EXTENT OF THE UTILIZATION OF COLLABORATIVE LEARNING IN PHYSICS IN SECONDARY SCHOOLS IN NANDI COUNTY, KENYA.

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DECLARATION

This thesis is my original work and has not been presented for consideration in any university. No part of this research thesis may be produced without prior permission from the author and/or Kenyatta University.

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DEDICATION

I dedicate this work to Supreme Heavenly father for giving me life, to my parents Syprose and Joseph for being a constant source of inspiration, to my wife Dorothy and our children Olive, Ted and Damara for standing with me throughout the entire study period.

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I'm grateful to the gracious God who enabled me to finish this work in peace and grace. For their professional direction, advice, and encouragement, my supervisors, Prof. John Maundu and Dr Waititu Michael, have my sincere gratitude. The secondary school principals in the Nandi North District, as well as the students who attended those schools and made significant contributions to this study, are also to be thanked.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASEI	Activity, Student, Experiment, Improvisation
CEMASTEA	Centre for Mathematics, Science and Technology Education in Africa
CTL	Collaborative Teaching and Learning
CI	Collaborative Instructional
CIM	Collaborative Instructional Method
CL	Collaborative Learning
DEO	District Education Office
FGD	Focus Group Discussion
GOK	Government of Kenya
INSET	In-service Education and Training
JICA	Japan International Cooperation Agency
KCSE	Kenya Certificate of Secondary Education
MOE	Ministry of education.
NACOSTI	National Commission for Science and Technology Innovation
PDSI	Plan, Do, See and Improve
SMASSE	Strengthening of Mathematics and Science in Secondary Education
SMASSE-WECSA	Strengthening of Mathematics and Science in Secondary Education- Western, Eastern, Central and Southern Africa
TSC	Teachers Service Commission

BEd	Bachelor of Education
Dip Ed	Diploma in Education
MEd	Masters in Education
MSc	Masters in Science
MA	Masters in Arts

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ABSTRACT

Several studies have reported that a collaborative approach in learning has a positive impact in learners' performance, however frequency of utilization of this approach in physics classroom depends on teacher, learners and other external factors which needs further exploration in Nandi North Sub- County. This study seeks to; determine the frequency at which collaborative learning is being utilized in physics classes, Teachers' preparedness, student view when CL is utilized in physics classrooms and limiting factors for its use in physics classes. The study was guided by Vygotsky's social development theory and employed descriptive survey research design. The study targets all students and teachers of physics in public secondary schools in the Nandi North sub-county. In this study, 12(20%) of the total number of schools were selected of which 2 were boy schools, 3 girl schools, and 7 mixed schools. Twelve (12) teachers and three hundred and eighty-four (384) physics students in the selected schools participated in this study. The researcher used a questionnaire, observed classes, conducted interviews, and analysed documents to gather data. A descriptive statistical technique such as percentages, means and frequency counts was used to analyse the data. The finding indicates despite teachers being equipped with Collaborative Learning skills and learners having positive perspective on Collaborative learning, the frequency at which is being utilized is very low. Some major limiting factors for utilizing Collaborative learning include inadequate time, large classes, limited resources and heavy workloads. The Kenyan Ministry of Education and other involved parties could leverage this study's findings to formulate strategies that will improve the implementation of collaborative learning techniques in science classrooms.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The background of the study, the problem statement, the study's purpose, its objectives, its research questions, and its justification are all explored in this chapter. information about the study's significance, limitations, and assumptions as well as its scope and theoretical and conceptual framework is also included here. This chapter concludes by providing an operational explanation of the essential terms.

1.1 Background to the Study

Education is seen as the foundation of any human endeavour in this age of worldwide adoption of new technologies development. Battle and Lewis (2002) notes that education is an indispensable factor for human capital growth and is connected to one's personal wellbeing and the opportunity for a prosperous life. Education plays an important part in human capital development, and is connected to personal wellbeing and the chance of having a better life. Additionally, Saxton (2000) notes this rise in productivity results in new streams of income that fuel the expansion of the national economy Because of this, instructors continue to place a high importance on student performance. It is intended to impact locally, regionally, nationally, and internationally positively. Light and Cox (2008) note that the pursuit of high standards for instruction and learning has increased the desire to investigate how best to encourage learning Different teaching strategies that produce superior learning outcomes have been identified and are applied in classrooms. They consist of those that let students have group discussions and benefit from their classmates. This study addressed the frequency of collaborative teaching methods in secondary school physics classes and the limiting factors for its utilization.

Many studies show that collaborative learning enhances students' understanding of concepts. Collaborative learning when utilized promoted more favourable perceptions toward group members, the teacher, and the group as a whole, according to American research on learning together versus alone conducted by Johnson and Johnson (1991). The goal of a collaborative working strategy, based on study by Borich (2004), is to increase student engagement and promote a favourable mindset and feeling about the subject. This is supported by McKeachie (1999), who found interaction with peers in particular for many pupils, to be a key motivation. Gokhale (1995) says that the academic literature has done a lot of research on the idea of collaborative learning, which involves groups of students working together to achieve educational goals.

