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Students' Classroom Participation During Mathematics and Its Effect on Their Analytical Skills in Problem-Solving in Secondary Schools in Fako Division, South West Region of Cameroon

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ABSTRACT

In today's scientific and technological age, for any nation to meet up with the current global challenges, it needs to consider the study of mathematics very seriously. This makes mathematics very pivotal in reshaping the future and students' attitude towards mathematics an area of concern. Cameroon needs graduates with advanced mathematics skills to promote innovation, data synthesis, and technology if it is to solve challenging problems and be competitive in the global scenario. This study examined students' classroom participation during mathematics and its effect on their analytical skills in problem- solving in secondary schools in Fako Division, South West Region of Cameroon. The objective is to determine if students' classroom participation during mathematics has an effect on their analytical skills in problem-solving. The mixed research methodology with convergent parallel design was used. The target population comprised 6350 form five students from secondary schools in Fako Division. The accessible population was made up of 1036 students and the sample size of the study was made of 512 form five students from six colleges using the random sampling technique. There were also 26 teachers and 6 Heads of Mathematics Department. Data was collected using questionnaire and interview guide. Instruments were validated and the reliability coefficients gave satisfactory values of 0.75 and 0.743 for students' and teachers' questionnaire respectively. The statistical analyses and findings reveal that students' classroom participation during mathematics has a positive correlation with their analytical skills in problem-solving. It was recommended that: (1) problem-solving should be part of each curricular unit and begin in kindergarten; (2) the Cameroon government should employ more teachers with qualification in mathematics to teach mathematics and problem-solving in our secondary schools and sanction schools that employ teachers to teach mathematics without a qualification in mathematics; (3) teachers should cultivate students' interest in mathematics as early as possible. Varying classroom instruction practices could be a remedy to enhance students' understanding, achievement, and motivation in learning mathematics.

KEYWORDS: mathematics, attitude, participation, problem-solving, computational, numerical, analytical, skills

Introduction

Attitudes are acquired through learning and can be changed through persuasion using variety of techniques. Attitudes once established, help to shape the experiences the individual has with object, subject or person (Awandia, 2015). Although altitude changes gradually, people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences. Formation of attitudes towards academic subject matter are thought to develop through: the automisation of a repeated emotional reaction to the subject and the transference of an existing attitude to a new but related task (Mcleod, 1992). Formation of academic attitudes has been identified as a complex process involving socialisation, relationships with teachers, teacher attitudes and aspects of the subject matter itself (Taylor, 1992).

Neale (1969) defined attitude toward mathematics as an aggregated measure of "a liking or disliking of mathematics, a tendency to engage in or avoid mathematics activities, a belief that one is good or bad at mathematics and a belief that mathematics is useful or useless" (p.632). Generally, a positive attitude towards mathematics (as well as any other subject) is valued for the following reasons: a positive attitude is an important school outcome in and of itself, attitude is often positively, although slightly, related to achievement, a positive attitude towards mathematics may increase one's tendency to select mathematics courses in high school and college and possibly one's tendency to select careers in mathematics or mathematics related fields. Negative attitudes towards mathematics can be caused by bad experiences of mathematics, mathematics anxiety, a lack of support from adults amongst others. Students are often not confident in their understanding of basic concepts and they also do not see the everyday relevance or value of mathematics. Many have had memories of school mathematics and this continue to influence how they feel about mathematics throughout their adult lives. More so, mathematics makes some people feel anxious, leaving them to avoid situations where they may have to use mathematics (Chinn, 2012). Those who are already out of school and have little or no mathematical skills, may feel as though it is too late to improve and do not know where to go for support. In their frustration, they may adopt a position which is anti-numeracy. Changes in attitude toward mathematics involve a complex interaction among student and teacher characteristics, course content, method of instruction, instructional materials, parental and peer support, and methods of measuring these changes.

