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EDITORIAL

STEM Journal of Anambra STAN (STEMJAS) is a publication of **Science Teachers Association of Nigeria, Anambra State Chapter.** STEMJAS is developed to disseminate information on Science, Technology, Engineering and Mathematics (STEM) to teachers, teacher-trainers, researchers and other interested persons. Articles that are of relevance to STEM education are published in this journal.

We are grateful to the contributors and hope that our readers will enjoy reading these contributions.

Prof. Rita N. Nnorom

Editor-in-Chief

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INTEREST AND GENDER AS INTERPLAYING EFFECTS OF THE ALGEBRAIC BOARD GAME ON SECONDARY SCHOOL STUDENTS IN ALGEBRA IN ONITSHA EDUCATION ZONE OF ANAMBRA STATE

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Abstract

The study examined interest and gender as interplaying effects of the algebraic board game on secondary school students in algebra in Onitsha Education Zone of Anambra State. One research question was posed and two hypotheses formulated to guide the study. Quasi-experimental (Non-equivalent control group design) was used for the study. The sample used for the study was 320 male and female senior secondary two students purposively selected from one in-tact class each of the eight schools in the zone. The instrument used for the study was Algebraic Interest Scale (ALIS). Cronbach Alpha was used to compute the reliability index for ALIS and it was found to be 0.70. Research assistants were trained for the experiment and extraneous variables were controlled. Mean and Standard deviation were used to answer the research questions, while the Analysis of Covariance (ANCOVA) was adopted in testing the hypotheses at 0.05 alpha level. The findings of the study showed that the interest of students taught algebra using the algebraic board game improved significantly more than those taught using the expository method. More-so, there was no significant difference in the mean interest scores of male and female students taught algebra using the algebraic board game. Based on the findings of this study, it was recommended that algebraic board game should be used by mathematics teachers in teaching algebra in order to arouse the students' interest; students both male and female should be encouraged to develop team spirit during their learning interaction for enhancement of their interest in mathematics.

Keywords: Interest, Gender, Algebraic Board Game, Algebra

Introduction

Mathematical games is a game whose rules, strategies and outcomes are defined by clear mathematical parameters. A mathematical game need not be conceptually complex to involve deeper computational fundamental principles. Games promote strategic thinking and give students opportunities to learn in a low-stakes setting. The use of mathematical games is one of the areas of emphasis of National Mathematical Centre, (NMC), Abuja for improving mathematics instruction in schools (NMC, 2010). To play a mathematical game, two or more students are required. The players work together to find a solution to a given mathematical problem. A mathematical game has rules for playing it, winning or losing it. Winner, loser and the spectator(s) learn the mathematical concept that is practiced in the game. Obodo (2004) explained that mathematical games encourage students to discuss and share mathematical strategies/techniques with their peers, teachers and parents. As students play the game and joke around, their interest in mathematics is captured and unusual solutions to problems are achieved. These unusual solutions are solutions that were not easy to obtain when the expository method of teaching is utilized. According to Obodo (2004), mathematical games may take the form of fallacies, puzzles, paradoxes, magic tricks or any other form that provides amusement or curiosity. Mathematical games bring joy to the learner, clear boredom, breakdown resistance to learning by reducing tension; and providing an environment where the student can develop skills and acquire more knowledge. Akisola and Animasahum (2007) further stated that mathematical games have the features which stimulate mathematical thinking, and generate excitement and spirit of individualism, cooperation and competition. Mathematical games have different forms such as board games, algebraic board game, spatial strategy games, card games, arithmetical games and matching games.

One of the mathematical games that this study was focused on is algebraic board game. Games are played with interest which stimulates learning and perfection of skills. Kwame and Damte (2013) described interest as a disposition, attitude and feelings of an individual towards an activity which shows behaviorally, the extent the person likes to participate in an activity. Rix (2012) defined interest as inward state of the mind towards something. Additionally, Hanks (2011) saw interest as that which concerns, involves or draws the attention of or arouses the curiosity of a person. Thus, interest is the feeling of intentness, concern or curiosity about an object.

