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Effect of Gender Difference on the Mathematics Performance of Secondary School Students in Lokoja, Kogi-Nigeria

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***Abstract*-** This study was purported to investigate gender difference and performance in mathematics among secondary school two students in Lokoja. The study set out to achieve three hypotheses of the significant effect of mathematics teacher sex, student sex and school sex type on students' performance in mathematics. A sample of 440 senior secondary two students were surveyed in 11 government secondary schools in Lokoja and the multiple regressions model in SPSS version 23 was employed to analyse the data. The results showed that mathematics teacher sex, student sex, and school sex type differences do not affect students' performance in mathematics. It is therefore recommended that more female mathematics teachers should be employed and trained to help increase the positive performance tendency gotten in this study, and an appropriate number of all-boys, all-girls and mixed-sex secondary schools need to be established to close any gap on gender inequality. More so, interventions on this research should be built around liberal feminism, radical feminism, flow and Piaget's learning theories.

***Keywords* -** Gender Difference, Teacher Sex, Student Sex, School Sex Type, Performance in Mathematics.

I. INTRODUCTION

Performance in mathematics of both genders is a vital achievement component for academic and societal development. Good performance in mathematics is one of the pre-requisites of secondary education, necessary for admission into any tertiary institution in Nigeria. Thus, the proper understanding of mathematics provides a better foundation for learning most sciences. Good performance in mathematics does not only accredit students' numerical knowledge but also develops problem-solving skills in them [1]. For students to perform well in mathematics, they have to obtain an above-average score in tests or examinations. In reality, students' scores in mathematics have hardly been without failure. As such, studies have mentioned the experience of teachers and mentoring of students by mathematics teachers, especially based on gender permutation, to be affecting students' performance in mathematics [2]. This led to the consideration of how gender difference may affect students' performance in mathematics in this study.

In Nigeria, adolescents are expected to behave according to gender. Gender is the socially constructed roles and expectations associated with males and females [3]. Gender is manifested in human traits based on the sexual dispositions of men and women [4]. Academically, some gender dissimilarities have been identified to exist. Boys perform noticeably less well at reading, while girls perform slightly less well at mathematics than boys (there are within-country differences) and are, on average, underrepresented among mathematics, science and technology students [5]. Much of the research on gender inequality within Europe has focused on gender dissimilarities in the fields of mathematics, science and technology (MST), thus, gender mainstreaming is needed as a fairness initiative to create a balance [6]. As such, the gender difference in this study is considered from the perspectives of mathematics teachers' sexes, students' sexes, and school sex type.

Mathematics teachers' sexes refer to male and female teachers teaching the subject of mathematics. Some schools usually employ both sexes of teachers to collaborate and handle the subject. Where there is the case of teacher difference in mathematics teaching, there may also be role models sufficiency problem for mentoring of students' gender concerning performance. Furthermore, the enrolment factors of both genders of students given admissions in Kogi State by the Ministry of Education also revealed the problem of gender difference in the education system. Similarly, teachers' enrolment dynamics and understanding their gender perspectives by school-going adolescents may be important in measuring students' performance in mathematics as well [7]. Hardly has any school enrolled an equal number of genders of mathematics teachers and this may create some psychological impressions for some of the students.

Students' sexes refer to both male and female students. Furthermore, certain subjects and fields of study are presumed as "feminine" and others as "masculine". In this

case, most students may affirm their gender identities by selecting subjects that support them as females or males, but this is not always so. Dominant (hegemonic) gender norms governing what is the ideal type of masculine and feminine identities impact strongly on educational choices [8,9]. In a bid to ensure effective academic provision for students to acquire the right quality of education, perform better in their examinations (both internal and external) and consequently gain admission to the higher institutions of their choice, some parents or guardians have made a particular decision of the type of secondary school they want for their children, not minding the location and cost implication, and with special consideration on coeducational or single-gender school (or school type) enrolment [10]. Today, there may be more mixed schools than single-sex schools across the world for reasons yet unknown. Based on this, the effect of school type on students' performance in mathematics is worth objective consideration to help in meeting one of the purposes of this study.