Laney (2019) asserts that, for every student who looks forward to the next mathematics lesson, there is another who feels confused and defeated. One student might not like mathematics because they think the subject is not useful and may not participate in class, while another dislikes it because they doubt their own ability to succeed. Participation is a student attitudinal construct. Traditionally, mathematics courses are not heralded as participation courses. Many students come to their mathematics classes expecting simply to listen or at most take notes rather than to actively participate. Typically, they are rarely called upon to answer questions that have been asked by the professor. Robinson (2005) of Seattle University believes that students learn better when they are actively engaged in the lecture. Students who ask and answer questions related to the lesson show active participation in the classroom. When students contribute to class discussions by sharing their ideas and thoughts, they show engagement in the lesson. If students complete their assignments and show a willingness to learn new techniques and solve mathematical problems then they show enthusiasm and readiness to participate. Students who provide

feedback to their classmates' mathematical work and offer suggestions for improvement show an understanding of the topic and a willingness to help others. When students communicate and collaborate effectively with their group work, they show that they are actively participating in the learning process. Students who demonstrate positive classroom behaviour such as taking turns, waiting for their turn to speak and not interrupting others show an eagerness and willingness to participate. In the online environment, the initial measurement of participation in asynchronous classes might be with pages visited, tools used, messages accessed, discussions posted, and email contacts (Coldwell et al. 2008) as cited in (Bekkering & Ward, 2021).

Statement of the problem

Student participation while in class and attendance are predictors of student performance. Class participation is becoming more important than pure class attendance alone (Bŭchele, 2020). Lack of classroom participation during mathematics lessons can have significant consequences for students. When students do not participate during mathematics lesson, they may develop negative attitude towards the subject. Negative attitude from students towards mathematics could lead to low intake/dwindling enrolment of students in mathematics or mathematics related disciplines in tertiary education. This may also lead to fewer professional mathematicians. There are far too many schools than teachers with a degree/ diploma in mathematics. Thus, those who teach mathematics in our schools especially lay-private schools may not have a qualification in mathematics. Such teachers may not have a mastery of what they teach and in the long run can cause potential mathematics majors to fall off from the mathematics train. The implication is that there will be a "swing away from science" caused by a "drift away from mathematics". Worse still, the country in the near future will have a dearth of qualified personnel in the critical skills area of the country. Cameroon needs graduates with advanced mathematical skills to promote innovation, data synthesis and technology if it is to solve challenging problems and be competitive in the global scenario by 2035. But this cannot be the case if students do not participate during mathematics lessons, lack excellent problem-solving skills and do not exhibit the right attitude towards mathematics. This study attempts to provide a solution.

Objective(s) of the study

The study sought to determine if students' classroom participation during mathematics has an effect on their analytical skills in problem-solving.

Review of Related Literature

Problems represent gaps between where one is and where one wishes to be, or between what one knows and what one wishes to know. Problem-solving is thus the process of closing these gaps by finding missing information, re-evaluating what is already known or, in some cases redefining the problem (McGraw Hill, 1997). Problem-solving skills are skills students need to function properly in and beyond the mathematics classroom. Students "need to develop a sense of number that enables them to recognize relationships between quantities, to use the operations of addition, subtraction, multiplication and division to obtain numerical information, to understand how the operations are related to one another, to be able to approximate and estimate when appropriate and to be able to apply their understanding to problem situations" (Burns 2007, p.157) in (Switzer, 2010). Rogers et al. in their 2021 article titled "Encouraging student participation in mathematical activities in synchronous online tuition, investigated

student participation in three types of activity: solving mathematical problems via polling, on-screen activities on a shared whiteboard and text-chat during online undergraduate mathematics tutorial. Data were collected from tutorial observations, student and tutor surveys, semi- structured student interviews and a tutor focus group. Results showed high participation in all types of activity. Students also perceived them as enjoyable and aiding their learning although with some differences between the types of activity such as those done by text-chat being slightly less well received. Thus, active learning in mathematics can lead to deeper understanding than passively listening to a lecture. Jones et al. (2008) carried out a study in Wales on students' participation in post-16 mathematics: a perspective from students in Wales. Their work was an investigation into the factors influencing students' participation in Advanced Subsidiary (AS-Level) mathematics within the Welsh secondary schooling system. They considered tendencies in girls' and boys' attitudes towards mathematics in Wales which may affect their participation in the subject. Closed questionnaires were used to gather data from 375 year 12 (age 16/17) students from 14 schools in Wales. Results show that anxiety about, confidence in and enjoyment of mathematics are all significant factors on students' mathematics AS-LEVEL choices, with gender stereotypical career aspirations also being a determining influence on students' subject preferences. The research demonstrates that girls are more inclined to want to opt out of mathematics at year 9 compared to the boys. National statistics for Wales illustrate that considerably fewer females choose to study mathematics at AS-Level.

