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Students' Contributions as Implicative to their Learning Abilities in Secondary School Mathematics

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Abstract
This study is part of a larger study which explores the classroom students' contributions as implicative to their learning abilitiesin secondary school Mathematics. For this part, it uses both qualitative and quantitative research design of two teaching strategies on Sequence and Series (Arithmetic & Geometric Progression) in Mathematics. The qualitative method examines the students' contributions via the use of videotape and transcription. The quantitative part uses quasi-experimental research design of a pre-test and a post-test control group 2x3x2 factorial. Kuder- Richardson formula 21 (K-R, 21) method is used to determine the reliability of the instrument and the process returns reliability coefficients of 0.85 for the study.
The target population for the study consists of all Senior Secondary Two (SS2) students in the public secondary schools in Lagos State. The study samples involve two SS2 students of public schools in the Badagry Local Government Area. In analysing qualitative and qualitative data, descriptive statistics, mean, standard deviation, frequency counts, percentage bar chart are used. The findings of the research question show the predominance ofstudents' contributions in the treatment classroom and those in the conventional classroom. It is concluded that the students' actively participation in classroom are greatly dependent on their learning abilities. It is however recommended that the Mathematics educators should spring up wide publicity of the urgency or needs for the classroom conversation to be taken into cognisance while in the Mathematics classroom.

Keywords:*students' contributions, learning abilities, Mathematics education.*

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I. Introduction

"Mathematics is one of the basic educational materials that can effectively contribute to the development of the students' mathematical aspects, with the use of math language, symbols, words, forms and relationships to express and understand mathematical ideas" (Mes'ed, p. 13). What a student learns is mostly dependent on whom the student has as a teacher towards his or her classroom activities (Colvin & Johnson, 2007). Similarly, the teacher must be aware of what, when and how to manage the students at any particular time in the classroom and the readiness to develop the students' learningabilities. An effective teaching is determined by the ability to teach and communicate effective instruction as opposed to their age or course experience; this incident only adds to the growing mix of emotions towards being an educator. In the meantime, one can consequently relate the students' achievements to their mental ability by being subjected to test before engaging in the learning activities.

Research has shown that both the academic and the mental needs of children must ultimately be addressed so as to provide a benevolent academic experience within the scope of learning (Stornes& Bru, 2011). This has become a point of concentration for the students and their respective teacher while in the classroom. However, it is highly required for the students to survive solving problems in Mathematics through their mental ability as being implicated for the students' ability in the other course. The more the students increase in their mental ability, the better it becomes in their learning achievement.This is supported by Belhu (2017) that "any individual who is competent in mathematical sciences, can equally have the ability to do any other course" (p. 6). In effect, ability has to do with something that you are able to do with a particular mental or physical skill.

The focus of the teacher should be directed to achieving what can help the students to do better in every course of study. The teacher being the custodian of knowledge should able to differentiate every student level of cognitive ability while in the classroom. This would enable the teacher to know the students in their various categories. The categories which include low, average and high ability level should be tailored accordingly

when in the classroom. Indeed, the disparity in ability can be viewed as level of intelligence, knowing that intelligence is the ability to learn, understand and think about a given task.

Meanwhile, the students' contributions ought to complement their learning abilities in classroom activities. Taylor and Parsons (2011) aim at improving the students' engagement in the classroom that focuses on how to work in the area of the students' commitment that is seen to have grown in a number of ways which include change from focusing upon the disengagedstudents to the engaged students. The study concludes that change seems crucial and promises to organise how the study of the students' engagement will be carried out in the future.

However, the constructive pedagogies represent learning ability for identification of what has been learnt which is line with how Lam (2013) sees a learner as an important agent in the learning process.

