

THE EFFECT OF A GROUP TEACHING APPROACH STRATEGIES ON TEACHING OF MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN RWANDA, A CASE OF GASABO DISTRICT

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Abstract: The current research examined the impact of group teaching approach strategies on the academic performance of students in Mathematics in public secondary schools in Gasabo District, Rwanda. The specific objectives of the current study are: to identify group teaching approach strategies to improve the students' academic performance in mathematics, to assess students' academic performance in mathematics and to determine the relationship between group teaching approach strategies and students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda. The study data have been collected using research instruments such as questionnaires, interview guides and document analysis. The target population for the study was people comprised students, teachers, DOSs and Head Teachers of secondary schools in Gasabo District in Rwanda. In addition, the sample of the study has been identified through random and census approach. The primary respondents consisted of 300 students and 35 teachers selected from public secondary schools. On the other hand, the current study collected data from key informers who are DOSs and Head Teachers of the selected schools. Moreover, qualitative and quantitative approaches have been used to analyze and to interpret data collected in order to get a conclusion and recommendations for improvement and for further studies to be done. The findings show that that group teaching approach strategies to improve students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda are collaborative learning, learner centered method, presentation method, discussion method, brainstorming and seminar method. The findings also discovered prevalent issue of poor academic performance in mathematics among students in public secondary schools, as evidenced by consistently low marks in national examinations. After analyzing the correlation as well as the regression between group teaching approach strategies and students' academic performance in mathematics, it was found that there is a statistical and significant relationship between group teaching approach strategies and students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda with the P-value of .000, Adjusted R Square of .902 and the Pearson Coefficient of Correlation of .950**. It has been recommended that all stakeholders of education sector should to support Mathematics teaching and learning activities in Rwanda at all levels of education.

Keywords: Academic performance, Education, Learning.

1. INTRODUCTION

Background of the Study

Since the tragic events of the 1994 Genocide against the Tutsi, the Government of Rwanda (GoR) has demonstrated impressive progress in rebuilding the country's social and economic foundations. Over the past decade, successive Rwandan Education Sector Strategic Plans (ESSPs) have been aligned with the national macroeconomic development program known as the Economic Development and Poverty Reduction Strategy (EDPRS). The primary objectives of both EDPRS-1 and EDPRS-2 have been to achieve sustainable economic growth and foster social development.

Since 1998, the GoR has prioritized a development agenda aimed at transforming Rwanda into a middle-income country by 2020. The concept note for Vision 2050 sets the target for Rwanda to become an upper middle-income country by 2035 and a high-income country by 2050. Vision 2020 (Vision 2050) is being implemented through medium-term planning frameworks spanning five to seven-year periods. The current ESSP aligns with the National Strategy for Transformation (NST-1) (Republic of Rwanda, 2017), which covers the period from 2017 to 2024.

According to Mocho (2012), poor teaching methods have been identified as contributing factors to underachievement in the subject of Mathematics, as teachers often have the autonomy to decide which topics to teach and when, disregarding students' cognitive abilities and the level of learning they are at. Furthermore, Odundo (2013) asserts that Mathematics teachers often resort to familiar pedagogical methods in secondary schools in Gasabo District, Kigali.

Problem Statement.

A positive group learning experience can greatly enhance students' academic self-confidence. It allows them to develop their own unique voice and shape their perspectives through interactions with their peers. Successful group dynamics provide social support and encouragement, fostering a willingness to take intellectual risks.

Group learning also promotes a sense of responsibility for one's own learning, creating a comfortable and collaborative environment among students. This not only benefits the students themselves but also facilitates the role of teachers and parents in supporting their educational journey.

In 2016, the Rwandan government introduced the Competence-Based Curriculum (CBC) as a replacement for the Knowledge-Based Curriculum (KBC). Alongside this change, the Rwanda Education Board (REB) recognized the need for effective Continuing Professional Development (CPD) and school-based collaborative training in all schools. The primary objective of the CBC was to improve students' collaboration skills and shift the teaching and learning approaches from being teacher-centered to learner-centered, specifically through the use of group approaches. The implementation of competency-based education necessitated a shift in pedagogical focus, and the curriculum emphasized the importance of collaborative learning within group settings. However, some students in mathematics struggled to engage in group approaches, which ultimately affected their academic performance. These students lacked awareness of the benefits of group approaches and how they could positively impact their learning outcomes, resulting in poor performance in mathematics.