Collaborative learning through problem-solving demonstrated an increase in pupil participation and material retention when compared to many traditional methods in which students do not interact with teachers. Kpangban and Ajaja (2007) says that the majority of activities utilized in science education nowadays are geared toward helping students understand facts, rules, and action steps Utilizing pupil ideas entails including pupil experiences, opinions, perspective, and issues into the lesson by making the student the primary source in a student-centred instructional approach where activities are completed in groups**.**

To increase the value and standard of secondary education in Kenya, the Ministry of Education considered creating appropriate in-service training (Strengthening Mathematics and Science in Secondary Education, SMASSE Project, 2008). When educators use these techniques, the goal is they will perform better in the KCSE and students will prefer those subjects. However, considering national statistics, this was not the case. Physics is below average. The average national physics KCSE score in the last four years was; 40.55% in 2016, 38.38% in 2017, 36.35% in 2018 and 36.53% in 2019, indicating the situation was not good. Kenya Certificate of Secondary Education Physics syllabus contains many concepts. These concepts can be learned through either individual research or collaborative approaches. From Form One to Form Four, physics experimental activities are equally distributed in the syllabus and aim at developing learners' science skills like observation, data recording, data analysis, and manipulative skills. These science activities are designed in a way that they can be done collaboratively. A similar study was conducted in Vietnam by Ha Le, *et.al,* (2018) who investigated obstacles to collaborative learning and checked on the impact of large classrooms, time constraints, student collaborative skills, and teacher preparedness. Similar investigation was also done in Nigeria by Olaniyan and Govender (2018) to investigate impact of environment to Collaborative learning. Despite this claim, students have frequently competed rather than teamed up when learning. This prevents the growth of talent by isolating students and fostering unfavourable interactions between them and their teachers and fellow students. Therefore, this study seeks to examine the use of collaborative teaching techniques in the classroom and learning physics in secondary schools in Nandi North Sub-County, Kenya.

1.2 Statement of the Problem

In line with the Constitution of Kenya (2010) and international agreements within the Vision 2030 for Kenya, the Kenyan government affirms a commitment to ensuring that all citizens have access to high-quality education, training, and research as a fundamental human right. The government recognizes that science and mathematics are of essence in the realization of the goals of Vision 2030, which projects Kenya as a prosperous and competitive country by the year 2030. Despite such commitment, performance in mathematics and science has remained poor at KCSE level. Besides, student attitudes toward physics have continually remained low as only about 25% of students opt to study physics, as compared to other sciences such as Chemistry and Biology indicating a worsening situation.

The declining trend may be caused by students' attitudes toward the subject of physics and their physics teachers as pointed out by Nderitu (2009). Their attitudes are, no doubt, due to the nature of teaching and learning in classrooms. The SMASSE Strengthening of Mathematics and Science Education program promotes a pedagogical method known as collaborative learning (CL) that is particularly effective in improving the learning of students. Unfortunately, despite significant government investment in SMASSE, achievement in physics remains inadequate. For instance, the national KCSE average score in physics for the last four years has been: 40.55% in 2016, 38.38% in 2017, 36.35% in 2018, and 36.53% in 2019, thus showing that the situation has not improved significantly.

Students continue to perceive physics and other sciences as difficult and uninteresting. This has called into question the use of traditional teaching methods in physics. In a similar light, research by Soliven (2003) identified that high school physics teachers employ various instructional strategies, with the teachers who include collaborative tasks obtaining higher learning outcomes. Also, Zemke *et.al,* (2004) established in their study that students experienced a deeper understanding of hard concepts after working in collaborative groups. In a similar vein, Ha Le *et.al,* (2018) investigated the challenges to collaborative learning in Vietnam, such as those emanating from large classrooms, time constraints, student collaboration skills, and teacher preparedness.

But the most important question remains: How often is collaborative learning implemented as a teaching method in physics classes? To what extent are teachers prepared to use CL, and what are the factors that limit its use? The study examines the frequency of collaborative learning practices, assesses teacher preparedness, examines student attitudes, and identifies the limiting factors that hinder the effective use of collaborative learning in physics teaching and learning in secondary schools in Nandi North Sub- County, Kenya. This study, therefore, will add to finding a solution to the problem and enhance the performance of students in physics by clarifying the problem, explaining the role of the collaborative approach, and identifying the gaps that need to be addressed for improvement.

1.3 Purpose of the Study

The study's goal looked into secondary schools' extent of use of collaborative teaching strategies and the influencing factors in Physics classrooms. This method would help improve the frequency at which CL is utilized in physics classrooms, which may have a positive impact on students' performance in physics and their enrolment in the subject.

1.4 Objectives of the Study

This study aimed to achieve the following objectives:

a) To determine the extent of use of CL

b) To establish teachers' preparedness for the implementation of CL

c) To determine students' perception of CL

d) To establish limiting factors to the utilization of CL.

e) To establish preferred group size for CL learners.

1.5 Research Questions

The study will be guided by the following questions:

i. At what frequency is CL in use?

ii. How are teachers prepared to utilize CL?

iii. How do students view CL being utilized in a Physics classroom?

iv. What are the limiting factors to the utilization of collaborative learning in physics classrooms?

v. What is the optimal group size for maximizing student engagement and learning outcomes in collaborative learning environments?

1.6 Significance of the Study

The study findings will be of great significance to the school management by gaining insight into how to increase and improve the effectiveness of CL for better student learning. The findings of this research will help teachers adopt a collaborative approach to teaching physics. The students will benefit from a better student-centered teaching and learning that will result in most of them selecting Physics and performing better at KCSE. Additionally, Quality Assurance and Standard officers may utilize the study's findings as a guide when planning in-service courses for physics teachers. Future researchers will also benefit from the study since it will form a basis for future literature for them where they will refer to for information concerning collaborative learning approaches.

