Effects of Collaborative Learning Technique and Mathematics Anxiety on Mathematics Learning Achievement among Secondary School Students in Gombe State, Nigeria

Muraina Kamilu Olanrewaju
muraina_kamilu@yahoo.com
Legacy University, Gambia
Yusuf Suleiman
yusufsuleiman96094@gmail.com
Unicaf University, Cyprus

ABSTRACT

Mathematics is one of the subjects that is taken very seriously in the school system, irrespective of country or level of education. This study therefore examined the effects of collaborative learning technique and Mathematics anxiety on Mathematics learning achievement of secondary school students in Gombe State, Nigeria. Pretest-posttest, control group quasi-experimental design with a 2x2 factorial matrix was used in the study. Multi-stage sampling technique was used in sampling participants from four local government areas in the state. The respondents were measured with validated scale of 0.84 reliability coefficient research instrument and the data obtained was analyzed using independent samples t-test statistical analysis. Two (2) research hypotheses were formulated and tested at 0.05 level of significance. The results showed that there was a significant difference in the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group (t= 58.75; p<0.05) and there was a significant difference in the Mathematics learning achievement of secondary school students with high Mathematics anxiety and those with low Mathematics anxiety (t= 38.41; p<0.05). In view of these findings, the study recommends that educational stakeholders should intensify their effort to organize conferences on the implications of collaborative learning technique for effective interventions towards enhancing Mathematics learning achievement among secondary school students.

Keywords*: Collaborative learning technique, Mathematics anxiety, Mathematics learning achievement and secondary school students*

INTRODUCTION

Mathematics is one of the core subjects that students are expected to have credit to further their studies in institutions of higher learning (Adejumo, Oluwole & Muraina, 2015). This makes Mathematics one of the essential subjects for student advancement. However, Mathematics is one of the subjects that is taken very seriously in the school system, irrespective of country or level of education. It has been described as a model of thinking which encourages learners to observe, reflect and reason logically about a problem and in communicating ideas, making it the central intellectual discipline and a vital tool in science, commerce and technology (Uwadiae, 2014). In the words of Salman (2005), Mathematics is a precursor of scientific discoveries and inventions. It is the foundation for any meaningful scientific endeavour and any nation that must develop in science and technology must have a strong mathematical foundation for its youths. In terms of curriculum relevance, Mathematics is compulsory at the secondary school level and a prerequisite for moving from the Junior Secondary School (JSS) to the Senior Secondary School (SSS); just as at the tertiary level of education, a sound background in Mathematics is a necessary condition for the study of all science, technology and social science based courses, as required by the Unified Tertiary and Matriculation Examination (UTME).

Learning achievement is the performance of students in the tests and examinations he/she has been exposed to. Learning achievement is a concept that has always being used synonymously with some concepts such as learning outcomes, academic achievement, academic performance and academic success among others (Adejumo, Oluwole & Muraina, 2015). Analysis of school certificate Mathematics examination results showed that students' performances in Mathematics are consistently poor. Uwadiae (2014) reported that less than 42% of registered candidate in SSCE obtained credit pass in Mathematics. Even the SSCE results released by WAEC and NECO for 2012 indicated students' poor achievement in Mathematics. According to Olunloye (2010), this ugly trend of high failure rate in Mathematics is a national disaster. Therefore, feasible ways of improving performance has remained an area of great concern for researchers.

Moreover, it is disheartening that research and data from National Examination Bodies like West African Examinations Council (WAEC) have shown a consistently poor performance in this subject. Majority of secondary school students often dread and show negative readiness towards Mathematics and the trends of their achievement in the Senior Secondary School (SSS) certificate examination is also a source of worry to the stakeholders (Ajayi & Muraina, 2011; Adejumo, Oluwole & Muraina, 2015). From available statistics, the national average hovers around 32 per cent for Mathematics. Uwadie (2014) in support of the above assertion noted that only 48.88% of candidates who sat for November/December 2013 West African Senior School Certificate Examination (WASSCE) obtained credit while the rest of 51.12% of the candidates failed in Mathematics (Oluwole & Muraina, 2016). The 2014 May/June SSCE results also recorded mass failure by students across the country. 242, 162 students sat for the examination with only 23,042 (9.52%) obtained distinction. In Mathematics, 15, 752 (6.50%) got credit while 101,321 (41.8%) got pass. 94.162 (38.9%) failed while 7,886 (3.26%) were involved in malpractice. Therefore, only 16.02% (distinction and credit percentage) qualified for admission into universities and polytechnics. This study therefore concentrates on the effects of collaborative learning technique and Mathematics anxiety on Mathematics learning achievement of secondary school students.