In contemporary discussions, the terms "group work" and "group approach" are often used interchangeably with "collaboration" (Barnes, 2003; Edwards & Jones, 2001). Across various domains, there is growing recognition of the positive impact of collaborative initiatives in fostering interdisciplinary approaches. In research contexts, collaboration is seen as a valuable tool for leveraging available resources and facilitating research processes, practices, and partnerships (Erichsen, Goldenstein & Kaiser, 2011).

For the purposes of this article, the terms "collaboration" and "group approach" have been used interchangeably (Barnes, 2003; Davidson & Kroll, 1991; Edwards & Jones, 2001; Lai, 2011; Yackel, Cobb & Wood, 1991). In this study, both terms refer to an arrangement in which two or more individuals work together towards a common goal. Various strategies are integrated within this arrangement to address complex problems, topics, or issues (Erichsen et al., 2011).

A study conducted by Jean Claude Dushimimana and Alphonse Uworwabayeho from the University of Rwanda-College of Education highlighted the issue of poor performance in mathematics among students. The Gisozi Sector, located in the Gasabo District of Kigali City in Rwanda, was selected as a sample to assess the potential impact of group teaching approach strategies on students' academic performance in mathematics when applied in teaching (Uworwabayeho, 2009).

Specific Objectives

The specific objectives carried out to this research are the following:

- (i) To identify group teaching approach strategies to improve the students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda
- (ii) To assess students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda
- (iii) To determine the relationship between group teaching approach strategies and students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda

Research Questions

The following are three research questions which guided this study:

- i. What are the group teaching approach strategies to improve the students' academic performance in public secondary schools of Gasabo District in Rwanda?
- ii. How is students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda
- iii. To what extent does group teaching approach strategies influence students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda

2. REVIEW OF RELATED LITERATURE

Theoretical Literature

Concept of Group Teaching

The present study focuses on the impact of group teaching approach strategies on student academic performance in public secondary schools. The study was guided by research questions and objectives that aimed to explore the role of teachers in effectively utilizing group teaching approach strategies to enhance student academic performance.

According to the National Council of Teachers of Mathematics, group teaching approach strategies in mathematical education has been found to play a crucial role in promoting student engagement, critical thinking, and productive learning outcomes. Recent research studies in the field of mathematics education at primary and secondary school levels have highlighted the benefits of employing small groups for various activities and exercises.

Webb's review of studies on peer interaction and achievement in small-scale groups revealed positive outcomes. It emphasized the importance of conveying clarifications and simplifications of ideas, solutions, and methods among group members, which was associated with higher achievement.

Conversely, non-responsive feedback or irrelevant feedback from group members had a negative impact on achievement. Webb also highlighted that group teaching approach strategies was most effective when students were taught how to work in groups, present and provide assistance, and accept help. Detailed explanations followed by application to tasks were found to be fruitful.

Furthermore, research by Slavin demonstrated the positive effects of group teaching approach strategies on cross-ethnic relations and student achievement. Yackel, Cobb, and Wood discovered that small-scale group teaching approach strategies followed by whole-class dialogue provided unique learning opportunities, such as collaborative discussions and resolution of differing viewpoints.

Numerous studies have investigated the effectiveness of competitive, individualistic, and cooperative group teaching approach strategies methodologies in promoting productivity and achievement. Meta-analysis results comparing cooperative learning to competitive or individualistic learning strategies indicated that cooperative approaches led to significantly higher levels of student learning, with effect sizes ranging from 0.64 to 0.67. Group teaching approach strategies has received significant research attention and has been shown to contribute to higher achievement and positive relationships among students compared to competitive or individualistic approaches.

Methods Adopted by Teachers to Teach Students in Secondary Schools

The term "methods" pertains to the organized arrangement or pattern of structuring learning activities. Teaching methods can be categorized into two main types: teacher-centered methods and learner-centered methods of teaching (MIE, 2004). Learner-centered instruction focuses on students actively constructing their own understanding of the content and developing a personal sense of ownership over knowledge (Jacobson and Kolchak, 2009). Thus, student-centeredness involves placing a significant emphasis on inquiry-based and problem-based learning, where students are at the center of the learning process and engage in group work. Each of these methods have been discussed in detail below.