The Nigeria education system (from primary to tertiary institution) operates on a 6-3-3-4 basis. The secondary school system is represented by the 3-3, meaning three years of Junior Secondary School (JSS) and the same for Senior Secondary School (SSS). Secondary education is comprehensively designed to broaden pupils' knowledge and outlook through pre-vocational and academic frameworks [11]. Secondary schools could be in the form of single-sex (either all-boys or all-girls) or mixed-sex. Single-gender or single-sex education is the practice where male and female students attend separate classes or schools. Researchers have probed the impact of single-sex education on the learning and performance of students, as policymakers, educators, and parents unsure keep wondering what type of education is most effective, and for whom [12]. On the other hand, Mixed-sex/gender education or coeducation is an integrated education system where boys and girls attend and learn together in the same classroom. This system is the largest construct of present-day schooling which proponents believed is the most effective and sustainable for human development with societal relevance. Supporting this, even the founder of the Association for single-sex education believed that "whenever girls and boys are together, their behaviour inevitably reflects the larger society in which they live" [13].

To investigate the current reality around this research background, Liberal and Radical feminists' theories, as well as Flow theory and Piaget learning theory are adopted, and the following hypotheses are to be tested.

a. There is a significant difference between teacher sex and students' performance in mathematics in Lokoja secondary schools.
b. There is a significant difference between student sex and their performance in mathematics in Lokoja secondary schools.
c. There is a significant difference between school sex type and students' performance in mathematics in Lokoja secondary schools.

Therefore, this study is structured into section I as introduction; section II as related work with the review of the theoretical framework and empirical studies. Section III discusses the methodology through design, population and sampling, and instrument development and validation; section IV presented the results based on preliminary evaluation and main analysis. Section V summarizes the conclusion from the findings and suggested future scope for further study.

II. RELATED WORK

This section uses theoretical and empirical reviews to explore existing research issues related to the title, research problems, objectives and concepts of this study.

Theoretical Framework

Many theories have been useful in explaining the foundation of gender difference and psychology of learners in education research and this is also relevantly employed in this study. Gender equality theories of Liberal and Radical feminists are selected to support this study as well as Flow theory, and Piaget learning theory. Liberal feminism which seeks for rightful inclusion of females opposes the fallacious belief of the society that women are, by nature, less intellectually and physically capable than men in mathematics challenge; thus, to end the discrimination against equal opportunities of women in mathematical education and the society [14,15]. Radical feminism, on the other hand, challenges the status quo of patriarchy (dominance of men) which argues that men monopolise knowledge in mathematics in schools [15]. With these, there is the need to develop suitable mathematics contexts for both genders using flow and Piaget learning theory. The flow theory of Mihaly Csikszentmihalyi requires that mathematical teaching be made intrinsically enjoyable by matching challenges with the skills of the students [16]. The balance between challenge and the skill can be fragile because low challenges and low skills produced apathy, high challenges and low skills result in anxiety whereas, low challenges and high skills result in relaxation. Experiences of anxiety or relaxation may prompt the teacher to adjust the level of challenge and also enable the students or pupils to increase his or her level of skill to re-enter flow. More so, Piaget's Learning Theory of four-stage notions requires that mathematics teaching should be organised based on nature and nurture to enhance students' cognitive and systematic development [17].

Empirical Studies between Gender Difference and Students' Performance in Mathematics

A study of gender differences and performance in mathematics conducted on the Standard 3 National Assessment in Trinidad and Tobago, found that boys and girls differ significantly on the persistence and mathematics self-concept factors [18]. As a result, girls tend to persist more but hold a lower mathematics self-concept than boys. The performance in mathematics of graduating senior secondary year three students for 10

years was investigated for possible gender differences [19]. Data were collected from 880 males and 900 females who took the mock examination in mathematics results from Nigeria's south-east region. The study revealed the existence of significant differences on students' performance in mathematics favouring the male students between single-sex male and female schools. Again, gender differences in mathematics performance among secondary school students in Bureti Sub-County, Kericho County Kenya [20]. A descriptive survey design was used and the study revealed that gender was strongly associated with mathematics achievement in which boys' schools performed better than girls' schools. It was observed that boys had a stronger affinity and interest towards mathematics, whereas teacher and school factors were of little effect on mathematics achievement concerning gender.

