	0.72
14.	Concept of replacement	2.91	1.00	3.75	0.59
15.	Individual replacement sudden failure item	3.28	1.05	3.79	0.63
16.	Replacement of items that wear out gradually	2.97	1.09	3.71	0.66
17.	Introduction of modeling	3.06	1.13	3.93	0.38
18.	Dependent and independent variables in mathematical modeling	3.06	1.11	3.75	0.65
19.	Examples of some models	3.03	1.12	3.18	1.16
20.	Construction of model	3.06	1.05	3.18	1.16
21.	Methodology of modeling	3.25	1.05	3.36	1.13
22.	Application to physical, biological, social and behavioural services.	3.00	1.08	3.07	1.30
23.	Introduction to game theory.	3.19	1.09	2.89	1.29
24.	Description of types of games.	3.09	0.96	3.11	1.29
25.	Solution of two persons zero sum games using pure and mixed strategies.	3.09	1.06	3.07	1.36
26.	Matrix games.	3.09	1.03	3.04	1.35
	Mean	3.12	1.02	3.44	0.97

Difference: M= 0.35; SD= 0.03

Data in table 5 showed that the content of operations research is difficult to both sexes but the difference in the mean rating of the male (M=3.12; SD=1.02) and the female (M=3.44; SD=0.97) student perception of the operations research content difficulty in the FMC is small (M=0.35; SD=0.03).

Research question six: What is the difference in the mean rating of the male and the female student perception of the FMC content difficulty?

Table 6: Mean and Standard Deviation (SD) on the extent of student perception of the FMC content difficulty by gender

			Male		Female		Difference	
S/N	Contents	n	Mean	SD	Mean	SD	Mean	SD
1	Pure Mathematics	140	2.67	0.97	3.00	0.94	0.33	0.03
2	Coordinate Geometry	19	2.92	0.96	3.26	0.99	0.34	0.03
3	Statistics	42	2.82	1.00	3.19	0.95	0.37	0.05
4	Mechanics	37	2.56	1.09	3.02	1.08	0.46	0.01
5	Operations Research	26	3.12	1.02	3.44	0.97	0.35	0.03
	Total	264	2.82	1.01	3.18	0.99	0.36	0.02

Data in table 6 showed that the content of FMC is difficult with both sexes but the difference in the mean rating of the male (M=2.82; SD=1.01) and the female (M=3.18; SD=0.99) student perception of the FMC content difficulty is small (M=0.36; SD=0.02).

Hypothesis one: There is no significant difference between the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC.

Table 7: T-test analysis on the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	2.67	0.97	58	0.18	1.98	Not significant
Female	28	3.00	0.94				

Data in table 7 showed that there is no significant difference between the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis one is retained.

Hypothesis two: There is no significant difference between the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC.

Table 8: T-test analysis on the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	2.92	0.99	58	1.34	1.98	Not significant
Female	28	3.26	0.99				

Data in table 8 indicated that there is no significant difference between the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis two is retained.

Hypothesis three: There is no significant difference between the mean rating of the male and the female student perception of the statistics content difficulty in the FMC.

Table 9: T-test analysis on the mean rating of the male and the female student perception of the statistics content difficulty in the FMC

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	2.82	1.00	58	1.46	1.98	Not Significant
Female	28	3.19	0.95				

Data in table 9 revealed that there is no significant difference between the mean rating of the male and the female student perception of the statistics content difficulty in the FMC ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis three is retained.

Hypothesis four: There is no significant difference between the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC.

Table 10: T-test analysis on the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	2.56	1.09	58	1.64	1.98	Not Significant
Female	28	3.02	1.08				

Data in table 10 indicated that there is no significant difference between the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis four is retained.

Hypothesis five: There is no significant difference between the mean rating of the male and the female student perception of the operations research content difficulty in the FMC.

Table 11: T-test analysis on the mean rating of the male and the female student perception of the operations research content difficulty in the FMC

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	3.44	0.97	58	1.23	1.98	Not Significant
Female	28	3.12	1.02				

Data in table 11 showed that there is no significant difference between the mean rating of the male and the female student perception of the operations research content difficulty in the FMC ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis five is retained.