Interest is a tendency to seek out and participate actively in certain activities. Badmus (2012) revealed that students' achievement was significantly predicted by the students'

interest. Adeniyi and Salman (2015) stated that a survey of students' interest in mathematics depicts a very sad and regrettable situation. In the report of Ajai and Imoko (2015), a very low interest in mathematics among secondary school students was indicated. It is important to note that interest controls the motivation to learn and as such, it possesses a direct positive relationship with achievement. The interest of students in mathematics may be enhanced through the use of algebraic board game.

Interest brings about attention, once there is direct interest, attention is guaranteed and retention is assured. Interest can be regarded as a subjective feeling of concentration or curiosity over something (Nnakwo, 2019). Interest is a motivational construct. Anibueze (2017) opined that interest has to do with preparedness or mastery of a subject matter, background knowledge that can enable a student to cope with further or next higher level of learning of subject matter. Hornby (2000) defined interest as a feeling somebody has when he or she wants to know or learn more about something. Harbor-Peters (2000) noted that interest is a tendency to become absorbed in an experience and continue in it.

Mathematics is a science subject and some gender-based science researchers have reported that what both the 'feminist empiricists' and the 'liberal feminist critics' seem to agree is that females in principle will produce exactly the same scientific knowledge as males provided that sufficient rigor is undertaken in scientific inquiry (Howes, 2002; Sinnes, 2006). They also believe that initiatives that build on the assumption that females and males are equal in their approach to science, and that inequality in science and science education is caused by political, educational and social factors external to science, would be expected to focus on removing these external obstacles. Researchers have found out that boys and girls exhibit different patterns of interest, while girls pay attention to efforts in explaining their performances; boys on the other hand, exhibit the pattern of luck and ability as a factor that determines their performance. Thus, differences in gender have been found to be a motivation for their functioning and academic achievement and interest. Further research has shown that girls acknowledge success and failure not as a result of efforts but ability, while boys attribute success to efforts to boost their self- image (Smith, 2002).

Differences in academic interest of boys and girls may be as a result of culture, biological functions and stereotype. Jiboku (2008) revealed a dwindling performance of women in education which could be attributed to gender inequality in education. Bisong (2006) opined that curriculum planners already exhibit bias towards the girl or

woman who is seen as fragile and needed protection. Gender, according to Samtrock (2005), prescribes sets of role behaviours expected of male and females in their thinking, actions and feelings. According to the social cognitive theory, the adolescent's gender development is based on adolescents' observation and copying of other's behaviour, also by rewards and punishments of gender-approach and gender-inappropriate behavior.

Olubunmi (2011) remarked that gender differences are intolerable hence it would be right and proper to treat boys and girls in schools differently due to their natural predispositions. From the foregoing, evidences have shown that there is no definitive conclusion on the influence of students' gender on their academic interest. Some researchers have found male students doing better than female while some found the contrary. So the present study investigated more on it in order to bridge the gender gap which is a way of achieving and enhancing mathematical knowledge, social equality and human development in terms of interest.

Research Question

1. What are the mean interest scores and standard deviations of students taught with the algebraic board game due to gender as measured by ALIS?

Research Hypotheses

Two null hypotheses were tested at 0.05 level of significance;

1. There is no significant difference between the mean interest scores of students in the experimental group due to gender as measured by ALIS.
2. There is no interaction effect of teaching method and gender on students' interest as measured by ALIS.

Method

Quasi-experimental (Non-equivalent control group design) was used for the study. The sample used for the study was 320 male and female senior secondary two students purposively selected from one intact class each of the eight schools in the zone. The instrument used for the study was Algebraic Interest Scale (ALIS). ALIS was prepared for assessment of students' interest in algebra. The inventory consisted of 15 items. It had two sections, A and B. Section A contained the bio-data of the respondents while section B contained the interest items. The response options are: very much interested (VMI) – 4 points, much interested (MI) – 3 points, Interested (I) – 2 points and not

interested (NI) – 1 point. ALIS was administered as pretest and posttest in different numbering patterns. Cronbach Alpha was used to compute its reliability index. This was found to be 0.70. Research assistants were trained for the experiment and extraneous variables were controlled. Mean and Standard deviation were used to answer the research question, while the Analysis of Covariance (ANCOVA) was adopted in testing the hypotheses at 0.05 alpha level.