Furthermore, the influence of gender on secondary schools' students' academic performance in South-West, Nigeria used results of 2003/2004 to 2007/2008 West African School Certificate Examinations (WASCE) to reveal that male students performed better than females in mathematics [21]. The gender difference in mathematics anxiety and performance in mathematics of secondary schools' students in Bauchi State Nigeria by using a t-test of independent sample to find a significant difference between mathematics anxiety and performance in mathematics, but there was no significant difference between student gender and performance in mathematics [22]. There was also a significant influence of gender on students' attitudes towards mathematics of junior secondary schools in Edo state's Ovia North-East council [23]. Exploring the differences of attitude towards mathematics in male and female students in the year 2014 in district Malakand, the independent sample t-test was applied and the result showed a non-significant difference between the attitude towards the mathematics of 10th-grade male and female students as opposed to so some researchers' claim that male is superior in Mathematics than female students [24].

III. METHODOLOGY

Research Design, Population and Sampling

This study used the cross-sectional survey design to develop a structured questionnaire and collect data about the experience of students on the issue of gender difference and performance in mathematics. The population was made up of eleven (11) government secondary schools with a total of 440 students of senior secondary two (S.S. 2) class in Lokoja metropolis. Each class of the (S. S. 2) has approximately 40 students on average. The rationale for the selection of these eleven schools is to give an equal chance of participation to the entire public-school students as the means to fulfiling the research purpose. As a result of this, the sample size is taken as the same 440 (S. S. 2) students with the population of the eleven government secondary schools, since the size is manageable in terms of cost and time of coverage. On the other hand, the simple random probability sampling technique was used to survey the 440 students so that they would have an equal chance of responding to the survey.

Instrument Development and Validation

Operationalisation of the research variables was done by formulating the questionnaire instrument based on the assumptions of liberal, radical feminism theories to address gender equality issues, and flow and Piaget's learning theories to indoctrinate mathematics teaching methods into gender psychology [15,25,17]. The validity of the instrument was designed to measure the exact variables under investigation. It was subjectively critiqued by three senior lecturers from the Faculty of Education, the University of Jos who are experts in the fields of mathematics, administration and planning, and measurement and evaluation. Their major observations on the instrument were that: "it should address all objectives set out in the study; remove or rephrase ambiguous words or statements; items in a scale should be sufficient (at least three items)". On the other hand, the reliability of the instrument was statistically tested to ascertain its ability to produce a similar result when applied to the same circumstances at different times [26]. It was determined by a reliability test through the use of a preliminary survey where twenty-nine copies of the questionnaire were administered to students of different secondary schools in Lokoja, Kogi State. The Statistical Package for Social Science (SPSS) version 23 tool was used to estimate the internal consistency of the instrument, as well as other analyses in this study. The results of the reliability test (see table 1 below) were all found to be high above 0.6 which implies that there is consistency in the items of the survey, thus it is reliable.

Table 1. Reliability Result

Variables	**No. of Items**	**Cronbach's Alpha**
Student Gender Difference	9	0.647
Teacher Gender Difference	8	0.717
School Gender Type	4	0.624
Performance in Mathematics	6	0.782
Total	**27**	**0.841**

Source: Pilot Survey Result, 2021

This study uses the simple percentage to present and interpret the demographic section, and multiple regressions analysis to predict the strength of a variable (dependent) based on the values of two or more variables (independent). In using multiple regressions analysis for data analysis, the following assumptions were met: one dependent only and to be measured on a continuous scale (interval or ratios); two or more independent variables; independence of observation using Durbin-Watson statistic; linear relationship and homoscedasticity. Others

are no multi-collinearity; no outliers and the data should be normally distributed [27].