Hypothesis six: There is no significant difference between the mean rating of the male and the female student perception of the FMC content difficulty.

Table 12: T-test analysis on the mean rating of the male and the female student perception of the FMC content difficulty

Sex	n	Mean	SD	df	t_{cal}	t_{crt}	Decision
Male	32	2.82	1.01	58	1.39	1.98	Not Significant
Female	28	3.18	0.99				

Data in table 12 showed that there is no significant difference between the mean rating of the male and the female student perception of the FMC content difficulty ($t_{cal(58,0.05)}$=0.18; t_{cal} <t_{crt}). The null hypothesis six is retained.

- Discussion of Findings

Gender and student perception of the pure mathematics content difficulty in the FMC

Data in table 1 indicated that the difference in the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC is small. Data in table 7 showed that there is no significant difference between the mean rating of the male and the female student perception of the pure mathematics content difficulty in the FMC. Umoinyang and Ekwueme (2005) reported that the preference of content is directly related to perception of difficulty and for boys and girls to differentially prefer some content areas of Mathematics means that they hold varying view of their difficulty. They revealed that the male students have preference for number and numeration and trigonometry more than the female students but noted that both boys and girls have equal preference for algebraic processes.

Gender and student perception of the coordinate geometry content difficulty in the FMC

Data in table 2 showed that the difference in the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC is small. Data in table 8 indicated that there is no significant difference between the mean rating of the male and the female student perception of the coordinate geometry content difficulty in the FMC. Zalmon, et al. (2017) reported that students perceived the geometry and introductory calculus themes of the senior secondary Mathematics curriculum difficult to learn but that there was no significant difference on the gender perception of students. Umoinyang and Ekwueme (2005) revealed that the male and the female students have no preference for plane geometry and mensuration.

Gender and student perception of the statistics content difficulty in the FMC

Data in table 3 showed that the difference in the mean rating of the male and the female student perception of the statistics content difficulty in the FMC is small. Data in table 9 revealed that there is no significant difference between the mean rating of the male and the female student perception of the statistics content difficulty in the FMC. Findings of this study collaborated with the findings of Umoinyang and Ekwueme (2005) who reported that both boys and girls have equal preference for statistics and probability.

Gender and student perception of the mechanics content difficulty in the FMC

Data in table 4 showed that the difference in the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC is small. Data in table 10 indicated that there is no significant difference between the mean rating of the male and the female student perception of the mechanics content difficulty in the FMC. Similar result was obtained by Zalmon, et al. (2017) who reported that there was no significant difference on the gender perception of student content difficulty in the senior secondary Mathematics curriculum.

Gender and student perception of the operations research content difficulty in the FMC

Data in table 5 showed that the difference in the mean rating of the male and the female student perception of the operations research content difficulty in the FMC is small. Data in table 11 showed that there is no significant difference between the mean rating of the male and the female student perception of the operations research content difficulty in the FMC. Iji and Omenka (2015) found out that students found the operations research content difficult to learn.

Gender and student perception of the FMC content difficulty

Data in table 6 showed that the difference in the mean rating of the male and the female student perception of the FMC content difficulty is small. Data in table 12 showed that there is no significant difference between the mean rating of the male and the female student perception of the FMC content difficulty. Zalmon, et al. (2017) reported that there was no significant difference on the gender perception of student content difficulty in Mathematics.

CONCLUSION

This study investigated the influence of gender on student perception of the Further Mathematics curriculum content difficulty and found out that gender had no significant influence on the perception of students on the FMC content difficulty. The study showed that both the male and the female students perceived the pure mathematics, coordinate geometry, statistics, mechanics and operations research contents of the Further Mathematics curriculum difficult to learn.

RECOMMENDATIONS

The study recommended that:

1. Further Mathematics teachers should employ diagnostic and remedial instructional strategies and active learning approaches to teach the male and the female students to remediate perceived learning difficulties in the Further Mathematics curriculum contents.
2. Female students should be encouraged by their teachers to develop interest in learning Further Mathematics with their male counterparts.
3. The male and the female students should change their perceptions and develop positive attitudes towards learning Further Mathematics through improved learning culture.