The National Council of Teachers of Mathematics (NCTM) argued that problem-solving should become the "the focus of mathematics in school" (1989, p.6). According to NCTM (1989, 1991), centering mathematics instruction around problem-solving can help all students learn key concepts and skills within motivating contexts. The use of open, contextualized problems seems sensible at many levels. Instead of having students complete meaningless exercises and memorize what the teacher tells them, why not have students learn key mathematical ideas while solving interesting problems? Any good mathematics teacher would be quick to point out that student's success or failure in solving a problem often is as much a matter of self-confidence, motivation, perseverance and many other non-cognitive traits, as the mathematical knowledge they possess. An individual's failure to solve a problem successfully when the individual possesses the necessary knowledge stems from the presence of non-cognitive and meta cognitive factors that inhibit the appropriate utilization of this knowledge. These factors are of at least four types: affects and attitudes, beliefs, control and contextual factors (Garfola et al., 1985). Classroom activities designed to develop problem-solving ability include: Teacher-student planning; effective discussion procedures; effective procedures for presenting data for group consideration; and cooperative organization for group activity. However, a classroom that is organized around significant problems cannot limit its activities to studying the textbook and listening to lectures. Its source of information must include whatever will lead to the understanding of current problems. Peer interaction can foster cognitive development by allowing children to acquire new skills and restructure their ideas through discussion. Having a partner can increase the amount of time students' work on a task. However, collaborative contexts can facilitate children's acquisition of skills because partners often bring different skills to the task.

Analytical skills refer to the ability to collect and analyze information, problem-solve and make decisions. Analytical skills consist of categories that include logical reasoning, critical thinking, communication, research, data analysis and creativity. Analytical skills come to play when detecting patterns, brainstorming, observing, interpreting data, integrating new information, theorizing, and

making decisions based on multiple factors and options available. Analytical capabilities indicate that you are able to consider your next step, solve complex problems, find creative answers, and make smart decisions. This explains why they are essential in business life. Analytical problem-solving skills involve reasoning with facts and logic, focusing on critical thinking, analytical reasoning, and creative solutions. Employers seek individuals who can evaluate information, analyse data, draw conclusions and consider alternative viewpoints. These skills are crucial for resolving complex issues efficiently and making well-thought –out decisions. Analytical problem-solving entails defining problems clearly, scoping their boundaries, and applying a systematic approach to identify patterns and formulate hypotheses. It requires a blend of analytical, critical and creative thinking to address challenges effectively in various contexts, from academic to professional settings. Ultimately, the ability to analyze situations, think logically, take initiative, and persist in finding solutions is highly valued by employers seeking individuals with strong analytical problem-solving skills. Alan Schoenfeld in his 1980 article Teaching Problem-Solving Skills published by Taylor and Francis on behalf of the Mathematical Association of America attempted to find out whether teaching problem-solving strategies to students makes a difference sometimes.

His small sample of 7 yielded a statistically significant difference in pre-test to post-test gains; each of the four "heuristics" students outscored the 3 non-heuristic students, a one –in 35 chances. But, more important, the transcripts of the solutions showed that explicit use of the strategies accounted for the difference between the two groups.