On the other hand, the role of classroom interaction has been emphasised by Elbers (2003) that "Classroom interaction was valuable and fruitful because it required the participants to seriously consider many ideas. Challenged by their teachers or their schoolmates, students had to argue and account for their ideas" (p. 92). One can affirm from Elbers' findings that the students account for their ideas and become the master of the concepts of conversation in the classroom. Brodie (2007b) reveals that "when genuine participatory classrooms are created, they can be liberating and empowering for both teacher and learners" (p. 12) and similarly in the findings of Bruce (2007) he further states that:

"… teacher must model maths-talk so that students understand the norms of interaction in the maths classroom, encourage students to justify their solutions and build on one another's ideas and finally step aside as students' take increasing responsibility for sustaining and enriching interactions" (p. 2).

It is on this the researchers examined related literatures on students' contributions as implicative to their learning abilities. Brodie (2007a) investigates on teaching with conversations: beginnings and endings. She develops teaching approaches in many countries in order to support the students' conversations about their mathematical thinking and her analysis suggests that the ending conversations may be more difficult than beginning them. For instance, two teachers may successfully begin and maintain conversations but struggle to find the right moment and ways in which to end them. This suggests that the teacher-educators might want to work with the teachers on how to pull the threads of a conversation together to ensure successful resolution.

In the research study of Şahin-Dogruer, Işıksal, and Koç (2015), they explore on a fifth grade Mathematics classroom through observation for a period of sixteen weeks that involves twenty lesson hours in total. The analysis is based on the students' learning as the main category, which is further divided into two sub-categories, including content and learning. The findings reveal that despite the recent reform efforts in school Mathematics in Turkey, the teacher-centred instruction continues to be the dominating instructional method. Although the results do not meet the assumptions of discursive classroom at all, the study concludes through observing the classroom practices and argues that Mathematics teachers try to make connections between mathematical content and other disciplines where they try to give examples from real-world situations and encourage the students in that way.

In the research study of Taylor and Parsons (2011), they aim at improving the students' engagement in the classroom. The study focuses on how to work in the area of the students' commitment that is seen to have grown in a number of ways which include change from focusing upon the disengagedstudents to the engaged learners. The study concludes that change seems crucial and promises to organise how the study of the students' engagement will be carried out in the future.

II. Statement of the Problem

The discoveries of Charles-Ogan and George (2015) resolve that "there are Mathematics concepts that are difficult although the difficulty varies from concept to concept as perceived by students and that students are aware of the factors that can attribute to the concepts difficulty" (p. 73). However, various efforts have been put in place in order to ameliorate the difficulties. Such factors include different teaching strategies towards effective students' learning which have been explored. Hithertostudents'challenges emanate in the Mathematics discourse. The implication here is that the use of the various strategies has only been used to replace the conventional approach of teaching but not taking into account the students' contributions in the Mathematics classroom. Besides, researchers have worked on the effective outcome of classroom discourse towards students' learning achievementsand understanding concepts in the Mathematics classroom (Hand, 2012; Şahin-Dogruer, Işıksal, and Koç, 2015; Taylor and Parsons, 2011; Brodie, 2008).

Importantly, a good reflection of classroom conversation can only work if the teachers,while in the Mathematics classroom, take and consider the time to respond to the students' contributionsand also offering words of encouragement to the students (Taylor, 2017). It is against this contextual that the researcher explores the students' contributions as implicative to their learning abilities in secondary school Mathematics.

III. Purpose of the Study

The researcher explores the students' contributions as an implicative to their learning abilities in secondary school Mathematics. It is the belief of the researcher that the students' contributions in the Mathematics classroom have the potentials of providing a panacea for the students' learning abilities in Mathematics.

IV. Research Questions

i. What is the impact of the students' contributions in the Mathematics classroom?
ii. What is the difference in students' pretest and posttest in the Mathematics classroom?

V. Research Method

The researcher employs a mixed method, that is, the quantitative and qualitative approaches in the conduct of the study. As qualitative research, the researcher uses a case study tradition of research design as folklore for describing the students' contributions in the Mathematics classroom towards their learningabilities. While as quantitative research, it uses quasi-experimental research design of a pre-test and a post-test control group 2x3x2 factorial. Kuder- Richardson formula 21 (K-R, 21) method is used to determine the reliability of the instrument and the process returns reliability coefficients of 0.85 for the study.