1.7 Limitation of the Study

These are factors that the researcher has no control over but that could easily have a negative impact on the findings. This study relied on self-report data from questionnaires, which may not have been independently verified. However, triangulation techniques, which involve using various data collection tools, such as observation checklists and document analysis, helped to lessen this issue. The study employed a cross-sectional approach that yielded snap-shot data, that is, information is as it is at the time of data collection, what happened before and in future is not captured. As a result, it was assumed that the actual picture of the situation both now and in the future would be captured.

1.8 Assumptions of the Study

The assumptions in this study are that each public school in the County has at least one Physics teacher who has undergone the SMASSE INSET; that the Physics teachers and students were honest when filling out the questionnaire such that the true picture was captured; that the respondents were able to read and comprehend the questionnaires; that the current pertinent records will be acquired from schools and County education office; that the results will be considered to be helpful by Ministry of Education, teachers, students and the community of stakeholders as a whole; and that the results will improve the use of collaborative learning approach in the teaching of Physics in secondary schools in Nandi North, Sub-County.

1.9 Theoretical Framework

This study has adopted Vygotsky's Sociocultural theory. Vygotsky’s (1978) theory asserts that a child's social interactions may direct and moderate their cognitive growth and capacity for learning. In line with this theory, people acquire particular cognitive structures by watching how others behave, and these strategies are what explain how people pick up social behaviours. Vygotsky used the idea of the zone of proximal development (ZPD) to describe how learning happens as a result of interactions with other people (Tudge and Winterhoff, 1993). These theories emphasize how social connections are essential to the learning process and how important it is for this interaction process to reflect back into an individual's inner reality. Vygotsky calls this participatory method of learning between students and their more experienced peers "collaborative dialogue." During this process, the learner looks for and absorbs information from the More Knowledgeable Other, then applies it to their own behavior. Usually, this encounter occurs in the learner's Zone of Proximal Development, where they can accomplish more with assistance than on their own.

It exemplifies the vicarious reinforcement concept. According to Bustos and Espiritu (1996), reinforcement is sufficient to reinforce behaviour in this regard and incorporates conceptual learning. Regarding studying physics, process skills like observing, recording, and analyzing experimental data are also regarded as social learning, particularly in lab tasks. The students collaborate cohesively to accomplish goals. Observation learning is the process by which individuals see others perform their roles in an activity and pick up new abilities as a result of those observations. (Jose *et.al,* 2009). Vygotsky (1978) further claims that social interactions are the means via which cognitive development occurs. According to him, when students connect with more knowledgeable peers or adults (teachers, parents, etc.), the learning process will continue more successfully. His ZPD principle is founded on the idea that there are two types of tasks that human may complete: those that require no assistance and those that can be completed with the assistance or support of an adult or peer (a person with greater knowledge than the individual).

Interacting with more knowledgeable adults or peers helps the individual learn more efficiently. Furthermore, it is predicated on the idea that a person may accomplish goals with the assistance of others without needing assistance. Moll (1990) argued that knowledge of three fundamental concerns is necessary for comprehending Vygotsky's ZPD theory. These are: the necessity of social interaction; the process of personal development for each individual; and the comprehensive usage of real activities. Using Authentic Activities Holistically According to Vygotsky, teachers must carry out the processes of working, learning, and teaching holistically and through real-world activities. Real-world scenarios must serve as the foundation for authentic activities, and they must have purpose for the pupils. Additionally, students must be motivated to study that subject (Vygotsky, 1978). The Need for Social Interaction According to Vygotsky, students learn via the social interactions they engage in with their more competent peers or their teachers. During this engagement, newly acquired knowledge from more experienced peers or teachers is directly learned by the pupils through doing, living, and internalizing it (Vygotsky, 1978). Doolittle (1997) views this process as the primary evidence of social reliance. In this case, ZPD is interactive rather than just one-sided based on students, classmates, or instructors opinions. ZPD requires social interaction, and also requires social reliance amongst individuals. The Process of Individual Change According to Vygotsky (1987), aims to personal transformation. According to him, ZPD is an ongoing change. According to Gokhale's (2000) assessment, students who participate in group projects or collaborative learning demonstrate superior critical thinking abilities compared to those who receive traditional instruction. This is consistent with Vygotsky's thesis. Collaborative learning allows students to pick up a variety of skills from one another. According to this perspective, a person's progress cannot be observed solely from within. Social elements should also be included because they are a part of the external world and have an impact on this growth. Thus, the learning, as Vygotsky (1986) noted, is "integrated into social interactions that take place when a child engages with people, things, and surroundings." The interaction causes the brain to function more because of the different inputs that are gathered. More precisely, individuals can collaborate with peers to perform mental tasks including reasoning, problem solving, and thinking (Wertsch & Rogoff, 1984). In the case where the task involves problem-solving as in Physics, learners can adopt these collaborative approaches to solve a variety of problems. For collaborative to be effective in class there are variables which this research investigated.