Collaborative Learning Strategy for Mathematics

Collaborative learning strategy (CLS) is a method of learning in which secondary school students team together to explore a significant question or create a meaningful project. This learning strategy shares many of the same traits as cooperative learning strategy. However, the major difference is it being more student-centered than cooperative learning. Collaborative learning provides the driving force for social constructivism where students are in control of their own learning and ultimately, the outcome of their learning (Oluwole & Muraina, 2016). Collaborative learning is best suited to an arrangement of groups where students can freely interact with one another and construct their ideas together. CLS is a type of learning strategy that has evolved over the last thirty years and is still evolving. It encourages an educational approach to learning that involves groups of students working together to solve a problem, complete a task, or create a product. According to Gerlach (1994), collaborative learning strategy is based on

the idea that learning is a naturally social act in which the participants talk among themselves and it is through the talk that learning occurs. Social learning or learning as part of a group is an important way to help students gain experience in collaboration and develop important skills in critical thinking, self-reflection and co-construction of knowledge.

Briandley, Walti and Blaschke (2009) and Dillenbourg (1999) found that collaborative learning strategy is a process which two or more people learn or attempt to learn something together. Unlike individual learning strategy, people who engage in collaborative learning capitalize on one another's resources and skills, asking one another for information, evaluating one another's work, among other things (Chiu, 2004). More specifically, collaborative learning strategy is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetrical roles (Mitnik, Recabarren, Nussbahum & Soto, 2009; Owoyele & Muraina, 2016). Lawrence (2004) stated that collaborative learning strategy increases students' interest towards Mathematics and invariably enhances achievement. In the same vain, Fasli and Kopoules (2005) revealed that collaborative learning strategy provides incentives for students to develop interest in science and thereby enhance achievement. Ardodo and Gbore (2012) view that students' interest could be enhanced through the use of good innovative strategies that will stimulate their interest and achievement and this can be achieved using collaborative learning strategy.

Mathematics anxiety as moderating variable in this study refers to the feelings of tension and anxiety that interfere with the manipulation of numbers and solving mathematical problems in an open variety of societal life and academic situations. Although there is on-going debate on various causes of Mathematics anxiety, it is said that achievement and performance improved when Mathematics anxiety was reduced (Wilbert, 2006; Owoyele & Muraina, 2016). Vinson (2001) also noted that Mathematical skills is increased when anxiety is diminished. Mathematics anxiety affects student achievement and attitude towards Mathematics and it may also lead to poor performance and avoidance of Mathematics (Hembree, 2009). Many people think of Mathematics as a punishment or something that induces stress.

In separate meta-analysis studies, Hembree (2009) and Ma (1999) reported that Mathematics anxiety was related to Mathematics performance among individuals at various ages. It has also been associated with Mathematics performance before and during secondary school (Green, 2000). Mathematics anxiety is common among secondary school students but more so among students majoring in the arts than those majoring in science (Wang & Ye, 2015). Aprebo (2002) asserted that poor achievement in Mathematics emanated from anxiety and fear. Mathematics phobia, he said, has been an academic disease whose symptoms are always expressed on the faces of the learners in the Mathematics classroom. Not surprisingly, Mathematics anxiety is inversely related to students' learning readiness (Ikegulu, 2000; Owoyele & Muraina, 2016). Green (2000) reported that although Mathematics anxiety was significantly related to Mathematics learning readiness, other factors such as test anxiety, Mathematics placement test scores, and teacher feedback were stronger predictors of students' learning readiness. Bassarear (2006) found that poor performance and readiness in Mathematics was related to high Mathematics anxiety among medium and high ability students; however, highly anxious students with low ability actually outperformed lower ability students who expressed less anxiety. Students with less anxiety may have more strategies at their disposal than their more anxiety-prone counterparts.