The target population for the study consists of all the Senior Secondary Two (SS2) students in the public secondary schools in Lagos State. The study sample involves two non-equivalent classes of the Senior Secondary Two (SS2) students designated as the treatment and control groups of public schools in the Badagry Local Government Area, Agboju District V in Lagos State. Both classes are mixed with male and female students and comparable numbers of students (60 in the treatment group and 54 in the control group) randomly picked from the population.

VI. Results

Research question one: What is the impact of the students' contributions in the Mathematics classroom?
In this description of the students' contributions, an extract from one of the study transcripts of the treatment and control groups is examined as shown below. This extract is focused on the predominance of the students' contributions towards solving problems on Geometric Progression (GP) in Mathematics classroomof the treatment group are as follows:

TG-L2-U72 Teacher: We want someone else to come out again and explain it better, we want to hear it to be more audible, we want to hear you clearer. Okay, just explain and you speak louder.
TG-L2-C74 Bola: General formula for geometric progression is…
TG-L2-C75 Chorus: The nth term…
TG-L2-C76 Bola: The nth term is equal to a *times* r raise to power of n minus one. Our first term is one hundred and sixty-two, our second term is what?
TG-L2-C77 Chorus: Minus one hundred and eight.
TG-L2-C78 Bola: Our last term is what?
TG-L2-C79 Chorus: Minus twenty-one whole number, one over three.
TG-L2-C80 Bola: To get our common ratio, that is the second term divides first term, that is minus one hundred and eight divided by …
TG-L2-C81 Chorus: One *hundred and* sixty-two.
TG-L2-C82 Bola: Minus twenty-one whole number, one over three is the same as what?
TG-L2-C83 Chorus: Minus sixty-four.
TG-L2-C84 Bola: Over …
TG-L2-C85 Chorus: Three
TG-L2-C86 Bola: Minus one hundred and eight divided by one *hundred and* sixty-two is what?
TG-L2-C87 Chorus: Minus two over three.
TG-L2-C88 Bola: Our last term is equal to a *times* r raise to power of n minus one. What is our last term?
TG-L2-C89 Chorus: Minus twenty-one whole number, one over three.
TG-L2-C90 Bola: What is our a?
TG-L2-C91 Chorus: One *hundred and* sixty-two.
TG-L2-C92 Bola: r?
TG-L2-C93 Chorus: *Open bracket* minus two over three, *close bracket,* raise to power of n minus one.
TG-L2-C94 Bola: Minus twenty-one times three.
TG-L2-C95 Students: Minus sixty-three
TG-L2-C96 Bola: Plus one

TG-L2-C97 Chorus: Minus sixty-four
TG-L2-C98 Bola: Over three is equal to one hundred and sixty-two times into bracket minus two over three close bracket raise to power n minus one. Bring this to other side, it would be division because this is multiplication here. This is stand alone, minus sixty-four over three divided by one *hundred and* sixty-two, did you understand?
TG-L2-C99 Chorus: Yes
TG-L2-C100 Bola: Equal to *open bracket* minus two over three, *close bracket* raises to power of n minus one, three times one *hundred and* sixty-two is what?
TG-L2-C101 Students: *Silence*
TG-L2-C102 Bola: One *hundred and* sixty-two.
TG-L2-C103 Chorus: Four *hundred and* eight-six
TG-L2-C104 Bola: You change to lowest term, by saying two times minus thirty-two, in four *hundred and* eight-six, this is it, you will now equate it to *Open bracket* minus two over three, *close bracket* raises to power of n minus one, did you understand?
TG-L2-C105 Chorus: Yes.
TG-L2-C106 Bola: Now, this is in index form, when you multiply two in five places you get thirty-two. Try it on your calculator first, have you try it?
TG-L2-C107 Chorus: Yes
TG-L2-C108 Bola: Three raises to power five to give us what?
TG-L2-C109 Chorus: Two *hundred and* forty-three
TG-L2-C110 Bola: *Open bracket* minus two over three, *close bracket* raises to power of n minus one, so you can bring this together in one bracket just like saying $[(-2/3)^5]$,abi?
TG-L2-C111 Chorus: Yes
TG-L2-C112 Bola: Equals *Open bracket* minus two over three, *close bracket* raises to power of n minus one, this will cancel this because they are the same thing, number of indices will give us two raise to power of x is equal to two raise to power of two, two will cancel two, that is the same thing that apply here $[(-2/3)^5 = (-2/3)^{n-1}]$, so, five is equal to n minus one, collect like terms, n is equal to five plus one, and n is equal to six.
TG-L2-U73 Teacher: Let clap for her