1.10 Conceptual Framework

The use of collaborative learning approach depends on the teacher’s preparedness, students’ perceptions and limiting factors as shown in Figure 1.1. Teachers’ preparedness to use this method may determine whether the method will be utilized in the classroom or not. Learners’ perception on the use of collaborative learning approach can determine whether it will be used or not. Establishment of preferred group size for implementation of collaborative learning by teachers and learners may also contribute to the extent of utilisation of the CL. Other limiting factors such as class size, presence of resources for instruction and learning, time set aside for physics and personal traits of students will contribute to the extent of utilisation of CL. This conceptual framework is related to the theory that will guide this study in the sense that according to Vygotsky Theory, Individuals acquire particular cognitive structures via witnessing how others behave, and these ways explain how people acquire social behaviours (collaborative learning). For Zone of Proximal Development to achieved teachers and peer plays critical role. Skills like observing, recording and analysis of experimental data are also considered as a form of social learning, specifically in laboratory activities. Therefore, the students' perception towards collaborative learning approach will determine application of the approach in teaching and learning physics. The number of learners within a collaborative group that can be small, ranging from 2–3 students, to larger groups of 4–6 students or more. The framework would hypothesize that group size can affect the quality and quantity of interaction among group members, and consequently affects learning outcomes (Vygotsky, 1978).

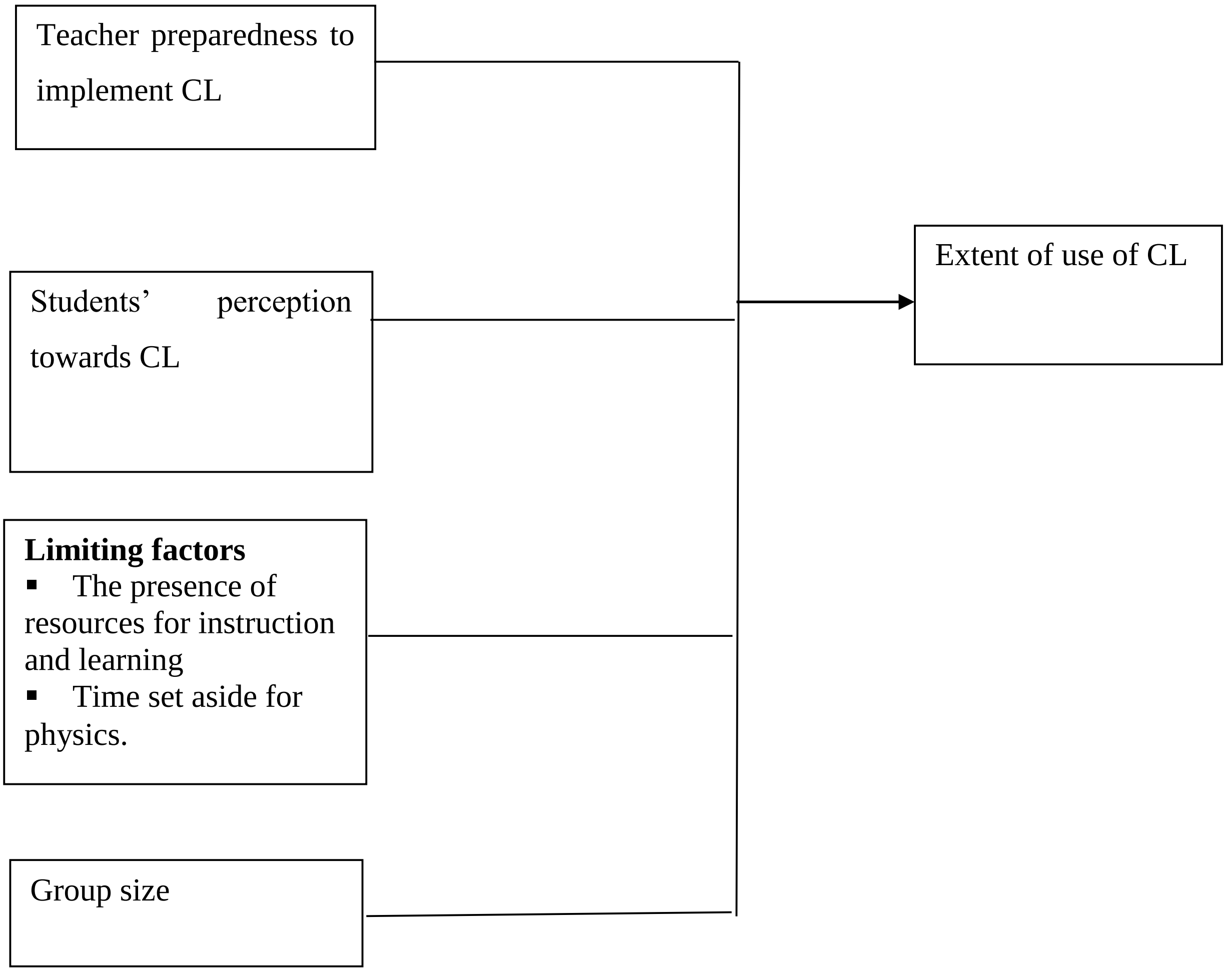


Figure 1.1: Conceptual Framework

1.11 Operational Definition of Terms

Attitude - an emotional response to something or someone that is manifested in one's thoughts, emotions, or intended actions. It is a social orientation—a innate tendency to respond positively or negatively to something.

Collaborative learning (CL)- It refers to the pairing and grouping of students with the aim of achieving academic goals.

Motivation - is a psychological trait that drives an organism to act in a way that will help it achieve its goals, elicits control from the organism, and sustains specific goal-directed behaviours.

Perspective- a specific view; an attitude toward or manner of looking at something.

Perception of collaborative learning: This is how secondary school students and teachers view the use of collaborative instructional method in physics classroom.

Form I: year one of secondary school study curriculum in Kenya.

Form II: year two of secondary school study school curriculum in Kenya.

Form III: third year of secondary school study curriculum in Kenya.