REFERENCES

[1] Abdullahi, U. (2017). Impact of student teams-achievement divisions strategy on senior secondary school students' trigonometric performance and retention in Katsina State, Nigeria. *Abacus: The Journal of the Mathematical Association of Nigeria, 42(2),* 149-160.

[2] Alio, R. C. & Harbor- Peters, V. F. (2000). Effects of Polya's problem solving technique on secondary school students' achievement in Mathematics. *Abacus: The Journal of the Mathematical Association of Nigeria, 25(1),* 20-25.

[3] Daso, P. O., Zalmon, I. G. & Sillaa, A. C. (2021). Comparative assessment of student and teacher perception of the curriculum content difficulty in Further Mathematics. *International Journal of Research and Innovation in Social Sciences, V(III),* 384-391.

[4] Ekwueme, C. O. (2013). *Mathematics teaching and learning in schools.* Radiant Ventures Nig. Ltd.

[5] Iji, C. O. & Omenka, J. E. (2015). Mathematics teachers' perception of difficult concepts in secondary school Mathematics curriculum in Benue State, Nigeria. *Asia Pacific Journal of Education, Arts and Sciences, 2(1),* 32 – 45.

[6] Musa, N., Binji, M. B. & Hussaini, A. M. (2015). Relationship between personality characteristics such as gender home background and academic achievement in Mathematics among primary school pupils in Sokoto State, Nigeria. *Journal of Issues on Mathematics, 17(1),* 168-192.

[7] Nigerian Educational Research and Development Council (2012). *Senior secondary school trade curriculum: Further Mathematics for SS 1-3.* NERDC Press.

[8] Odili, G. A. (2006). *Mathematics in Nigeria secondary schools: A teaching perspective.* Rex Charles & Patrick Limited and Anachuma Educational Books.

[9] Oji, N. N. & Abonyi, O. S. (2017). Evaluating the influence of gender and class level on Mathematics test anxiety inventory for secondary school students in Ebonyi State, Nigeria. *Nigerian Journal of Curriculum Studies, 24(3),* 78-86.

[10] Oloda, F. S. S. (2017). Gender, environment and parents' socio-economic status as determinant of students' performance in Mathematics periodic tests and terminal examination in Ondo State secondary schools. *Abacus: The Journal of the Mathematical Association of Nigeria, 42(1),* 166-172.

[11] Umoinyang, I. E. & Ekwueme, C. O. (2005). Gender differences in Mathematics learning factors among secondary schools students in Calabar, Cross River State in U. Nzewi (Ed). *Science Technology and Mathematics (STM) Education and professionalism (224-228), proceedings of the 46th Annual Conference of the Science Teachers Association of Nigeria: Ibadan: Heiman.*

[12] Wonu, N. & Zalmon, I. G. (2019). Constraints to instructional effectiveness and undergraduate student Mathematics learning achievement. *International Journal of Advanced Education and Research, 4(6),* 54-64.

[13] Zalmon, I. G. & George, N. R. (2020). Assessment of students' perception of content difficulty in the Nigerian Further Mathematics curriculum. *International Journal of Innovative Research and Development, 9(11),* 38-48.

[14] Zalmon, I. G. (2021). *Effects of Polya's and Schoenfeld's problem solving strategy on secondary students' performance and retention in Mathematics in Obio- Akpor, Rivers State* . Unpublished Ph.D Thesis, University of Port Harcourt.

[15] Zalmon, I. G., Daso, P. O. & Elleh, G. N. (2020). Inter-agency differential analysis of student Mathematics grading in senior secondary certificate examination. *International Journal of Progressive Sciences and Technologies (IJPSAT), 23(2),* 158-165.

[16] Zalmon, I. G., Efet, D. E. & Ogunsola, A. O. (2017). Diagnosis and remediation of student content difficulty in the senior secondary education Mathematics curriculum. *International Journal of Science, Technology, Engineering, Mathematics and Science Education, 2(1),* 90-109.