Despite the effort of scholars and researchers in finding lasting solutions to the problems of low Mathematics learning achievement among students in the school, little studies have concentrated on the use of collaborative learning technique and self-monitoring skill training in enhancing students learning achievement especially in Mathematics and sciences. However, despite several studies on learning achievement of students in the school (Adejumo, Oluwole & Muraina, 2015; Busari, 2013; Oluwole & Muraina, 2016), researchers have not concentrated on the issues that are related to the use of collaborative learning strategy and Mathematics anxiety. Also, related studies on interest and achievement in sciences were studied mostly outside Nigeria, the need to use these intervention strategies in enhancing Mathematics learning achievement make this present study a necessary one. In order to fill the gap in the previous study and to add to existing literature, the present study intends to examine the effects of collaborative learning technique and Mathematics anxiety on Mathematics learning achievement of secondary school students in Gombe State, Nigeria.

As a solution, stakeholders in Nigerian secondary school education have called for the use of psychological interventions. Therefore, there is a need to find more effective skill trainings that are likely to improve learning achievement in senior secondary Mathematics. Also, there has been very little research done in Nigeria in this area. This study therefore concentrates on the effects of collaborative learning technique and Mathematics anxiety on Mathematics learning achievement of secondary school students in Gombe State, Nigeria.

PURPOSE OF THE STUDY

The main purpose of this study is to investigate the effects of collaborative learning techniques and Mathematics anxiety on Mathematics learning achievement of secondary school students in Gombe State, Nigeria. The secondary purposes include:

1. finding out any significant difference in the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group

2. examining any significant difference in the Mathematics learning achievement of secondary school students with high mathematics anxiety and those with low mathematics anxiety.

Hypotheses

Therefore, the following null hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference in the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group

2. There is no significant difference in the Mathematics learning achievement of secondary school students with high Mathematics anxiety and those with low Mathematics anxiety

METHODOLOGY

The study adopted the pretest-posttest, control group quasi-experimental design with a 2X2 factorial matrix. In essence, the row consisted of collaborative learning technique and the control. The row was crossed with Mathematics anxiety varied at two levels (High and Low). The population for the study comprised 21,360 public secondary school students in 11 Local Government Areas (LGAs) of Gombe State, Nigeria (TESCOM, 2017). Multi-stage sampling technique was used for the study. The first stage involved the use of simple random sampling technique to select four LGAs. The second stage witnessed the selection of two public secondary schools from each sampled LGAs. Ten secondary school students were sampled in each school through balloting and this cut across different genders. On the whole, eighty secondary school students were drawn for the study. However, the whole population was grouped into two, one group formed collaborative learning technique class and the remaining one served as control group. Two instruments were used for the study.

Mathematics Learning Achievement Test (MLAT)

This was made up of thirty one (31) multiple choice items with four options. All the questions are to be answered by the participants within an hour. The reliability coefficient of the instrument was determined using Kuder – Richardson formula 20 (KR20). Kuder – Richardson formula 20 (KR20) was used to determine the internal consistency and overall coefficient of the instrument. Item analysis was also used to carry out the difficulty index and discriminatory power of the test. This was done between the higher achievers and lower achievers in Mathematic. The difficulty and discriminating indices of each of the test items was computed for further validation of the instrument. The difficulty level of .51 and the discrimination index of .75 were obtained.

However, Writing of test items was followed by face and content validation. The face and content validation reduced the items from sixty (60) to forty five (45) after giving the test to three (3) Mathematics teachers in secondary schools for scrutiny; while item analysis further reduced the test items from forty five (45) to thirty one (31). The surviving items were administered on thirty students. Kuder-Richardson formula (KR) was

applied to the scores in order to measure the internal consistency. Example of the items in the Test was: *1. Simplify (-8) x (-3)? 2. Solve for x in x^2 -5x = 6?; 3. Find the value of x if 4x + 7 = 5x + 6?* The internal consistency coefficient of .79 was obtained on the test-retest method used on the students within an interval of three weeks. However, to construct MLG, a table of specifications (or test blueprint) was drawn up for sixty (60) test items.