IV. RESULTS AND DISCUSSION

The data collected were subjected to the process of data entry, preliminary checks, and main analysis, while the results are presented with the aid of tables and figures. Moreover, the demographic features of respondents and the results of the test of hypotheses, together with their corresponding interpretations are also reported, followed by discussion.

Table 2. Questionnaire Administration and Retrieval

Questionnaire	Frequency	Percentage
Distribution	440	100
Invalid and non-returned	28	6.4
Valid	412	93.6

Field Survey Result (2021)

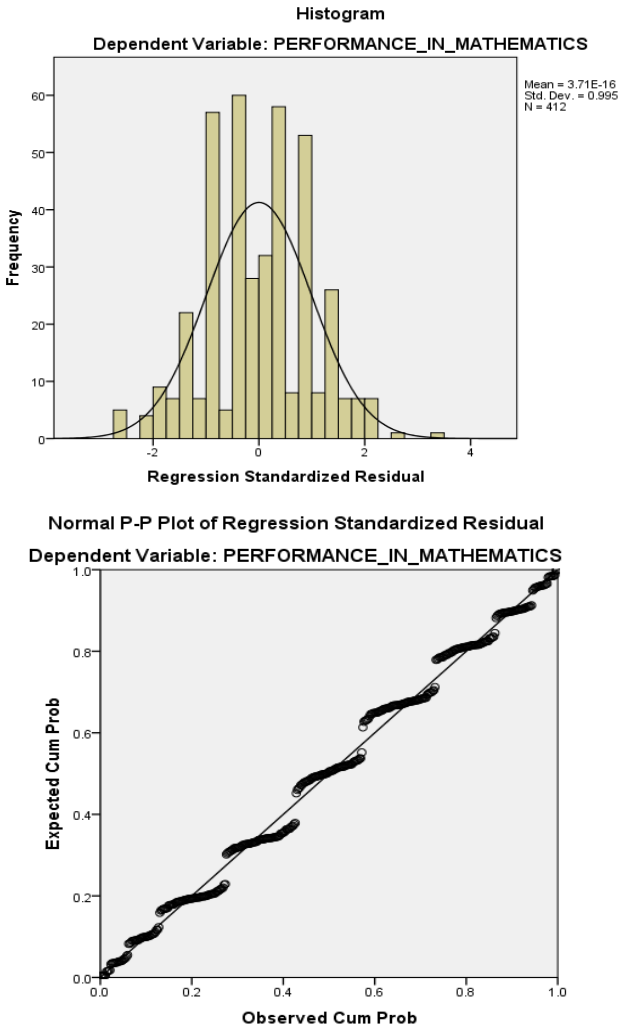
Table 2 show that during the survey, 440(100) copies of the questionnaire were administered to respondents but after proper data screening at the phase of data entry, 412(93.6%) were found valid for analysis. The remaining 28(6.4%) of the questionnaires described as invalid and un-returned constitute less than 15% of the total administered instrument, which may not interfere with the representativeness of large sample size and can greatly minimise sampling bias [28].

Results of Preliminary Evaluation

After the data entry into the SPSS sheet, certain preliminary evaluations were conducted to satisfy the conditions for using multiple regressions analysis. These results are interpreted and presented below.

Missing Values, Outliers, Data Normality

Multiple imputation method from SPSS was used to assess missing values of data. All results for variables of gender differences and performance in mathematics, their cases and values indicated the absence of missing values in the dataset. If this is not appropriately checked and treated, it can cause biased results and lead to inefficient analysis [29]. The test for outliers (observations at abnormal position) were also evaluated, and the global variables for student gender difference show the presence of outliers at 55, 226 and 404 positions. These were treated by replacing the outlier values with the immediate values up above and down below their values until there was none. If these are not treated, they can increase error variance and reduce the power of statistical tests as well as decrease the normality of the data [30]. This was done using boxplot explore statistics. Furthermore, the histogram (1A) and probability-to-probability (P-P) Plot graph (1B) were used to evaluate the normality of the data.