Learner (Student) Centered Method of Teaching

A learner-centered method of teaching is characterized by active student involvement, where learners take a more prominent role compared to the teacher. This approach places the child at the core of the educational process, prioritizing their growth and development into a well-rounded individual. In this method, the focus is on aligning the educational experience with the specific needs of the children. The curriculum and teaching methods are tailored to cater to the diverse needs of the learners at various levels. The selection of content and instructional strategies is based on a deep understanding of the nature, needs, and interests of the students.

Empirical Literature Review

Numerous studies have explored the impact of teaching methods on student performance in various countries. One such study conducted in the United States by Haas (2002) focused on teaching methods employed in secondary schools. The findings of this study revealed a significant correlation between teaching methods and student achievement, emphasizing the influential role of instructional approaches on academic performance.

Theories in Teaching

The concepts of teaching are based on various theories of learning. Some teaching theories are derived from learning theories, particularly the mechanistic model. Others are formulated by analyzing teaching behavior and its outcomes, as well as through experimental research.

Dewey's Theory

Dewey's Theory, proposed by John Dewey (1938), focuses on key principles that challenge traditional education. The theory emphasizes the importance of experiential learning, where education is derived from engaging in various experiences. Selecting the right kind of experiences becomes a central concern in an education centered around experiential learning.

Another key concept in Dewey's theory is democracy, as he believes that democratic social structures enhance the quality of human experiences (Dewey, 1938).

Inquiry Theory

The concept of inquiry theory draws inspiration from Dewey's ideas, particularly his formulation of scientific thinking, as well as from cognitive theorists who refer to it in various ways such as the discovery method, inquiry method, self-directed learning, or problem-solving learning. One prominent advocate of teaching through inquiry is Bruner (1966). He proposed a process for designing instructional methods that satisfy four conditions: accounting for individual learning preferences, organizing knowledge in a way that supports learner understanding, determining effective sequences for presenting material, and providing appropriate incentives. It is worth noting that these two theories are primarily applied in developed countries.

Conceptual Framework

A concept can be delineated as an abstract or overarching notion inferred from specific instances. A conceptualization constitutes a simplified, abstract portrayal of the world, fashioned to serve a particular purpose (Kombo & Tromp, 2014). A conceptual framework encompasses a collection of overarching ideas and principles garnered from pertinent domains of investigation, harnessed to structure subsequent presentations (Reichel & Ramey, 1987).

To decipher the study's findings, the following conceptual framework has been employed to steer the study objectives, as depicted in the figure below.