Materials and method

The researcher used the mixed-research method that involves both quantitative and qualitative research methods. We made use of the convergent parallel design. This design is used when the researcher collects and analyzes both quantitative and qualitative data simultaneously during the same phase of research process, keeping the methods independent and then merging the results into an overall interpretation. The accessible population was made up of 1036 students and the sample size of the study was made of 512 form five students from six colleges using the random sampling technique. There were also 26 teachers and 6 Heads of Mathematics Department**.** The questionnaire was administered to 512 form five students of the six selected secondary schools in Fako Division. Simple random sampling technique was used to select the respondents who took part in the research from the six schools. A questionnaire was constructed based on the objective(s) of the study. The 4-point Likert scale type scale was used to construct the questionnaire items with each item having four options (Strongly Agree, SA = 4; Agree, A=3; Disagree, D=2; and Strongly Disagree, SD=1). The questionnaire was validated both face wise and content wise. The direct delivery technique was used to administer the questionnaire. In each school, permission was obtained from the Vice Principal who delegated the Dean of Studies or the Head of Mathematics Department to assist in the effective administration of the instrument. Students were met in class and were reminded of the anonymity of their responses, the objectivity and sincerity while filling the questionnaires. They were also advised to work independently. All the necessary explanations concerning the questionnaire were made to the respondents at the beginning of the exercise. The respondents were then given enough time to fill their copies, after which they were collected, giving a return rate of 100%. The statistical method that was used to analyze the data for the study was descriptive statistics and Pearson Product Moment Correlation to test the Hypothesis.

Findings and Discussion

Research Question: How does students' classroom participation during mathematics influence their analytical skills in problem-solving?

Table 1: Thematic Presentation of Students' Responses to Open Ended Questionnaire Questions on What They do When Stuck on Something in Mathematics in Relation to Classroom Participation During Mathematics

Code	Code Description	Grounding	Sample Quotations
Questions	Asking questions during lessons	15	"Many students do not ask questions in class because they are scared of the crowd".
Teachers' attitude	Teachers attitude towards mathematics and in teaching mathematics	20	"He just teaches and leaves". "He keeps giving notes. He just talks and go forward by himself".
Absence	Some students stay away from mathematics classes or are absent minded in class	8	"Many students are not patient enough in mathematics". "There are some students who are not serious in any subject".
Better Explanation	More explanation than giving notes by teachers as to foster understanding	5	"He uses simple language and practical examples for better understanding". "the teacher makes teaching livelier to capture students".
Technology	Using technology to study	6	"the teacher promotes power point presentations". "He introduced the projector system of teaching to us".
Related class material	Seeking inspiration from related class material or taking a break to refresh your mind	18	"I stay motivated". "I set time limits for challenging problems".

Table 1 above and Table 2 below bring out some salient points provided by students and teachers on what students do when stuck on something in mathematics in relation to their classroom participation during mathematics. Amongst them are the following: Asking questions during lessons, teachers' attitude towards mathematics and in teaching mathematics, students staying away from class or being absent minded in class, using technology to study, seeking inspiration from related class material or taking a break to refresh the mind. They also pointed out that the use of simple language and practical examples as well as repeating a concept many times enhances the students' understanding.

Table 2 Thematic Presentation of Teachers' Responses to Open Ended Questionnaire Questions on What Students do When Stuck on Something in Mathematics in Relation to Classroom Participation During Mathematics

Code	Code Description	Grounding	Sample Quotations
Questions	Asking questions during lessons	1	"How did you arrive at that result, sir?".
Teachers' attitude	Teachers attitude towards mathematics and in teaching mathematics	2	"He gives us room to express our views". "He encourages us to make statement when solving".
Absence	Some students stay away from mathematics classes or are absent minded in class	3	"Many students are not patient enough in mathematics". "There are some students who are not serious in any subject".
Repetition	More explanation than giving notes by teachers as to foster understanding	5	"He modifies solved examples in class". "He explains a concept about ten times only to make us understand and at times we still do not understand".
Technology	Using technology to study	2	"This does not help my understanding of mathematics".
Related class material	Seeking inspiration from related class material or taking a break to refresh your mind	2	"I take a break, then get to think of it, after which I apply reasoning to solve it

Views obtained from interviews with Head of Mathematics Department on Students' classroom participation during Mathematics