Figures 1A and 1B. Histogram and Normal P-P Plot

Figure 1A indicates a normal distribution because the curve divides the histogram at the centre without lop-siding to either side. On the other hand, figure 1B is the probability-to-probability plot on regression residual which also confirmed and satisfied the normality proposition because the thick line is attached to the diagonal line. In addition, the results of the descriptive statistics using skewness and Kurtosis indicate values within the acceptable range of ≤ +1 or -1 which suggest data normality is assumed [31].

Assessment of Multi-collinearity (Collinearity)

Multi-collinearity or collinearity is a statistical problem that occurs when there is autocorrelation between two or more predictor variables which interfere with regression results negatively. The method of detecting multicollinearity problems is to test for Variance Inflation Factors (VIF) and the Tolerance (being the reciprocal of VIF) values. If the multi-collinearity problem is detected, it can be resolved by eliminating the upsetting or centre the independent variables. The benchmark points are that the VIF and the Tolerance values should not exceed 4 and are supposed not to be less than 0.10 [27].

Table 3. Multi-collinearity Statistics

Variables	T-statistics	Sig.	Tolerance	VIF
(Constant)	9.611	0.000		
Student Gender Diff	-0.975	0.330	0.988	1.012
Teacher Gender Diff	0.310	0.756	0.990	1.010
School Gender Type	-0.484	0.628	0.994	1.006

a. Dependent variable: Performance in Mathematics
Source: Field survey result (2021)

Table 3 shows no case of multi-collinearity because the Tolerance and VIF values are within the threshold of greater than 0.10 and less than 4. This is to say that this data would have a good fit for a reliable result. However, the T values are not all positives and the probability values are not significant.

Table 4. Demographic Characteristics of Respondents

Items	Frequency	Percentage
Student Gender: Male	146	35.4
Female	266	64.6
Total	**412**	**100**
Age group: 12-20 years	388	94.2
21 years and above	24	5.8
Total	**412**	**100**
Teacher Gender: Male	318	77.2
Female	75	18.2
Both Male and Female	19	4.6
Total	**412**	**100**
School Gender Type: All-boys	0	0
All-girls	40	9.7
Mixed-sex	372	90.3
Total	**412**	**100**

Table 4 shows the demographic features of the respondents to this study. Female student gender participated more (64.6%) in the survey, while 77.2% of male teachers alone teach mathematics in Lokoja secondary schools. The age group of the students shows that 94.2% of them are within 12-20 years of age. The gender type of the schools indicates that 90.3% of the students are from mixed-sex schools, while there was a student from All-boys single-sex school.

Results of Main Analysis

Having performed some preliminary testing on the data to ensure its fitness, it is eligible to proceed to the main analysis. The main analysis is the multiple regressions model developed to test the hypotheses advanced earlier in this study.

Table 5. Summary of Regression Results

Relationship	Beta	T	P-Value	Decision
H1: TGD → PIM	0.015	0.990	0.310	Not Significant
H2: StGD → PIM	-0.049	-0.975	0.330	Not Significant
H3: ScGT → PIM	-0.024	-0.484	0.626	Not Significant

Note: StGD is Student Gender Difference, TGD is Teacher Gender Difference, ScGT is School Gender Type, PIM is Performance in Mathematics.
Source: Field survey result (2021)

Table 5 displays the relationship of the research hypotheses, standardized regression estimates, t-statistics and the decisions that follow the outcomes. Hypothesis one shows a positive estimate of 0.015, t-value of 0.990 and p-value of 0.310. Since the p-value is greater than the significance level of 0.05; teacher gender difference does not affect students' performance in mathematics. Hypothesis two reveals a negative estimate of -0.049, a P-value of 0.330 greater than 0.05 and a negative t-value of -0.975. This result concludes that students' gender difference does not affect their performance in mathematics. Hypothesis three discloses negative estimate of -0.024, t-value of -0.484 and p-value of 0.626. Since the p-value is greater than the significance level of 0.05, there is a significant difference between school sex type and students' performance in mathematics among government secondary school students in Lokoja.