Mathematics Anxiety Scale

This scale consists of fourteen (14) item instrument rated on four points type scale ranging from strongly agreed (SA) to strongly disagreed (SD). The instrument was adopted from Mathematics anxiety scale developed by Mahmood and Khatoon (2011). Example of the items in the scale was: 1. Mathematics makes me feel comfortable and easy; 2. I feel worried before entering the Mathematics class; 3. Solving Mathematics problems is always pleasant for me. The instrument has reliability coefficient of .89 with Cronbach's Alpha of .87.

Inclusion Criteria

The following criteria were used in selecting the participants for the study:

1.   Interested participants should be in SSS 2

2.   Participants with consent from their parents

3.   Participants with consent from the school authority

4.   Participants who are willing to participate in the treatment programme.

5.   Students with consistent record of low learning achievement in Mathematics

Exclusion Criteria

1.   Participants' non readiness to sign consent form.

The study was carried out in four phases: pre-sessional activities, pre-test, treatment and post-test. At the pre-session, activities include the screening, recruitment and assignment of participants to the two experimental and control group. Advertisement was made to request for participants in selected secondary schools. A preliminary meeting was organised to familiarise with the interested participants and to solicit their willingness to participate in the study. At the pre-test stage Mathematics Learning Achievement Test and Anxiety were administered to the participants. Participants in the experimental group only were exposed to eight sessions of treatment. Each session spanned for an average of 60 minutes (an Hour). Though the control group was not treated, they were exposed to a lecture titled *"Political Party in Nigeria"*. The post-test was administered following the conclusion of the programme.

Extraneous variables are those factors or attributes that may affect the outcome of the experimental study aside from the skill trainings to be employed. The researcher guided against effects of such variables through the following; appropriate randomisation of participants into the two intervention groups and the control group; adherence to inclusion criteria; effective use of the 2x2 factorial matrix design and the independent samples t-test statistical tool that was used equally takes care of likely extraneous variables.

T-test statistical analysis was then employed to analyse the data in this study and to establish any significant difference in the Mathematics learning achievement of participant in treatment group and control as well as Mathematics anxiety level.

RESULTS

The result in table 1 showed that there was a significant difference between the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group (t= 73.75; p<0.05). The mean value of the table further revealed that the students in collaborative learning technique had higher Mathematics learning achievement than their counterparts in the control group. This further meant that the treatment had a significant influence on Mathematics learning achievement of secondary school students. Hence, HO1 has been rejected.

Table 1: Summary of t-test of Students Exposed to Collaborative Learning Technique and Those Exposed to Conventional Lecture Method

Groups	N	Mean	SD	Std. Error	df	t	p	Remark
Collaborative Learning Technique	35	71.43	16.74	5.00	73	58.75*	0.00	* S
Lecture Method	40	37.36	10.52	2.72				

* Significant at p<0.05

Hypothesis One (HO1): There is no significant difference in the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group

Table 2 showed that there was a significant difference between the Mathematics learning achievement of secondary school students with high Mathematics anxiety and those with low Mathematics anxiety (t= 38.41; p<0.05). The mean value of the table further revealed that the students with low Mathematics anxiety had higher Mathematics learning achievement than their counterpart with high Mathematics anxiety. This further meant that Mathematics anxiety had significant influence on Mathematics learning achievement of secondary school students. Hence, HO2 was also rejected.

Table 2: Summary of t-test of Adolescents with High and Low Mathematics Anxiety

Groups	N	Mean	SD	Std. Error	df	t	p	Remark
High	39	51.65	8.28	4.59	73	38.41	0.01	* S
Low	36	63.97	3.76	1.98				

* Significant at p<0.05

Hypothesis Two (HO2): There is no significant difference in the Mathematics learning achievement of secondary school students with high Mathematics anxiety and those with low Mathematics anxiety.

DISCUSSION

The result in the Table 1 showed that there was a significant difference in the Mathematics learning achievement of secondary school students exposed to collaborative learning technique and those in the control group. The mean value of the table further revealed that the students in collaborative learning technique had higher Mathematics learning achievement than their counterparts in the control group. This further meant that the treatment has significant influence on Mathematics learning achievement of secondary school students. This is in line with the study of Gerlach (1994) that collaborative learning strategy is based on the idea that learning is a naturally social act in which the participants talk among themselves and it is through the talk that learning occurs. Briandley, Walti and Blaschke (2009) and Dillenbourg (1999) found that collaborative learning strategy is a process which two or more people learn or attempt to learn something together. Unlike individual learning strategy, people who engage in collaborative learning capitalize on one another's resources and skills, asking one another for information, evaluating one another's work, among other things (Chiu, 2004; Owoyele & Muraina, 2016). More specifically, collaborative learning strategy is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetry roles (Mitnik, Recabarren, Nussbahum & Soto, 2009). Lawrence (2004) stated that collaborative learning strategy increases the interest of students towards Mathematics and invariably enhances achievement. In the same vain, Fasli & Kopoules (2005) revealed that collaborative learning strategy provides incentives for students to develop interest in science and thereby enhance achievement.