One of the six respondents said without students' participation in class, it will be difficult to identify where their challenges are, except when there is an evaluation. This might be dangerous because they may not have time to take the evaluation again. 3 out of 6 Heads of Department said they always encourage students to participate in class. We make our students to know that people are not just serious because seriousness is profitable, people are serious because of their vision, one of the three said. So, given that you have envisaged that your career will be around medicine, technology, engineering or accountancy, we guide you on what you need to achieve your dream career. We start telling them as early as form 1to take this subject or that subject seriously and by the time they get to form five and high school they become not just students who do not struggle with the subject again, but these are students who already know where they are going to and they know what it takes in order for them to get to their

destination. Such students will always participate actively in class. This early orientation should always be there to awaken their seriousness. All the Heads of Department agreed that there is a need for the teacher to state the importance or connection of a topic to real life or certain professions, as this will boost class participation.

Inferential Statistics for classroom participation during Mathematics

The independent variable for the research hypothesis is students' classroom participation during mathematics, while the dependent variable is analytical skills of students in problem-solving in secondary schools of the South West Region. The scores of the independent variable were obtained from the responses recorded from the eight items of a four-point Likert scale questionnaire that measured students' classroom participation during mathematics. The scores of the dependent variable were obtained from the eight items of a four-point Likert scale questionnaire that measured the analytical skills of students in problem-solving in secondary schools of the South West Region. The statistical analysis technique used in this analysis is the Pearson Product Moment Correlation. The result of the analysis is presented on table 3.

Table 3 Pearson Product Moment Correlation Analysis of the Relationship Between Students' Classroom Participation During Mathematics and their Analytical Skills in Problem-Solving

		Problem-solving skills " Analytical"
Students' classroom participation during mathematics	Pearson's Correlation	.228**
	Sig,(2-tailed)	.000
	N	512

**. Correlation is significant at the 0.01 level (2-tailed)

SPSS reports a correlation coefficient of 0.228** with a p-value (two-tailed statistical significance) less than 0.001 based on 512 pairs of observations. It indicates a positive correlation between students' classroom participation during mathematics and their analytical skills in problem solving. Also, the correlation is significant because it has a p-value less than 0.05. Pearson 's correlation attempts to draw a line of best fit through the data of two variables, and the Pearson's correlation coefficient r, indicates how far away all these data points are from the line of best fit, that is, how well the data points fit this model/line of best fit. An r value of 0.228** indicates a linear relationship between the two variables being analyzed and also a slight positive trend between students' classroom participation during mathematics and their analytical skills in problem-solving. A positive correlation ($r > 0$) signifies that as one variable increases, the other tends to increase as well, showing a direct relationship. Thus, as students' classroom participation during mathematics increases, their analytical skills in problem-solving get better.

To determine whether there is a significant influence of classroom participation during mathematics on analytical skills in problem-solving, we perform a testing of statistical hypothesis as follows:

$$H_0: \rho = 0 \quad \text{and} \quad H_a: \rho \neq 0$$

A test carried out using SPSS 23.0 with the testing criteria as follows:

H_o is rejected if sig.(2-tailed) < 0.05 or if sig.(2-tailed) ≥ 0.05. In table 3 above, it is shown that a sig.(2-tailed) value of the Pearson correlation coefficient is equal to 0.228** and based on the testing H_o is

rejected. We retain H_a and conclude that there is a significant correlation between students' classroom participation during mathematics and analytical skills in problem-solving.

The findings reveal that students' classroom participation during mathematics has a positive influence on their analytical skills in problem-solving. This means that a high rate of classroom participation will lead to a high rate of analytical skills in problem-solving. This is a call for mathematics teachers to make the lessons livelier to capture students. These findings agree with that of Marta et al. (2004). In their study, participation in the mathematics classroom: Does every student have a chance?, they found out that the acquisition of concepts and skills is not enough in the process of becoming a mathematics learner. There also needs to be an active participation in the reconstruction of a specific kind of discourse. This research solidifies the trustworthiness of the findings of Rogers (2021). She investigated student participation in three types of activity: solving mathematical problems via polling, on-screen activities on a shared whiteboard and text-chat during online undergraduate mathematics tutorial. Results showed high participation in all types of activity. Students also perceived them as enjoyable and aiding their learning although with some differences between the type of activity. Our research findings did not align with that of Mesa (2010) who studied student participation in mathematics lessons taught by seven successful community college instructors and found high levels of student participation coupled with low complexity, which can result in detrimental opportunities for students to learn mathematics. This paradox is because her focus was on teachers and she concluded that even in environments in which students can have a say on what needs to be learned, the instructor's role in deciding how to orchestrate that learning is crucial.