Discussion

The result of hypothesis one suggested that teacher gender difference does not affect students' performance in mathematics. Based on the opinion of the students in this study, it is not certain whether their mathematics teacher(s) know(s) how to teach both male and female gender to understand and perform better in mathematics. However, having more male mathematics teachers than females as seen in the demographics of this study provides a tentative indication of students' positive performance in mathematics. As a result, the students may not have attached any relevance to the implication of gender of their mathematics teachers as long as school management ensures that all teachers irrespective of their gender treat the students equally without any discrimination. In line with this, researchers have advocated for policymakers and school administrators to promote the principle of equality between females and males in school curricula,

educational programmes and teaching activities, and the encouragement of gender uniformity in learning [32]. This result is partially consistent with the finding that teacher gender and school factors are of little effect on mathematics achievement based on their gender [20].

The finding of hypothesis two concluded that students' gender difference does not affect their performance in mathematics. The reason for this may arise from the dissonance of the strongly held perception that male students are better in mathematics or that female student are discriminated against in mathematics classes. Furthermore, this finding may also be attributed to having more female students in classes than the male, which equally gives an illusionary impression that more female gender differences can reduce performance in mathematics among the students. This is consistent with a study that earlier found a non-significant gender difference in students' performance in mathematics [22]. On the other hand, the finding did not conform to the studies that found a significant difference between gender and performance in mathematics in favour of male students doing better than females [21,19,20,18]. This lack of conformity may be caused by the type of data collected (primary or secondary), the difference in settings and the standard of education. Similarly, the attitude of male and female students towards mathematics equally has a positive and non-significant effect on performance [24,23].

Hypothesis three result of this study established that school gender type does not affect students' performance in mathematics. Lack of all-boys school as indicated from the demographic features of respondents may be responsible for this outcome. Only one all-girls and many mixed-sex schools can bring about an insignificant result. Additionally, there is also the insinuation that having this type of schools' makeup can decrease students' performance in mathematics. However, previous findings did not support this outcome because they found significant differences between gender and performance in mathematics in favour of the male when single-sex male school was compared with single-sex female school performance in public examinations [19,20]. The reason advanced for this outcome was related to male stronger affinity and interest towards mathematics.

Theories selected for this study have equally portrayed their roles in the findings. The non-significant results found on all hypotheses have aligned with the liberal feminism theory to discredit the societal fallacious view that female students perform less than males in mathematics in every academic setting. Continuous attainment of similar results is capable of putting an end to the mathematical patriarchy of male students in education as advocated by the radical feminism theory. This move is evident by the number strength of female students as found in government secondary schools in Lokoja. Furthermore, responses of students also suggest a successful application of the flow theory by the mathematics teachers (whether male or female) because they seem to understand the best way to regulate mathematics challenges to match both male and female students. The findings have supported the formal operational stage of Piaget learning theory meant for children of 12 years and above to engage in hypothetical and abstract thinking.

V. CONCLUSION AND FUTURE SCOPE

This study has shown that there is no significant difference between mathematics teacher sex, student sex, school gender type and students' performance in mathematics among government secondary schools in Lokoja, Kogi State. Additionally, there are tentative tendencies that having more male teachers may improve students' performance in mathematics while more female students and more mixed-sex school may reduce overall students' performance in mathematics. Based on these, it is therefore recommended that more female mathematics teachers should be employed and trained to help increase the positive performance tendency in this study, and an appropriate number of all-boys, all-girls and mixed-sex secondary schools need to be established to close any gap on gender inequality. More so, further interventions on this research should be built around liberal feminism, radical feminism, flow and Piaget's learning theories. This will deepen the understandings of principals, teachers and students (male and female) on how to improve mathematical intelligence for both genders to perform better in mathematics.