It is indicated from the extract above that the students' contributions is being mostly characterised with students-centred approach. This helps the students to be bold in their contributions in Mathematics classroom. By so doing, the teacher receives a good feedback from the students and that prompts the teacher to do more impacting knowledge during the classroom conversation. On the other hand, the researchers also reflect on the control group extract and looks at the predominance of the students' contributions in one of the transcripts from control group are as follows:
CG-L2-U77 Teacher: A GP has eight terms. Its first and last terms are zero point three and thirty-eight point four. Calculate the common ratio.
CG-L2-C73 Students: *Silence mood in solving the class work.* .
CG-L2-U78 Teacher: Now, correction.
CG-L2-C74 Students: *Silence*
CG-L2-U79 Teacher: If you are having problem with decimal, change it to what?
CG-L2-C75 Students: *Silence*
CG-L2-U80 Teacher: Fraction. Question say, GP has ……
CG-L2-C76 Students: *Silence*
CG-L2-U81 Teacher: Number of term equal to eight, a is three over ten, zero point three all over value for fraction, would give you what?
CG-L2-C77 Chorus: Three over ten.
CG-L2-U82 Teacher: How did you get that?
CG-L2-C78 Students: *Silence*
CG-L2-U83 Teacher: Zero point three all over ten that will give you three over ten, then the last will give you … we have thirty-eight point what? Thirty-eight point four. That is thirty-eight whole number four over ten. Which will give you two here two …, two in ten …, five. L is equal to r. Thirty-eight whole number, two over five. We are looking for r. Thirty-eight whole number, two over five equal to three over ten times r raise to power eight minus one. That gives you three over ten times r raise to power seven. We can change this *(38 2/5)* to what?
CG-L2-C79 Students: *Silence*
CG-L2-U84 Teacher: Improper …
CG-L2-C80 Chorus: Fraction
CG-L2-U85 Teacher: Three times eight, give you … five times eight… give you what?

CG-L2-C81 Students: *Silence*
CG-L2-U86 Teacher: Forty. Five times three… Fifteen plus four.
CG-L2-C82 Chorus: Nineteen.
CG-L2-U87 Teacher: Ehm .. One hundred and ninety over …? plus two …, One hundred and ninety-two over five. To divide the both side…, to get rid of this. So, that we can have the r, divide the both side by what?
CG-L2-C83 Students: *Silence*
CG-L2-U88 Teacher: Three over ten. One hundred and ninety-two over five divided by three over ten that will give r raise to power seven. One hundred and ninety-two over five times ten over three equal to r raise to power seven. Five here two …, Five here two…, three here one, three in nineteen …, six and in twelve …, four. What can go again? hmm …
CG-L2-C84 Chorus: Two.
CG-L2-U89 Teacher: Ehm …nothing.
CG-L2-C85 Chorus: Nothing
CG-L2-U90 Teacher: Nothing. Sixty-four times two is …
CG-L2-C86 Chorus: One hundred and twenty-eight.
CG-L2-U91 Teacher: One … what?
CG-L2-C87 Chorus: One hundred and twenty-eight.
CG-L2-U92 Teacher: r raises to power seven is equal to one hundred and twenty-eight. So …, so …our r is the highest, r raises to power seven.
CG-L2-C88 Chorus: R raise to power seven …, r raises to power seven …
CG-L2-U93 Teacher: Is equal to … who is that person?
CG-L2-C89 Students: *Silence*
CG-L2-U94 Teacher: Is equal to one hundred and twenty-eight. This give us two raise to power what?
CG-L2-C90 Chorus: Seven.
CG-L2-U95 Teacher: Two raise to power seven. Since the power are equal, you equate the what?
CG-L2-C91 Chorus: The base.
CG-L2-U96 Teacher: So, our r is equal to …
CG-L2-C92 Chorus: Two.
CG-L2-U97 Teacher: R is equal to two.
CG-L2-C93 Students: *Silence*