Problem-solving is considered as the heart of mathematics learning because the skill is not only for learning the subject but it emphasizes on developing thinking skill method as well. Students can apply their knowledge and problem-solving skills to be useful in daily life since the processes of solving the mathematics problem are similar to the general problem-solving (Pimta et al., 2009).

Information thematically analyzed from open ended questionnaire questions and interview revealed that students' classroom participation during mathematics has a positive influence on their analytical skills in problem-solving in secondary school in Fako Division, South West Region of Cameroon. When students are stuck on something in mathematics, some ask questions, seek inspiration from related class material, go to the teacher for more explanation as well as use technology to study. Students who do these things have a positive attitude towards mathematics and trust that these approaches will pay off. These students will remain engaged in the mathematics lessons and participating actively. This participation will directly influence their analytical skills in problem solving.

However, when some students stay away from mathematics classes or are absent minded in class, or when the teacher has a negative attitude towards mathematics and in teaching mathematics: he just teaches and leaves; keeps giving notes without explaining; just talks and go forward by himself, it inhibits students' classroom participation. The implication is that their analytical skills in problem-solving are negatively affected. Teachers and school leaders have an important role in the creation of intellectually challenging and supportive mathematics communities that raise the expectations of students and create opportunities for interaction among peers and with parents. Teachers' choice of activities and mathematics problems can have a strong impact on the values that are portrayed in the classroom and on how students view mathematics and its usefulness. As students' participation level gets higher their analytical skills in problem-solving get better.

All the Heads of Department affirmed that there is a need for the teacher to state the importance or connection of a topic to real life or certain professions as this will boost class participation. Five out of six Heads of Department agreed that some students do not participate during mathematics lessons or do not like mathematics today because they had bad teachers or did not have help at home. Nekang (2016) opines that some mathematics teachers create the impression that mathematics is very difficult and is not meant for everybody to study except for those with exceptional endowment. There are some mathematics teachers who are unnecessarily fast when teaching and do not involve their students in regular classroom exercises. Some do not have the patience to work out problems in different ways, so that their student can adapt to a convenient method. Some do not give adequate corrections to mathematics assignments while others do not mark exercises or assignments given to students let alone answer questions posed by students.

These negative attitudes can seriously dampen students' classroom participation and consequently have a negative effect on their analytical skills in problem-solving. Some parents instill in their children that mathematics is not useful to them with regard to the course they wish them to study. This may be because they hated or disliked mathematics in their own days and thus developed a negative disposition to the subject. Consequently, their children hate/dislike mathematics and arrive into the school with such already established negative values. Such students will have low participation levels and of course low analytical skills in problem-solving.

Conclusion

In Cameroon, many students are not studying courses they had wanted to study due to their negative attitude towards mathematics. They even choose to study some courses but were frustrated they did not pass GCE Ordinary Level mathematics which is a requirement for admission into their first choice programme. For example, many candidates choose technology, engineering, physical sciences, environmental sciences, social and management sciences but cannot be admitted for these programmes because they did not have a pass in GCE Ordinary Level Mathematics (Nekang, 2016). Secondary schools should strengthen guidance and counselling so as to change the students' perception in mathematics since a positive approach towards participation in mathematics by students will have a positive effect on their analytical skills in problem-solving.