On the other hand, to account for any constraints associated with this study, only students of 11 public secondary schools were surveyed and a cross-sectional survey questionnaire design was used to collect data in a short time. However, future study should extend their scope to private and more public secondary schools in Lokoja and the state at large, while data can be collected on test and retest quasi-experimental design to practically assess the effect through a test score intervention.

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AUTHORS CONTRIBUTION

U.E.O. conceived of the research problem, collected data for analysis, wrote the manuscript, and was a major contributor to the study. S.U.U. developed the questionnaire instrument, analysed and interpreted the data, and also contributed in drafting the discussion. All authors read and approved the final manuscript.

REFERENCES

[1] D.P. Arum, T.A. Kusmayadi, I. Pramudya, "Students' Logical-Mathematical Intelligence Profile," *Journal of Physics: Conference Series,* Vol. **1008**, pp. **1-9, 2018**.

[2] H.O. Ali, "Factors affecting Students' Academic Performance in Mathematical Sciences Departments in Tertiary Institutions in

Nigeria," *From Knowledge to Wisdom, US – China Education Review*, Vol. **3**, No. **3**, pp. **905-913, 2014**.
[3] N.C. Ikechukwu, "Gender inequality in education: Implications for socioeconomic development in Nigeria," *Sapientia Foundation Journal of Education, Sciences and Gender Studies*, Vol. **2**, No. **3**, pp. **257-266, 2020**.
[4] T. Gazura, "An overview of Issues and Concepts in Gender Mainstreaming," *Afro Asian Journal of Social Sciences*, Vol. **8**, No. **1**, pp. **1-21, 2017**.
[5] Commission of the European Communities, "Report on equality between men and women -2008," *DGESE Publisher*, Luxembourg, **2008a**.
[6] J.K. Wangusi, I.O. Abuya, "Gender fairness initiative and performance of female journalists: A case of media industry in Kenya," *International Journal of Scientific Research in Multidisciplinary Studies*, Vol. **6**, Issue **2,** pp. **1-8, 2020**.
[7] U. Harikrishnan, G.L. Sailo, "Challenges of school going adolescent: Perceptions of parents and teachers," *International Journal of Scientific Research in Multidisciplinary Studies*, Vol. **6**, Issue **2,** pp. **12-15, 2020**.
[8] R.W. Connell, "Growing up Masculine: rethinking the significance of adolescence in the making of masculinities," *Irish Journal of Sociology*, Vol. **14**, No. **2**, pp. **11-28, 2005**.
[9] U. Kessels, "Fitting into the stereotype: How gender-stereotyped perceptions of prototypic peers relate to liking school subjects," *European Journal of Psychology of Education,* Vol. **20,** pp. **309-323, 2005**.
[10] T.L. Adepoju, "A study of secondary school students' academic performance at the Senior school Certificate Examination and implication for educational planning and policy in Nigeria," *An interdisciplinary Journal, Ethiopia,* Vol.**5**, No. **6**, **2011**.
[11] S.C. Ogu, "National Policy on Education and performance of Secondary School Students in Nigeria," *Scribd Ariticle*, pp. **1-15, 2016**.
[12] A. Datnow, L. Hubbard, "Gender in policy and practice: Perspectives on single-sex and coeducational schooling," *Routledge and Falmer Publisher*, New York, **2002**.
[13] L.J. Sax, L. J. "Women Graduates of Single-sex and Coeducational High Schools: Differences in their Characteristics and Transition to College," *Sudikoff Family Institute for Education and New Media Publisher*, **2009**.
[14] L.R. Musgrave, "Liberal Feminism, from Law to Art: The Impact of Feminist Jurisprudence on Feminist Aesthetics," *Hypatia*, Vol. **18** No. **4**, pp. **214–235**, **2003**.