Form IV: forth year of secondary school study curriculum in Kenya.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter reviews the literature that is pertinent to the study. Finding out how teachers and students view collaborative learning approaches in physics instruction is the main goal of this study. Literature on collaborative learning is found in research journals, theses and dissertations, books, periodicals published by the Ministry of Education, pamphlets, booklets, seminar papers, and websites on the Internet.

2.1 The Concept of Collaborative Learning Approach

Understanding the meaning of Collaborative learning is of great significance to both teachers and learners. This helps both learners and teachers to organize and plan effectively when using this approach. Collaborative learning has been stated by various researchers in different ways. "Doing" is one of the five essential components supporting effective learning, as per Race (2005). Collaborative learning is one way to encourage student engagement, while student-centered teaching is another. However, a number of student-centered teaching methods have gained popularity over the past few years (Baeten *et.al,* 2010; Lea *et.al,* 2003). According to Machemer and Crawford, much as active learning requires doing, collaborative learning entails working with others (2007). Collaboration occurs when individuals cooperate with one another in a group setting to advance both their own and their peers' educational goals (Johnson and Johnson, 2009).

According to Dillenbourg (1999), collaborative learning is more specifically described as team problem-solving in situations where there are two or more people learning or trying to jointly learn something. Rochelle and Teasley (1995) claims collaboration more is the participation of individuals involved in a concerted effort to solve a problem on a cooperative basis. There are several reasons why the definition of collaborative learning is ambiguous. Other educators like Barkley, Major, and Cross (2014), defines collaborative learning as a type of group learning in which two or perhaps more pupils in a class work together and equally divide the task in order to finish the assignments that have been specifically designed to meet the class's student learning objectives.

Compared to individual learning, Chiu (2008) says participants in collaborative teamwork utilize each other's skills and resources. Collaborative learning, in particular, is based on the impression that new knowledge could be produced within a population where people actively converse by exchanging experiences and assuming balanced obligations. In particular, collaborative learning is based on the notion that knowledge can be created within a population where people actively interact by sharing experiences and taking on asymmetric responsibilities. These comprise both in-person interactions. The focus of this research is to answer whether this approach is in practice in Physics classrooms despite the extent to which collaborative learning has been defined.

2.2 Teachers' Preparedness on Collaborative Approach to Teaching and Learning of Physics

Teacher preparedness is very crucial for the utilization of CL in classrooms. There are many different ways to plan and organize CL activities. Palincsar (1987) defined reciprocal teaching as "an interactive teaching procedure in which the teacher and students collaborate in the joint construction of text"; hence an organized plan is great importance. To provide students with an example of how to manage their education, the teacher can initially take the lead. Lai (2011) suggests using a number of strategies to guide discussion, including "asking questions, summarising responses, clarifying misunderstandings, and supporting predictions about upcoming text content." According to Wiserma (2000), Teachers' and students' roles are closely intertwined in collaborative learning. First, the teacher should serve as a guide for the students, since collaborative learning may be an innovative learning approach for students, teachers should be sure that they properly convey the goals of the program. This will help ensure that students adjust to the new way of learning. Tinzmann *et.al*, (1990) votes that students in a collaborative classroom have a higher responsibility to create their learning activities when teachers set common learning tasks, such as producing a product in describing the concept, historical sequence, personal experience, and so on. Within the constraints specified by the instructor, these plans should ideally be partially drawn from the objectives that the students themselves have defined. Ndon (2011) states A teacher, in their role as a facilitator, should offer rich environments, experiences, and learning activities by including opportunities for collaborative work, problem solving, and real assignments. According to Lai (2011), educators must also keep an eye on and control their students' interactions. Sometimes, students may run out of ideas to talk about next. A momentarily inactive situation could become active again when the teacher is there. To make discussions more productive, teachers should urge students to contribute fresh ideas or provide groups with feedback. Dillenbourg (1999) suggests that educators establish guidelines for student involvement like this. For instance, each person in the group ought to pose at least one question. Students may be inspired to exchange ideas and then speak up by this practice. Wiserma (2000) describes how to examine students through evaluation. There are two ways that can be used to evaluate collaborative students in the classroom, which are. Group Assessment (Inter-Co). Assessment of colleague relationships in the classroom. On the other hand, in a collaborative learning environment, the instructor serves as a facilitator, creating chances for group projects and problem-solving.

Other factors that may affect using technology in education and learning include time restraints, the skill's perceived value in helping the teacher accomplish his or her goals, and perceived usability, among others. Hruskocy *et.al,* (2000) point out that educational theory plays a central role in persuading teachers to adopt innovation in teaching.

The proposal by Omose (1999) for a better training program for aspiring high school physics instructors in Nigeria, noted that there were several issues with the educational process of physics in Nigerian secondary schools, including insufficient university-level training for teachers, students' negative attitudes toward physics, inadequate laboratories, ineffective teaching methods, and a lack of instructional materials specifically created to support the teaching of physics. As a result, the challenges that the teacher faces in their work are numerous, and their understanding of the aforementioned, as well as theirs.

Daramola (1982) says inadequate training of the physics teachers affects their innovation in classroom. This occupies an important position if one considers the significance of teachers in educational settings. The most crucial resource in physics classrooms, according to Talisayan (1984), is the physics teacher in developing nations like Nigeria where science education has received little to no political support. He further emphasized that a well-trained and motivated physics teacher can overcome constraining situations such as lack of supplies and resources and government indifference. Therefore, he believed that teacher education was necessary to produce self-motivated and well-trained educators who will continually look for solutions to issues in the classroom, those who will lead changes to improve their instruction, and those who won't wait for government or outside funding to put those changes into practice. This study hopes to learn how physics teachers are prepared to plan and use CL in physics classrooms.