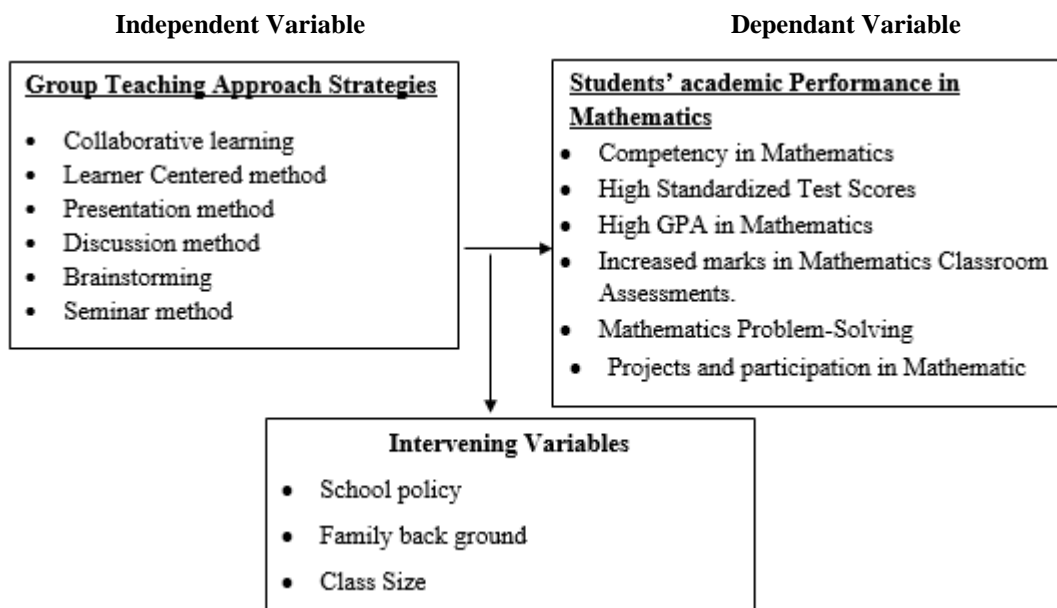


Figure 2.1: Conceptual Frameworks

3. RESEARCH METHODOLOGY

Research Design

This study employed a mixed methods research design, combining both quantitative and qualitative approaches. According to Creswell & Plano Clark (2011) as cited in Creswell (2011), using a mixed methods approach enhances the overall strength of the study beyond what could be achieved with either qualitative or quantitative methods alone. The research design is rooted in the philosophical worldview of pragmatism, as discussed by Rossman & Wilson (2009) as cited in Creswell (2011). From this perspective, the focus is on the research problem rather than specific methods, and pluralistic approaches may be employed to fully understand the problem at hand. The purpose of this study was to investigate the impact of group teaching approach strategies in mathematics on student academic performance.

Target Population

In this study, the target population consisted of educational practitioners in Gasabo district, including students, teachers, head teachers, and Sector Education Officers. The total number of participants in this population is estimated to be 358.

Sample Design

Sampling Technique

In this study, the researcher employed a simple random sampling technique to select the schools and administrators, as well as parents and teachers. A census approach has been used to gather information from all 18 head teachers, while a random sample has been drawn from the population of teachers since the study required specific data from them.

Sample Size

According to Denscombe (2008), it is crucial to select a sample that is representative of the entire population and capable of providing testable information. In this study, a random sampling technique has been employed to ensure the selection of a representative sample from each of the parties involved in the study.

Table 3.1: Respondents' Distribution

N/S	Type of respondent	Number of respondents
1.	Sector education officers	5
2.	Head Teachers	18
3.	Teachers	35
4.	Students	300
	TOTAL	358

Source, Researcher 2023

4. RESEARCH FINDINGS AND DISCUSSIONS

Students' Views on Group Teaching Approach Strategies to Improve Students' Academic Performance in Mathematics

The current researcher collected quantitative data about students' views on strategies of group teaching approach to improve students' academic performance in mathematics. Therefore, the table below presents the findings about the views of students.

Table 4.1: Students' Views on Group Teaching Approach Strategies to Improve the Students' academic Performance in Mathematics Subject

Statements	SA		A		N		D		SD		Mean	Std
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Collaborative learning is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	68	22.7	177	59.0	7	2.3	37	12.3	11	3.7	2.1	1.0
Learner Centered method is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	40	13.3	205	68.3	5	1.7	37	12.3	13	4.3	2.2	0.9
Presentation method is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	56	18.7	166	55.3	28	9.3	38	12.7	12	4.0	2.2	1.0
Discussion method is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	42	14.0	183	61.0	10	3.3	55	18.3	10	3.3	2.3	1.0
Brainstorming is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	49	16.3	179	59.7	5	1.7	37	12.3	30	10.0	2.3	1.1
Seminar method is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics.	65	20.7	178	59.3	7	2.3	38	12.7	12	4.0	2.1	1.0

Source: Primary Data 2023

Teachers' Views on Group Teaching Approach Strategies to Improve the Students' academic performance in Mathematics

The current research collected quantitative data about teachers' views group teaching approach strategies to improve students' academic performance in Mathematics. The findings are presented in the table below.