[15] S. Acker, "Feminist Theory and the Study of Gender and Education," *International Journal of Early Childhood*, Vol. **33**, No. **4**, pp. **419-435, 1987**.
[16] J. Spencer, "Making learning flow: Using Flow Theory as a framework for creative work and student engagement," *In the proceedings of 2017 Conference presentation of the Institute for Personalised Learning*, Milwaukee, WI, United States, **2017**.
[17]. J. Piaget, Theories of Learning, In P.H. Mussen (Ed.), Carmichael's manual of child psychology, Vol. 1, (3rd ed.), *John Wiley & Sons Inc. Publisher*, New York, **1970**.
[18] L.I. Brown, G.Y. Kanyonko, "Gender differences in mathematics performance in Trinidad and Tobago: Examining affective factors," *International Electronic Journal of Mathematics Education*, Vol. **5**, No. **3**, pp. **113-130, 2010**.
[19] A.O.A. Awofala, L.M. Nneji, "Effect of Framing and Team Assisted Individualized Instructional Strategies on Students' Achievement in Mathematics," *African Journal for The Study of Educational Issues*, Vol. **4**, No. **3,4**, pp. **75-89, 2011**.
[20] C. Nwihia, "Gender Difference in academic achievement of students in Kinankop Sub County, Nyandarua County, Kenya," *European Journal of Social Sciences Studies*, Vol. **5**, No. **4**, pp. **19-35, 2020**.
[21] B.O.A. Raheem, "The influence of gender on secondary school students' academic performance in South West, Nigeria," *Journal of Social Science*, Vol. **31**, No. **1**, pp. **93-98, 2012**.
[22] K. Muhammed, "Gender Difference in Math Anxiety and Mathematics Performance of Secondary School Students in Bauchi State," *International Journal of Education and Evaluation*, Vol. **3**, No. **11**, pp. **26-31, 2017**.
[23] I. Kennedy, O.E.A. Dickson, "The influence of gender on junior secondary school students' attitude towards mathematics in Ovia North East Local Government Area of Edo State," *African Research Review*, Vol. **10**, No. **4**, pp. **115-126, 2016**.
[24] A. Ali, Mushtag, M.A. Shah, M.A. Raheem, "A Comparative Study of Gender Differences in Attitude towards Mathematics," *Merit Research Journal of Agricultural Science and Soil Sciences*, Vol. **5**, No. **12**, pp. **130-133, 2017**.
[25] M. Csikszentmihalyi, "Finding flow: The psychology of engagement with everyday life, (1st ed.)," *Basic Books Publishers*, New York, P. **31, 1997**.
[26] J.C. Anyanwu, "Determinants of Foreign Direct Investment Inflows to Africa, 1980-2007," *Working Paper Series*, No. **136**, African Development Bank Publication, Tunis, Tunisia, **2011**.
[27]. J.F. Hair, W.C. Black, B.J. Babin, R.E. Anderson, "Multivariate data analysis (7th ed.)," *Pearson Education International publisher*, Upper saddle River, New Jersey, **2010**.
[28] D. Mundy, "A Question of Response Rate," *Science Editor*, Vol. **25**, **1**, pp. **25-26, 2002**.
[29] G.D. Garson, "Missing values analysis and data imputation," *Statistical Associates Publishers*, Asheboro, NC, **2015.**
[30] J.W. Osbome, A. Overbay, "The Powers of Outliers (and why Researchers should always Check for them)," *Practical Assessment, Research and Evaluation*, Vol. **9**, No. **6**, pp. **1-8, 2004**.
[31]. A. Field, "Discovering Statistics using SPSS (4nd ed.)," *SAGE Publisher*, London, **2013**.
[32] A.Z. Ngharen, C.E. Akogwu, "Gender Equality, Education and Sustainable Development in Nigeria in the 21st Century: An Appraisal," *International Journal of Advanced Studies in Economics and Public Sector Management*, Vol. **5**, No. **1**, pp. **203-214, 2017**.

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