2.3 Students' Perceptions of Collaborative Approach to Teaching and Learning of Physics

Academic self-concept includes descriptions and assessments of perceived academic achievement. Eshiwani (2005) states that Academic self-concepts include global self-esteem related to perceived academic achievement.

Students evaluate their performance with that of their peers (an external comparison) as well as to other aspects of their performance. When they compare well to those around them in a specific domain, people are more likely to preserve positive self-concepts in that domain. According to Eshiwani (2005), Academic achievement is significantly predicted by one's perception of oneself as an academic. Teachers may experience hostility from students who have issues with teachers and other school staff (Kerlinger, 1983). The use of self-regulation techniques and students' motivation both influences how interested they are in their coursework. It is therefore anticipated a positive correlation between academic achievement, motivation/self-regulation factor scores, and students' perspectives on their teachers and courses.

According to earlier studies (Kerlinger, 1983) underachievers seem to have a bad attitude toward school. According to research findings that have been consistent over many years, young learners with strong academic performance typically have an interest in learning. According to Heller and Hollabaugh (2011), high achievers and underachievers show more negative attitudes than the average person toward school. Students with positive cognitive attitudes towards school show a statistically significant association with higher grades. In the same way as academic self-concept, there seems to be an association between school attitudes and grades. Still, this association does not imply or establish a causal relationship between the two variables.

Although students' perceptions of the subject may differ from region to region, their attitudes toward Physics may have an impact on how well they perform in this subject. Students may choose the subject and would typically perform well in it if they feel that it is good, useful, and manageable. The effective results of science instruction, according to Shulman and Tamir (2002), are at least as significant as their cognitive counterparts. He argues variety of constructs, including attitudes, preferences, and interests, make up the affective domain, which has an impact on how well students perform in a subject. In 1994, Simpson *et.al,* published a detailed survey of student perspectives towards various science disciplines. They said that, in general, negative attitudes toward certain subjects can negatively affect subject choices and student performance in subjects such as high school. Those who are more actively engaged with science experience an active life interest in learning science (Oliver, 1990).

Hoffman (2002) made a distinction between enthusiasm for the study of physics and interest in physical matters in general. Hidi and Anderson (1992) suggest it is important to also bring out the distinction between wholesome interest in physics and interest in physics-particular topics or physical social climate

The findings by Clinton and Wilson (2019) showed that students thought the active learning classroom was far more conducive to group learning than the typical lecture setting. Students in the active-learning classroom also expressed a greater degree of satisfaction and utility with group learning than did their counterparts in the traditional lecture setting. There is discussion of the implications for creating learning environments and encouraging students to prioritize active learning.

Granito and Santana (2016) noted that compared to typical lecture classrooms, students said collaborative learning in active learning classrooms was more engaging and fun. One explanation by Oblinger, (2005) for this could be that the active learning classroom's design made collaborative learning more fun by better facilitating. Students often mentioned in their open-ended comments that interacting with their peers was a naturally joyful part of collaborative learning. Furthermore, Savin-Baden *et.al*, (2008) noted because of the classroom's design, which prioritizes peer interaction, students might have believed that collaborative learning was more beneficial in an active learning environment.

Marjan Laal (2012) findings show CL has several advantages over competitive and individualistic efforts. It usually leads to increased productivity and accomplishment, more devoted, loving, and supporting relationships, as well as improved psychological well-being, social skills, and self-esteem. Research by Hurst, Wallace and Nixon (2013), Le, Janssen, and Wubbels (2018) Pang, Lau, Poh, Cheong, and Low, (2018). Collaborative learning has been shown to foster higher-order thinking abilities, increase motivation, and improve interpersonal connections.

Since collaborative learning is an effective method of assessing individual differences, it plays a crucial role in improving students' performance across a wide range of cognitive, psychological, and social domains as notes Lavasania *et.al*, (2011). According to Forsyth and McMillan (1991), collaborative learning is viewed as a catalyst or motivational technique that entails a variety of learning scenarios in which students are assembled in small groups to complete a learning objective.

Prosser and Trigwell (1999) assert that learning outcomes are linked to causes and processes when students participate in the process of learning to obtain them. Students that participate in collaborative learning appreciate working as a team to accomplish a common objective. This will enable them to make decisions with even more responsibility. Students reported on a variety of collaborative learning experiences in the classroom. Peer idea sharing is more common among students who support one another through difficulties. With sincere curiosity, the kids communicate with other pupils from other cultural backgrounds by being patient and understanding. This result is consistent with earlier studies by Bellack, (1997) that assert that cooperative learning raises student engagement, strengthens communication and problem-solving abilities, and raises academic performance. Overall, when collaborative learning is incorporated into the educational process, students gain a variety of social interaction abilities.

Students have been found to develop different attitudes towards certain aspects of physics and when asked to give their overall attitudes towards physics they become ambivalent. Attitudes towards physics subjects could also vary from one student to another depending on how they perceive the subject. Student at their youth prefer something enjoyable to engage in, something less stressful and easier to do, and something which in their understanding would, in the long run, add value to their lives. It is, therefore, crucial to try and look at the physics subject to see if it is enjoyable to engage in, easy to understand, and would add value to the learners.