The result of Table 2 revealed that there was a significant difference between the Mathematics learning achievement of secondary school students with high Mathematics anxiety and those with low Mathematics anxiety. The mean value of the table further revealed that the students with low Mathematics anxiety had higher Mathematics learning achievement than their counterpart with high Mathematics anxiety. This further meant that Mathematics anxiety had a significant influence on Mathematics learning achievement of secondary school students. This is consistent with the study of Vinson (2001) who found that Mathematics power is increased when anxiety is diminished. As noted in literature, Mathematics anxiety

affects student achievement and attitude towards Mathematics and it may also lead to poor performance and avoidance of Mathematics (Hembree, 2009). Many people think of Mathematics as a punishment or something that induces stress, thus Mathematics anxiety has been proposed as an explanation for poor Mathematics achievement. In separate meta-analysis studies, Hembree (2009) and Ma (1999) reported that Mathematics anxiety was related to Mathematics performance among individuals at various ages. It has also been associated with Mathematics performance before and during secondary school (Green, 2000). Mathematics anxiety is common among secondary school students but more so among students majoring in the arts than those majoring in science (Wang and Ye, 2015). Aprebo (2002) asserted that poor achievement in Mathematics emanated from anxiety and fear. Mathematics phobia, he said, has been an academic disease whose symptoms are always expressed on the faces of the learners in the Mathematics classroom. Bassarear (2006) found that poor performance and readiness in Mathematics was related to high Mathematics anxiety among medium and high ability students.

RECOMMENDATIONS

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

1. Educational stakeholders should intensify their effort to organize seminars/conferences on the implications of collaborative learning technique as effective interventions towards enhancing Mathematics learning achievement among secondary school students.

2. The researchers and stakeholders in education should not only focus on the students' achievement alone but also their Mathematics anxiety. This is because Mathematics anxiety of the students has a lot of influence on Mathematics learning achievement among secondary school students.

3. Teachers and other stakeholders in the school system are to be trained on how to improve students' Mathematics learning achievement and collaborative learning technique. This will serve as efforts to assist the

students in overcoming the challenges of low Mathematics learning achievement among secondary school students.

4. The students in the school should be encouraged and trained on the effective usage of these interventions (collaborative learning technique). This will make the students to adopt effective attitude towards enhancing the Mathematics learning achievement.

CONCLUSION

Based on the findings of this study, it is hoping that with the improvement of Mathematics anxiety and collaborative learning technique could be changed for the better. The study found that Mathematics anxiety and collaborative learning technique have influenced Mathematics learning achievement among secondary school students. By and large, Mathematics anxiety and collaborative learning technique have a great influence on Mathematics learning achievement among secondary school students which has been proved in this study.

REFERENCES

Adejumo, A, Oluwole, D. A and Muraina, K. O. (2015). The influence of some psychological factors on the learning gains of University undergraduates in Mathematics in Oyo State, Nigeria. Proceedings of *International Conference for pedagogical and educational sciences, excellence in research and innovations for humanity*, January, 15-18. Switzerland.

Ajayi, K.O. and Muraina, K.O. (2011). Parents' education, occupation and real mother's age as predictors of students' achievement in Mathematics in some selected secondary schools in Ogun State, Nigeria. *Academic Leadership online Journal, 9*(2), 23-43.

Aprebo, G. (2002). *The Impact of using Cognitive and Meta Cognitive Teaching Strategies on the Reading Comprehension of the High Basic Stage Female Students*. Doctorate dissertation, Arab Amman University, Amman, Jordan.