Table 4.2: Teachers' Views on Group Teaching Approach Strategies to Improve the Students' Performance in Mathematics Subject

Statements	SA		A		N		D		SD		Mean	Std
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Collaborative learning is one of the strategies of group work approach to enhance students' competences in mathematics.	3	8.6	18	51.4	4	11.4	8	22.9	2	5.7	2.6	1.1
Learner Centered method is one of the strategies of group work approach to enhance students' competences in mathematics.	3	8.6	13	37.7	3	8.6	8	22.9	2	5.7	2.6	1.1
Presentation method is one of the strategies of group work approach to enhance students' competences in mathematics.	9	25.7	13	37.7	3	8.6	8	22.9	2	5.7	2.4	1.2
Discussion method is one of the strategies of group work approach to enhance students' competences in mathematics.	3	8.6	18	51.4	3	8.6	8	22.9	2	5.7	2.7	1.1
Brainstorming is one of the strategies of group work approach to enhance students' competences in mathematics.	3	8.6	20	57.1	2	5.7	8	22.9	2	5.7	2.6	1.1
Seminar method is one of the strategies of group work approach to enhance students' competences in mathematics.	7	20.0	14	40.0	3	8.6	9	25.7	2	5.7	2.5	1.2

Source: Primary data, 2023

The findings from Table 4.10 indicate responses provided by teachers on group teaching approach strategies to improve the students' academic performance in Mathematics subject

Key Informers Views on Strategies of Group Teaching Approach to Improve the Students' academic performance in Mathematics Subject

During this research, the researcher sought to get the views of the key informers about group teaching approach strategies to improve the students' academic performance in mathematics subject in public secondary schools of Gasabo District. The key informers who participated in this research were SEOs and Head Teachers from Gasabo District.

In all the interaction with the above mentioned key informers, the key question was the following: What are the strategies of group teaching approach strategies that can be used by teachers to enhance students' competences in mathematics in public secondary schools? The following are some answers provided by key informers.

The Performance of Students in Mathematics in Public Secondary Schools in Rwanda

The second objective of this research was to assess students' academic performance in Mathematics in public secondary schools of Gasabo district in Rwanda. In order to get vital information, firstly, the research requested students and teachers to fill questionnaires. Secondly, the researcher conducted interviews with key informers which are SEOs and Head teachers from the selected public secondary schools of Gasabo District in Rwanda.

Students' Views about Students' Academic Performance in Mathematics in Public Secondary Schools Gasabo District

During data collection, in the current study, the researcher collected quantitative data about teachers' views about students' academic performance in Mathematics in public secondary schools of Gasabo district in Rwanda. Therefore, the findings are presented in the following table.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of the Findings

Group Teaching Approach Strategies to Improve Students' Academic Performance in Mathematics

This first objective sought to identify group teaching approach strategies to improve students' academic performance in mathematics subject in public secondary schools of Gasabo District in Rwanda. The following statements were used in the real examination: Collaborative learning is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics. Learner Centered method is one of the strategies of group teaching approach strategies approach to enhance students' competences in mathematics. Presentation method is one of group teaching approach strategies to enhance students' academic performance in mathematics. Discussion method is one of group teaching approach strategies to enhance students' academic performance in mathematics. Brainstorming is one of group teaching approach strategies to enhance students' academic performance in mathematics. Seminar method is one of group teaching approach strategies to enhance students' academic performance in mathematics.

The findings show that the majority of respondents highlighted that that collaborative learning, learner centered method, presentation method, discussion method, brainstorming method and seminar method are the group teaching approach strategies that can be used by teachers to enhance students' academic performance in mathematics within public secondary schools of Gasabo District in Rwanda.

The Performance of Students in Mathematics in Public Secondary Schools in Rwanda

The second objective of the study was to assess students' academic performance in Mathematics in public secondary schools of Gasabo district in Rwanda. Students' academic performance in Mathematics has been assessed in that following angles: competency in Mathematics, high standardized test scores in Mathematics, high GPA in Mathematics, increased marks in Mathematics classroom assessments, Mathematics problem-solving and projects and participation in Mathematic competitions.

The findings of the study highlighted a prevalent issue of poor academic performance in mathematics among students in public secondary schools, as evidenced by consistently low marks in national examinations. This academic challenge poses a dilemma for mathematics teaching and learning within these schools. Respondents emphasized the urgent need for strategic interventions to enhance mathematics education, providing students with the necessary support and resources to excel in this critical subject. The disparity in mathematics performance compared to other subjects underscores the necessity for targeted efforts to improve mathematical skills and overall academic achievement.