The common belief among some of the students could be that physics is a difficult subject and not enjoyable to engage in. According to Spall *et.al*, (2003) report, Biology is far more popular than Physics in Wales and England. For example, in 2002, 52,100 students chose Biology while 31,500 students took advanced A-level Physics (Publisher Association/Education Publishers Council, 2003). Compared to 16,000 applications for Biology, 10,700 applications were received for physical science Welsh and English higher institution courses in 2001 (Universities and Colleges Administration Services, 2003). The distribution of this is seen in the number of students choosing to pursue physical science at higher institutions of learning.

In Kenya, a similar case of enrolment has been observed whereby in the last four years (2016 - 2019) is as shown in Table 2.1.

Table 2.1: KCSE enrolment 2016-2019

Year	Physics	Biology	Chemistry
2016	149,790	509,982	566,836
2017	160,182	545,663	606,515
2018	172,676	589,900	656,163
2019	184,599	618,654	691,802
	667,247	1,645,545	2,521,316

Only 667,247 students selected physics compared to Chemistry 2,521,316 students and Biology 1,645,545 students (KNEC Newsletter, 2019). The negative attitude towards physics subjects as exhibited in the above data was to be addressed by the SMASSE project. The student attitude or belief developed towards the physics subject could be a factor that makes performance in the physics subject remain below average at KCSE.

Furthermore, the belief that students hold about physics may in turn influence the teacher adoption of CL while teaching physics. If the students believe the subject is easy the teacher could also be motivated to bring in better teaching approaches so as to improve the physics performance. Positively inclined students are enthralled by the natural world and understand the value of science in general or how it might affect their future; negatively inclined students typically view science as a challenging subject. Comparing high-tech and socially conscious pupils' behaviour closely connected perceptions of science and teachers' more theoretical, decontextualized versions of school science reveals a significant gap between the two parties and may prevent an efficient exchange of ideas. Essentially, school science presents a perspective of the established scientific landscape that is looking backward; Students, however, are drawn to and excited by the intense passion of the technological tomorrow that science promises. Osborne *et.al,* (2003) suggest a requirement for science classes is more forward-looking and less retrospective to capitalize on students' interests, The belief that students develop about the subject is based on some knowledge about the subject.

However, the students' attitude towards physics seems not to have improved yet in Kenya. Howes (2002) asserts that science education reforms essentially disregard the very students who stand to gain from them. Most physics teachers do not keenly consider the students' interests when teaching physics. A very efficient method to address some of the issues of the moment in physics education could be to adapt the curriculum by including subjects that students are interested in. The needs of the student should be considered during physics instruction. According to Woolnough (1994), only a small proportion of pupils will be interested in physics if it is not taught in a lively manner and there is no encouragement to do so.

A teacher who is teaching learners who are “switched on’ to Physics may also get motivated and is more likely to put in the best approaches he/she knows to ensure the learners get the best from him/ her. Where the learners have a low perspective about the subject, the teacher may be discouraged and not put much effort into teaching. The research on students' attitudes toward taking science classes has been a crucial aspect of the task of the research community in science education for the past 30 to 40 years, as noted by Osborne *et.al,* (2003). Its importance has been underscored by the sustained decrease in post-compulsory admissions in recent decades, raising concerns in numerous nations, such as the United Kingdom notes Smithers and Robinson(1988) Australia notes Dekkeres and Decleacter (2001), Canada notes Bordt *et.al,* (2001), India notes Garg and Gupta (2003), Japan notes Goto (2001), USA notes National Science Foundation (2002) and all countries of the EU notes Commission of the European Communities (2001) all show greater hesitancy among students selecting science courses, especially science courses, in the last secondary education years. It does not have a significant impact not only on the continuation of the scientific effort, but also on the basic science education of upcoming generations. Due to this, fostering a positive attitude regarding science and scientists and scientific education always been a part of science education in many countries and is an issue of increasing concern.

Researchers used a number of strategies that hyped students' enthusiasm for physics, for instance the "educational reconstruction" advocated by Kattman *et.al,* (1997) or Lijnse's (1995) problem-posing methods. More recently, Tan and Tuan (2005) made use of an inquiry-based instruction to give students the chance to investigate, use, and experience how scientific knowledge is developed. Seker (2005) presented a number of topics by using the scientific history, and Seker (2005) reported an improvement in student a desire to learn physics. These recommended approaches are included within the SMASSSE teaching approach, but still, national results in physics in Kenya have remained below average. The attitudes of science students to physics have remained quite poor. In Nigeria, Onah and Ogwu (2010) found that gender, teacher credentials, and access to laboratory facilities had a substantial impact on students' mastery of physics concepts. They conducted their research in the Ebonyi North educational zone of Ebonyi state Nigeria. According to Hillyard *et.al*, (2010), attitudes of students toward work in groups were connected to their estimation of the importance of interaction between peers, and their earlier group activities experiences, foremost among them specific teacher's precision in articulating the goal of group task. According to Hammond *et.al,* (2010), working with their peers socially is valued by student. ere graded. Additionally, CL has been used in lectures, however the outcomes are conflicting. In contrast to Vreven and McFadden (2007) discovery that learners received no benefits from CL tasks during lectures, Cavanagh (2011) found that students highly valued the opportunity to participate in lectures through CL activities. According to two studies, CL may not be supported by how college students in general view "good" teaching. Resistance to cooperative learning, according to

Kelly and Fetherston (2008), reflects a transmission-based approach to education activities which focus the teacher as the only expert. Students believed their role to just take notes passively. According to Phipps *et.al,* (2001) report, and associated lectures with appropriate university instruction. Indeed, these findings in universities diverge significantly from those in elementary and high school education. The current study investigated student perspective when working in collaborative groups in physics classrooms.