Results

The data collected were presented in the tables below:

Research Question 1: What are the mean interest scores and standard deviations of students taught with the algebraic board game due to gender as measured by ALIS?

Table 1: Mean Interest and Standard Deviation Scores of male and female students taught **with the algebraic board game.**

Method	**N**	**Pretest**		**Posttest**	
		Mean	SD	Mean	SD
Male	77	17.12	3.12	43.01	7.12
Female	84	18.90	3.81	42.61	5.89

In Table 1, the male students in the experimental group had mean interest scores of 17.12 and 43.01 and standard deviation scores of 3.12 and 7.12 in pretest and posttest respectively; while the female counterpart in the same experimental group had mean interest scores of 18.90 and 42.61 and standard deviation scores of 3.81 and 5.89 in the pretest and posttest respectively.

The result shows that the mean interest scores of male and female students in ALIS are close to each other in the pretest and posttest, all the standard deviations are close to one another. This result evidently confirms that both male and female students did not differ much from each other in their interest in algebra.

Hypothesis 1: There is no significant difference between the mean interest scores of students in the experimental group due to gender as measured by ALIS.

Hypothesis 2: There is no interaction effect of teaching method and gender on students' interest as measured by ALIS.

Table 2: Two-way ANCOVA Results on Interest due to Method and Gender

Source	Type III sum of squares	Df	Mean square	F	Sig.	Dec.
Corrected Model	12.294	3	4.098	12.727	.000	
Intercept	3438.756	1	3438.756	10,679.363	.000	
Method	8.695	1	8.695	27.003	.000	S
Gender	1.811	1	1.811	5.625	0.081	NS
Method*Gender	0.056	1	0.056	0.174	0.671	NS
Error	101.752	316	0.322			
Total	3625.000	320	320			
Corrected Total	126.827	319	319			

Table 2 shows that for gender, the F-computed value of 5.625 is significant at 0.081 probability value which is higher than 0.05 level set for this study. Hence, the null hypothesis was accepted. This means that there is no significant difference between the mean interest scores of male and female students as measured by ALIS.

For interaction (Method*Gender), the F-computed value of 0.174 is significant at 0.671 computer significant level which is higher than 0.05 level set for this study. Hence, there is no teaching method and gender interaction effect on mean interest scores of students in the experimental group as measured by ALIS.

Discussion

In Table 1, the male students in the experimental group had mean interest scores of 17.12 and 43.01 and standard deviation scores of 3.12 and 7.12 in pretest and posttest respectively; while the female counterpart in the same experimental group had mean interest scores of 18.90 and 42.61 and standard deviation scores of 3.81 and 5.89 in the pretest and posttest respectively. From the result, it appears that the interest of male and female students seems to be enhanced equally with the use of the algebraic board game.

Table 2 confirms this finding with the ANCOVA result which was tested at $p \leq 0.05$ level of significance. From the ANCOVA result, it can be seen that there is no significant difference in the mean interest scores of male and female students of the experimental group. Hence, the use of algebraic game board favoured both gender in

enhancing their interest in algebra. This finding agrees with Olor (2010), Shafi (2018), and Nnaka and Anaekwe (2015) that male and female students do not differ in interest when taught algebra with various methods.

It then appears that parents have learnt to give equal opportunities to their male and female children so that both can take full advantage of their potentials in any of their life's chosen careers, hence no gender difference was found in students' interest in algebra in this present study.

Conclusion

From the findings of the study, conclusions were drawn as follows; there is no significant difference between the mean interest scores of male and female students in the experimental group. This could be as a result of interest gained by the two genders in their learning interaction.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Algebraic board game should be used by mathematics teachers in teaching algebra in order to arouse the students' interest;
2. Government should provide some mathematical games that will enhance interest of students in mathematics.
3. Government through different media should educate the society on fair-play as it relates to all genders in both art and science subjects in the school system.
4. Mathematics teachers should include innovative techniques in teaching difficult topics in mathematics so as to boost their learning morale of the students.
5. Mathematics teachers should not be unbiased in their engagement with students as regards to gender.
6. Students both male and female should be encouraged to develop team spirit during their learning interaction for enhancement of their interest in mathematics.