Recommendations

The teacher/student ratio in most of our institutions of learning is low and, in some cases, those who teach mathematics do not have a qualification in mathematics. The implication is that there is lack of time/opportunity to do problem-solving in the classroom. The teacher may not have time to attend to the students like hold individual meetings with students to track progress and set goals because, if he does, he may not complete the syllabus. He may as well not do problem-solving in the classroom because he lacks the skills to prepare problems and use them in whole-class situations, assist students in monitoring and reflecting on the problem-solving process, expose students to multiple problem-solving strategies amongst others. We therefore recommend that: (1) problem-solving should be part of each curricular unit and begin in kindergarten; (2) the Cameroon government should employ more teachers with qualification in mathematics to teach mathematics and problem-solving in our secondary schools and sanction schools that employ teachers to teach mathematics without a qualification in mathematics; (3) teachers should cultivate students' interest in mathematics as early as possible. Varying classroom

instruction practices could be a remedy to enhance students' understanding, achievement, and motivation in learning mathematics.

References

1. Awandia, J.T.T. (2015). *Students' negative attitude towards physics and the role of an effective teacher*. Unpublished PhD Thesis submitted to the Faculty of Education of the University of Buea, Cameroon
2. Bekkering, E., Ward, T. (2021). Class participation and student performance: A follow-up study. Information Systems Education Journal. 19 (4)
3. Buchele, S. (2020). Evaluating the link between attendance and performance in higher education: The role of classroom engagement dimensions. *Assessment & Evaluation in Higher Education*, 6(**2**), 1-19
4. Chinn, S.(2012). Beliefs, anxiety and avoiding fear in mathematics. *Child Development Research.* 5,67-98.
5. Garfola, J., Lester, F. K. (1985). Metacognition, cognitive monitoring, and mathematical performance. Journal of Research in Mathematics Education, 16, 163-176
6. Laney, K. (2019). How Attitude Towards Math Impacts Student Achievement. *Journal for Research in Mathematics Education.*https://www.prodigygame.com/in-en/blog/attitude-towards-math/
7. Marta, C., Nuria, P.(2004). Participation in the Mathematics classroom: Does every student have a voice? *For the Learning of Mathematics*. Vol. 24. No. 1 pp 7-12
8. McGraw-Hill (1997). *McGraw-Hill encyclopedia of science and technology, 121* (2). Problem solving (psychology)
9. McLeod, D. B. (1992). Research on affect in mathematics education: a reconceptualization. In D. Grows (Eds), *Handbook on research on mathematics teaching and learning (pp575-596).*New York: NY : McMillian.
10. Mesa, V. (2010). Student participation in mathematics lessons taught by seven successful community college instructions. *ALM International Journal,5*(1), 64-88.
11. National Council of Teachers of Mathematics (1989). Curriculum and evaluation standards for school mathematics. Reston, VA: the author
12. National Council of Teachers of Mathematics (1991). Principles and standards for school mathematics. Reston, VA: author
13. Neal, D. C. (1969). The role of attitudes in learning mathematics. *Arithmetic Teacher*, *16*, 631-640.
14. Nekang, F. N. (2016). *Principles and Practice of Mathematics Education in Cameroon*. NEC.
15. Pimta, S., Sombat, T., and Prasart, N. (2009). Factors influencing mathematic problem-solving ability of Sixth grade students. *Journal of Social Sciences, 5(4): 381 – 385*
16. Robinson, M.K.(2005).kooshl Enhancing class participation . MAA Online. Retrieved on April 8, 2024 from http://www.maa.org/t_and_l/koosh.html
17. Rogers, K.S., Claudi, T., and Hilary, H.(2021). Encouraging student participation in mathematical activities in synchronous online tuition. *Open Learning: The Journal of Open, Distance and E-Learning.* https://doi.org/10.1080/02680513.2021.1938523
18. Schoenfeld, A. H. (1980). Teaching problem-solving skills, *The American Mathematical Monthly 87*(10), 794.

19. Switzer, J. M. (2010). Bridging the Math gap. *Mathematics Teaching in the Middle School, Vol.15, no. 7.*
20. Taylor, L. (1992). Mathematical attitude development from a Vygotskian perspective. *Mathematics Education Research Journal, 4*, 8-23