Ardodo, S.O. and Gbore, L. O. (2012). Prediction of interest of science students of different ability on their academic performance in basic science. *International journal of psychology and counselling, 4*(6), 68-78

Bassarear, H. 2006. *Cognitive therapy and the emotional disorders*. New York: International Universities Press.

Briandley, J. E.; Walti C. H. and Blaschke L.M. (2009). *Creating Collaborative groups in an online environment.* Retrieved from Home-10-3-Briandley on 16-8-2013

Busari, A.O. (2013). Assessing the Relationship of Self-regulation, Motivation and Anxiety on Mathematics Achievement of Elementary School Children in South -Western Nigeria. *An International Multidisciplinary Journal. Vol. 7*(3), Serial No. 30:110-126

Chiu, M. M. (2004). Adapting teacher interventions to student needs during cooperative learning. *American Education Research Journal, 41,* 365-399.

Fasli, M. and Kopoulous, M. (2005). Supporting active Learning through Game – like exercises. *In proceedings of the 5 IEEE International Conference of Advanced Learning Technologies (ICALT 2005),* 730-734.

Gerlach, J. M. (1994). Is this collaboration*?* In Bosworth, K. and Hamilton, S. J. (Eds),Collaborative *Learning: underlying processes and effective techniques, new direction for teaching and learning*, *59*(1), 345-522.

Green, B. P. (2000). Mathematics anxiety in elementary school students. *Missouri Counsil of Teachers of Mathematics Bulletin, 30*(4), 5-15.

Hembree, R. (2009). Studying in higher education: Students' approaches to learning, Self-monitoring and cognitive strategies. *Studies in Higher Education, 31*, 99-117.

Ikegulu, R. O. (2000). Problem Based Learning Numerical Ability and Gender as Determinants of Achievement. Problem –solving and line *Students' Self-Concept and Their Achievement in Basic Science* Graphing Skills in Senior Secondary Physics in Ibadan, University of ibadan, *Unpublished PhD. Thesis*

Lawrence, R. (2004). Teaching data structures using competitive games education. *Journal for competitive learning 47*(4), 459-466.

Ma, X. (1999). Effects of early acceleration of students in Mathematics on attitudes toward Mathematics and Mathematics anxiety. *Teachers College Record, 105*(3), 438-464.

Mahmood, A. Y and Khatoon, H. C. (2011). Development and Validation of the Mathematics Anxiety Scale for Secondary and Senior Secondary School (SSS) Students *British Journal of Arts and Social Sciences.* http://www.bjournal.co.uk/BJASS.

Mitnik, R., Recabarren, M., Nussbaum, M., and Soto, A. (2009). Collaborative Robotic Instruction; *A Graph Teaching experience .Computes and Education, 53*(2), 330- 342.concepts by junior secondary school students. Proceedings of the 43rd annual conference of Science Teachers Association of Nigeria.

Oluwole, D. A and Muraina, K. O. (2016). Effectiveness of Motivational Enhancement Therapy in Enhancing Mathematics Learning Gains among School-Going Adolescents in Oyo State, Nigeria. *The Pacific Journal of Science and Technology, 17*(1), 140-151. Available at http://www.akamaiuniversity.us/PJST.htm

Owoyele, J.W and Muraina, K.O. (2016). Correlational Study of Self-concept and Study Habit on Mathematics Anxiety among Secondary School Students in Oyo North Senatorial District, Nigeria. *African Journal of Educational Management (AJEM), Vol. 17*, No. 2, 225-239

Salman, N. M. (2005). *Public images of Mathematics*. An unpublished doctoral dissertation, University of Exeter, U. K.

Uwadie, H. J. (2014). Relationship between boy's and girl's nonverbal ability and mathematical achievement. *School Psychology International, vol. 17*, pp. 71-80.

Vinson, B. (2001). A comparison of pre-service teachers' Mathematics anxiety before and after a methods class emphasizing manipulative. *Early Childhood Education Journal, 29*(2), 89-94.

Wang, M. D. and Ye, F. (2015). *Examining the intellectual and Motivational factors leading to gender disparity career.* Front Psychology. 6:36. University of Pittsburgh, USA

Wilbert, L.T. (2006). *High school Mathematics teachers' perception of students with Mathematics anxiety.* Paper AAI3341932: http://digitalscholarship.tnstate.edu/dissertations.