References

Adeniyi, C. O. & Salman, M. F. (2015). Effects of personalized system of instruction on senior secondary school students' achievement in mathematics. Abacus: *Journal of the Mathematical Association of Nigeria 40*(1), 122-133.

Agomuoh, P. C (2010). Effect of prior Knowledge, Exploration, Discussion, Dissatisfaction with Prior Knowledge and Application (PEDDA) and The Learning Circle (TLC) constructivists' instructional Models on Students' Conceptual Change and Retention in Physics. *Unpublished Ph.D Thesis,* UNN.

Ajai, J. & Imoko, I. I. (2015). Gender difference in mathematics achievement and retention scores: A case of problem-based learning method. *International Journal of Research in Education and Science, 1*(1), 45-50.

Akisola, K. & Animasahun, A. (2007). The effect of simulation games environment on students' achievement and attitude to mathematics in secondary schools. *Turkish Online Journal of Education Technology*. *6*(3), 113-119.

Anibueze, C. O. (2017). Effect of mathematics scrabble game on junior secondary school students' achievement and interest. Unpublished M.Sc. (Ed.) Dissertation. Dept of Science and Computer Education; Enugu State University of Science and Technology, Enugu.

Badmus, G. A. (2002). Improving positive attitudes and interest of students to mathematical sciences. In Ale, S.O. & Adetula, L.O. (ed). *Reflective and Intellective Position Papers on Mathematics Education Issues*. Abuja: Marvellous Mike Ventures Ltd.

Bisong, N. (2006). Gender disparity in the Nigerian labour force: Implications for counseling. *The Nigerian Journal of Guidance and Counseling, 11*(1), 76-83.

Hanks, F. (2011) *Education, manpower and economic growth: Strategies of human resources development.* New York: Vc-Mckey Press.

Harbor-Peters, V. F. A. (2000). Andragogical Inquiry. A pedagocal Model for teaching mathematics within the next millenium. *ABACUS: The Journal of Mathematics Association of Nigeria. 25*(1), 64- 72

Hornby, A. S. (2000). Oxford Advanced Learner's Dictionary of Current English. Oxford: University Press.

Howes, E. V. (2002). *Connecting girls and science: Constructivism, feminism, and education reform.* New York: Teachers College Press.

Jiboku, A. O. (2008). Gender and self-concept as predictors of academic self-efficacy of students. *Ogun Journal Counseling Studies*. 2(2), 89-94.

Kwame, M. & Damte, A. (2013) *Health Science Education: Issues and Trends.* Osogbo: Muyiwa Press Ltd.

National Mathematical Centre (NMC) (2010). *Lecture notes for capacity building workshop.* Abuja: Marvelous Mike Publishers.

Nnakwo, F. O. (2019). Effect of quadratic equation box on secondary school students' academic achievement, interest and retention in algebra in Enugu State. Unpublished M.Sc.(Ed.) Dissertation. Dept of Mathematics and Computer Education, ESUT, Enugu.

Obodo, G. C. (2004). *Principles and practice of mathematics education*. Enugu: Division of General Studies, ESUT.

Olubunmi, A. (2001). The Impact of School Location and Gender Differences on Students Achievement in Agricultural Science. A Case Study of Secondary Schools in Yewa North, Ogun State.

O'Neill and Summers (2009). Collins English Dictionary. Glasgow: HarperCollins Publishers.

Rix, M. (2012). Educational Technology. *Journal of Research in Science Teaching*.http://www3.interscience,wiley.com/cgibin/abstract/112608296/ ABSTRACT.

Samtrock, J. N. (2005). *Adolescence*. 10th Edition. NY: McGraw Hill.

Sinnes, A. T. (2006). Approaches to gender equity in science education. Two initiatives in sub-Saharan African seen through a lens derived from feminist critique of science. Oslo:

Unipub.http://www.ils.u10.no/forskninig/palidrgrad/doktorarhandlin- ger/doc s/AstridSinnes Avhandlingfeminist critque of science.oslo: Unipub.pdf.