It is indicated from the extract above that the students' contributions is being low as the teacher does most activities in the classroom which characterised with teacher-centred approach. By so doing, the teacher receives a very low feedback from the students.

Research question two: What is the difference in students' pretest and posttest in the Mathematics classroom?
In the consideration of this question, the data on the learning achievements in the Mathematics classroom of the two groups are collated and analysed. The data is generated from the administration of a pretest and a posttest. It is important to recall that there are 60 students in the treatment group and 54 students in the control group. A summary of the results of these students in both the pretest and the posttest is presented in the figures 1 and 2 below.

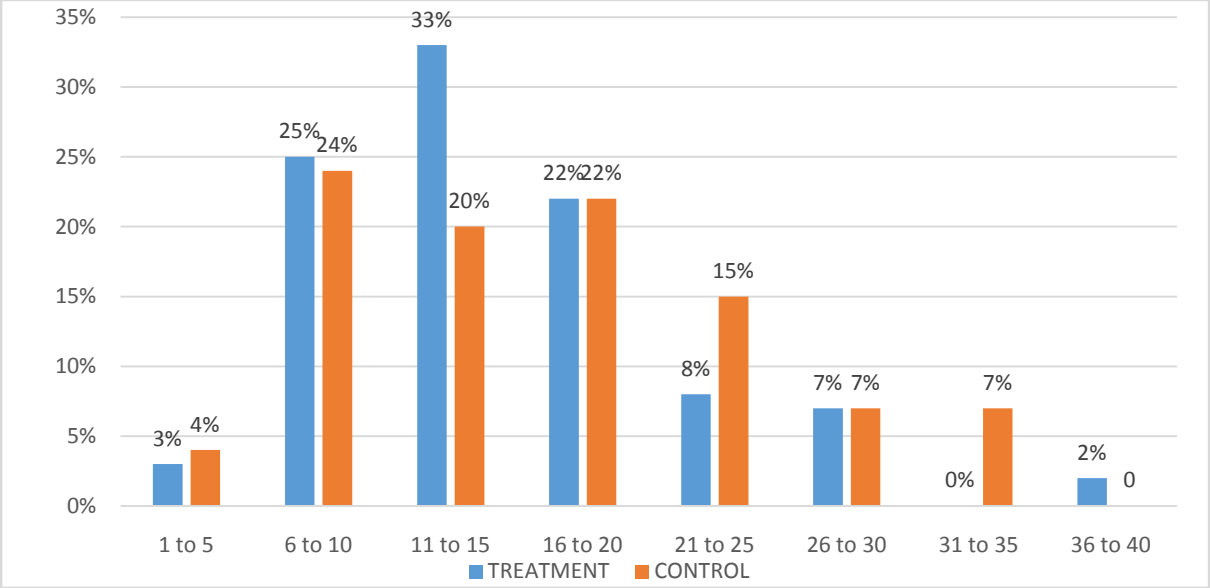

Figure 1: Distribution of the students' pretest scores

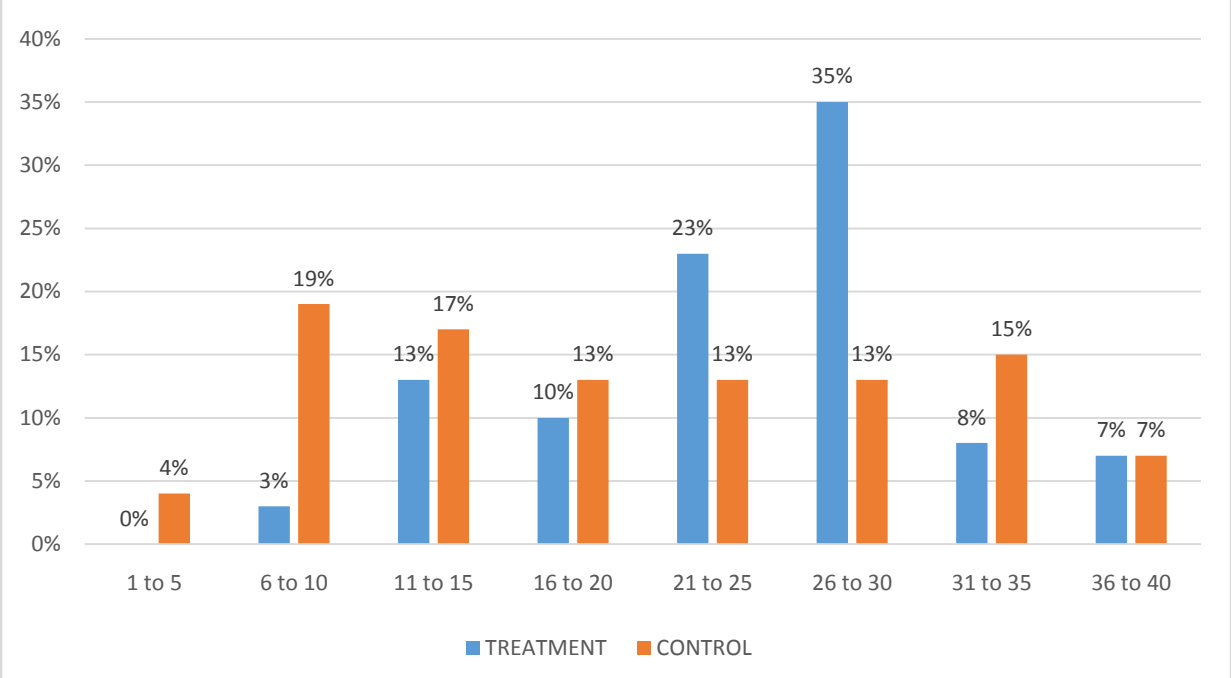

Figure 2: Distribution of the students' posttest scores

After a critical look at the figures 1 and 2 above, there is evidence that the students in the treatment group show a more improved performance in the posttest than those in the control group. It is noteworthy that a significant difference occurs within the scores of the pretest and the posttest in the treatment and control groups. Meanwhile, the table 1 below shows the descriptive statistics of the pretest and the posttest in the treatment and control groups as shown below:

Table 1: Description of the group performances in the pretest and the posttest

Index	Statistics in the Pretest		Statistics in the Posttest	
	Treatment	Control	Treatment	Control
Mean	14.60	16.59	24.02	20.52
SD	6.76	8.09	7.69	10.18
Maximum	37.00	35.00	38.00	38.00
Minimum	4.00	3.00	6.00	5.00

Range	33.00	32.00	32.00	33.00
Variance	45.67	65.45	59.20	103.58

The analysis of table 1 shows that the mean value of the treatment group for the posttest value is 24.02 higher than the pretest value of 14.60. A similar trend is observed in the standard deviation value of the treatment group with the posttest value of 7.69 which is greater than the pretest value of 6.76. The analysis of the pretest and the posttest in this study allows the researcher to expatiate more on the students' learning achievements and how the two tests are distributed in the treatment and control groups.