Relationship between Group Teaching Approach Strategies and Students' Academic Performance in Mathematics

The third objective of the current study was to determine the relationship between group teaching approach strategies and students' academic performance in mathematics subject in public secondary schools in Rwanda. Therefore, as reflected in chapter four, the correlation between group teaching approach strategies (collaborative learning, learner centered method, presentation method, discussion method, brainstorming and seminar method) and students' academic performance in mathematics was positive. This shows that the relationship is all positive and statistically significant. Each of the group teaching approach strategies influence students' academic performance in mathematics within public secondary schools of Gasabo District in Rwanda.

Conclusion

In conclusion, findings from the present research show that group teaching approach strategies to improve students' academic performance in mathematics subject in public secondary schools of Gasabo District in Rwanda are collaborative learning, learner centered method, presentation method, discussion method, brainstorming and seminar method.

After exploring group teaching approach strategies to improve students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda, the researcher discovered prevalent issue of poor academic performance in mathematics among students in public secondary schools, as evidenced by consistently low marks in national examinations. Even the findings from the key informants highlighted that students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda is poor.

In establishment of the relationship between two variables (independent and dependent variables), it has been found that collaborative learning, learner centered method, presentation method, discussion method, brainstorming and seminar method affects students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda. The correlation between group teaching approach strategies and students' academic performance in mathematics was found meaningful. This shows that the relationships between independent and dependent variables were positive and statistically significant. Each of the discussed group teaching approach strategies affects students' academic performance in mathematics in public secondary schools of Gasabo District in Rwanda.

Recommendations

On the basis of findings gotten, the current researcher provided the following recommendations:

All people involved in education sector in Gasabo District are recommended to work collaboratively in order to enhance the usage of group teaching approach strategies to improve students' academic performance in mathematics subject at all levels of education in Rwanda.

In addition, MINEDUC through Rwanda Education Basic Board is recommended to avail enough mathematics teaching and learning materials which are adequate in enhancing students' academic performance in Mathematics.

Finally, all stakeholders of education sector are recommended to support Mathematics teaching and learning activities in Rwanda, as it is the only and one shortcut for improving mathematics academic performance among Rwandan students.

Suggestion for Further Study

The researcher recommends further studies to be carried out in the following areas:

- i. The effect of creating awareness on importance of group teaching approach strategies at all levels of education
- ii. The influence of group teaching approach strategies on students' academic performance in sciences and Mathematics
- iii. Effect of group teaching approach strategies on Rwandan students' academic performance
- iv. Other factors that affecting mathematics teaching and learning in secondary schools of Rwanda
- v. Government's strategies for changing students' attitudes science subjects and mathematics.

REFERENCES

- [1] Accad, E. (1993). *Excision Practices, Discourses and Feminist Commitment*, Chicago. University of Chicago.
- [2] Davidson, N., & Kroll, D.L. (1991). An Overview of Research On Cooperative Learning Related to Mathematics. *Journal for Research in Mathematics Education*, 22, 362–365. <http://dx.doi.org/10.2307/749185>
- [3] Panitz, T. (1999). *Benefits of Cooperative Learning in Relation to Student Motivation*, in the All, m. (ed.) *Motivation from within: Approaches for Encouraging Faculty and Students to Excel*, New Directions for Teaching and Learning. San Francisco, CA; USA. Josey-Bass publishing.
- [4] Phyak,P. & Ojha,L.(2017). *ELT Seminar Instruction Rubrics*: Kathmandu:TUP.
- [5] Whicker, K.M., Bol, L., & Nunnery, J.A. (1997). Cooperative Learning in the Secondary Mathematics Classroom. *The Journal of Educational Research*, 91(1), 42–48. <http://dx.doi.org/10.1080/00220679709597519>.
- [6] Yackel, E., & Cobb, P. (1996) Sociomathematical Norms, Argumentation, and Autonomy in Mathematics. *Journal for Research in Mathematics Education*, 27(4), 458–477. <http://dx.doi.org/10.2307/749877>.
- [7] Yackel, E., Cobb, P., & Wood, T. (1991). Small-Group Interactions as a Source of Learning Opportunities in Second-Grade Mathematics. *Journal for Research in Mathematics Education*, 22(5), 390–408. <http://dx.doi.org/10.2307/749187>.