VII. Discussion of Findings

The findings of this study reveal differences between the students' contributions in the treatmentgroup and those in the control group. The students' contributions in the treatment group are predominantly over those in the control group which is implicated to their learning abilities. Thefindings indicated that the students' in the treatment group performed better than those in the control group in termsof pretest and posttest results of the study. This is in line with Afthina, Mardiyana & Pramudya (2017) that see the effective of teaching strategies on students' ability levels towards their Mathematics achievements.

VIII. Conclusion

The study explores the students' contributions as implicative to their learning abilities in secondary school Mathematics. From the findings of this study, it is concluded that the students' contributions is highly effective in thetreatment classroom than in the conventional classroom and it is implicated towards their learning abilities.

IX. Recommendations

In consideration of the findings of this study, the following recommendations towards improvement are made:

i. Education districts, schools, teachers and future researchers could benefit from this study and continue building on this research.
ii. Mathematics educators should spring up wide publicity of the urgency or needs for the classroom conversation to be taken into cognisance in the classroom.
iii. There is need to often organise seminars or workshops in training the teachers on the contemporary concepts in teaching and learning Mathematics.
iv. Professional associations like the Mathematical Association of Nigeria (MAN) should popularise the classroom conversation.

References

[1]. Accelerating Learning in Mathematics, ALIM. (2012). Helping Students to Participate in Learning Conversations. Accessed from http://nzmaths.co.nz/accelerating-learning. New Zealand Ministry of Education
[2]. Anthony, G. &Walshaw, M. (2007). Effective Pedagogy in Mathematics/Pāngarau: Best Evidence Synthesis Iteration [BES]. Wellington: Ministry of Education.
[3]. Baldinger, E., & Louie, N. (2014). TRU Math conversation guide: A tool for teacher learning and growth.
[4]. Berger, M. & Bowie, L. (2012). A Course on Functions for In-Service Mathematics Teachers: Changing Teachers' Discourse. Proceeding of Twentieth Annual Meeting of the Southern African Association for Research in Mathematics, Science and Technology Education.
[5]. Brodie, K. (2004). Working with Learner Contributions: Coding Teacher Responses. In D. E. McDougall & J. A. Ross (Eds.), Proceedings of the 26th Annual meeting of the Psychology of Mathematics Education (North America), Volume 2 (pp. 689-697). Toronto: OISE/UT.
[6]. Brodie, K. (2007), Teaching with conversations: Beginnings and endings. For the Learning of Mathematics 27, 1. FLM Publishing Association, Edmonton, Alberta, Canada
[7]. Brodie, K. (2008) Describing Teacher Change: Interactions between teacher moves and Learner contributions. In J..F. Matos, P. Valero & K. Yasukawa (Eds.). Proceedings of the Fifth International Mathematics Education and Society Conference. Lisbon.
[8]. Chauraya, M. & Brodie, K. (2018) Conversations in a professional learning community: An analysis of teacher learning opportunities in mathematics. Pythagoras - Journal of the Association for Mathematics Education of South Africa
[9]. Chitera, N., Kufaine N, Jumbe G. &Nhlema A. (2012). Local Languages and Mathematical Discourse: What Type? Proceeding of Twentieth Annual Meeting of the Southern African Association for Research in Mathematics, Science and Technology Education.
[10]. Fosnot, C. T. (2005). Constructivism revisited: Implications and reflections. The Constructivist, 16(1).
[11]. Hand, V. (2012). Book Review: Adding depth to portraits of mathematical inquiry. Teaching mathematical reasoning in secondary school classrooms conducted by Brodie (2010) Educ Stud Math (2012) 79:149–155. DOI 10.1007/s10649-011-9344-z
[12]. Hiebert, J. (2003). Signposts for teaching mathematics through problem-solving. In Teaching Mathematics through problem solving: Pre-kindergarten Grade 6 Reston, VA: NCTM
[13]. Şahin-Doğruer, Ş., Işıksal, M. &Koç, Y (2015). A Case Study on Mathematical Classroom Discourse in a Fifth Grade Classroom. Gaziantep University Journal of Social Sciences (http://jss.gantep.edu.tr) 14(1):299-322 ISSN: 1303-0094
[14]. Sfard, A. (2008). Thinking as Communicating: Human Development, the growth of discourses, and mathematising. New York: Cambridge
[15]. Sharma, S. (2013). Qualitative Approaches in Mathematics Education Research: Challenges and Possible Solutions, Education Journal. Vol. 2, No. 2, pp.50-57. doi: 10.11648/j.edu.20130202.14
[16]. Taylor, S. R. (2017). Successful teacher practices for reducing Mathematics anxiety in secondary students

[17]. Taylor, L. & Parsons, J. (2011). Improving Student Engagement. Current Issues in Education, 14(1). Retrieved from http://cie.asu.edu/
[18]. Berger, M. & Bowie, L. (2012). A Course on Functions for In-Service Mathematics Teachers: Changing Teachers' Discourse. Proceeding of Twentieth Annual Meeting of the Southern African Association for Research in Mathematics, Science and Technology Education.
[19]. Brodie, K. (2004). Working with Learner Contributions: Coding Teacher Responses. In D. E. McDougall & J. A. Ross (Eds.), Proceedings of the 26th Annual meeting of the Psychology of Mathematics Education (North America), Volume 2 (pp. 689-697). Toronto: OISE/UT.
[20]. Brodie, K. (2007), Teaching with conversations: Beginnings and endings. For the Learning of Mathematics 27, 1. FLM Publishing Association, Edmonton, Alberta, Canada
[21]. Brodie, K. (2008) Describing Teacher Change: Interactions between teacher moves and Learner contributions. In J..F. Matos, P. Valero & K. Yasukawa (Eds.). Proceedings of the Fifth International Mathematics Education and Society Conference. Lisbon.
[22]. Chauraya, M. & Brodie, K. (2018) Conversations in a professional learning community: An analysis of teacher learning opportunities in mathematics.Pythagoras - Journal of the Association for Mathematics Education of South Africa
[23]. Chitera, N., Kufaine N, Jumbe G. &Nhlema A. (2012). Local Languages and Mathematical Discourse: What Type? Proceeding of Twentieth Annual Meeting of the Southern African Association for Research in Mathematics, Science and Technology Education.
[24]. Jensen, J. L. (2017). Teachers' use of reasoning-based questions in procedural and conceptual lessons." PhD (Doctor of Philosophy) thesis, University of Iowa.
[25]. Lobato, J. Clarke, D & Ellis, A. B. (2005). Initiating and Eliciting in Teaching: A Reformulation of Telling. Journal for Research in Mathematics Education. Vol. 36, No. 2, 101–136
[26]. McAninch, M. J. (2015). A qualitative study of secondary mathematics teachers' questioning, responses, and perceived influences. PhD (Doctor of Philosophy) thesis, University of Iowa, 2015.
[27]. Ontario Ministry of Education (2011). Student Achievement Division to support leadership and instructional effectiveness in Ontario schools, Capacity Building Series. www.edu.gov.on.ca/eng/literacynumeracy/inspire/
[28]. Pantaleo, S. (2007). Inter thinking: Young children using language to think collectively during interactive read-alouds. Early Childhood Education ,34(6), 439–447.
[29]. Sofyan, R. R. & Mahmud, M. (2018). Teacher Talk in Classroom Interaction: https://www.researchgate.net/publication/326168011
[30]. Sfard, A. (2008). Thinking as Communicating: Human Development, the growth of discourses, and mathematising. New York: Cambridge
[31]. Taylor, S. R. (2017). Successful teacher practices for reducing Mathematics anxiety in secondary students
[32]. Wells, G. (2007). Semiotic mediation, dialogue and the construction of knowledge. Human Development ,50, 244–274.
[33]. Yeulet, C. (2010). Mathematics Teaching in the middle school. National Council of Teachers of Mathematics (NCTM).