2.4 Limiting factors for utilization of collaborative learning

There are obstacles that affect the frequency and effectiveness of Cl in classrooms. According to earlier research by Parson, (2017) and Rands and Gansemer Topf (2017) based on focus groups and interviews, students perceive that chances for movement around the room and seating arrangements in active learning classrooms foster relationships with peers. until now, research on the use of CL has only looked at issues seen by one actor, such as pupils as pointed out by Popov *et.al,* (2012), or teachers as noted by Gillies and Boyle (2010).

The narrow focus on teachers or students has prevented a thorough examination of the root causes of issues that teachers and students face during CL and the effects of these issues.

For instance, examining the choices teachers make when creating collaborative tasks—such as whether or not to include individual accountability and positive interdependence as pointed by Roseth, *et.al,* (2008). Dommeyer (2007) and Popov *et.al,* (2012) suggest the necessity to look at issues that may lead to the free-riding of some individuals in a collaborative group. These choices ultimately impact how students view group work and the collaborative attitude it inspires in them. Janssen *et.al,* (2007) note that some students may choose to participate less than other group members due to the perception that the activity is not a true group task that necessitates the participation of all group members.

Abrami, *et.al,* (2004) examined obstacles solely from the teachers' perspective or (Freeman and Greenacre, 2010; Ross, 2008) concentrated on a single obstacle rather than several or the pupils according to Chiriac and Granström (2012). According to Ha Le, *et.al,* (2018) large classrooms (about 40–60 students per class), time constraints, and a lack of assessment criteria may all be contributing factors to these teachers' difficulties in evaluating the collaborative process: Over fifty people attend some of my classes. teacher is unable to oversee their group activities efficiently. 20 to 25 pupils are the ideal number for this type of study. This study seeks to find out what could be the obstacle to the utilization of CL in secondary Physics classrooms in Nandi County.

2.5 Group Size

According to a 2011 study by Kooloos *et.al,* students prefer smaller groups and smaller assignments, such as peer group of five (5) person.

Saqr *et.al,* (2019) draw the overall conclusion that larger groups are linked to worse and less varied social interactions as well as lower individual student performance. A large group size made the group less cohesive, with members exchanging information and communicating less effectively. In contrast to the goal of collaborative learning, large groups may encourage some students to isolate themselves and become inactive.

A meta-study conducted by Lou *et.al,* (2001) found that students learn better in small groups and that small group size is a strong determinant of individual accomplishment when studying using computing technologies. A research by Lohman *et.al,* (2000) found that PBL groups with three to six students rated the usefulness of small group discussions higher than those in larger groups.In turn, Tu and McIsaac (2000) recommend that the group size be restricted to three people, particularly in real-time online collaboration scenarios. If not, a method that allows for equal turn-taking must be used to guarantee that each participant has an equal chance. It goes without saying that this problem is not as pertinent in asynchronous communication, such as in learning management system discussion forums.

According to research by Salomon and Globerson (1989), larger groups may result in fewer people participating in collaborative learning. For example, they may amplify the "free rider" and "sucker" effects, where the most capable members put forth the greatest effort and the most capable members put out less mental work due to the perception of a free rider situation.

2.6 The Existing Gaps in The Reviewed Literature

In this chapter, the concept of collaborative learning has been explained. The literature on students' perceptions of collaborative learning has also been reviewed globally, regionally, nationally, and locally. A critical review of the literature has been undertaken to expose the gap the current study intends to fill. Most of the studies reviewed touch on collaborative learning in higher learning institutions and middle-level colleges; however, the proposed study will be done in secondary schools. Much of the literature is also from developed countries and other African countries other than in developing countries where Kenya belongs. This study will, therefore, be done in Kenya to establish the situation of collaborative learning in Nandi County. The study reviewed on collaborative learning has highlighted that CL promotes positive outcomes in learning and utilization of this method depends on teachers' innovative attitude and learners' attitude. According to the study, tertiary students were the main target of collaborative learning research during the reviewed period, with a particular concentration on the physical sciences and computing. Apart from teacher training and learners attitude the literatures has not given much on factors that limit the use of CL

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The methodology and techniques utilized to carry out the study are highlighted in this chapter. This chapter aimed to give an overview of the research topic, research design, study population, sample size and sampling methods, data sources and tools, data collection techniques, data analysis and presentation methods, and ethical considerations. Each of the above subheadings is discussed separately below

3.1 Research Design

This study employed descriptive survey research design. The use of a descriptive survey research methodology in this study has been justified because it captures how teachers and students currently feel about the use of collaborative learning in physics. The goal of the descriptive survey research methodology was to gather data on educational topics of interest to policymakers, curriculum experts, and teachers as Kothari (2009) claims. It investigates and describes the viewpoints, emotions, preferences, and attitudes of the population under study's chosen sample. The most popular research design for gaining an understanding of study variables and how concepts relate to the research problem, according to Mitzel (1982), is the survey research design. Therefore, it is deemed suitable for this study because the variables to be investigated and the data collection techniques are of a descriptive nature Koul (1984) suggests. The target group for the study is too large for observation to be done in-depth, making it economically feasible to take a representation of the whole in order to generalize findings to the entire population, generating thorough, extensive, and valuable research findings. The methodology was chosen because the situation would be studied as it is.

3.2 Categories of Analysis

3.2.1 Independent Variables

These are the factors that could influence or impact the level of collaborative learning in physics. These are manipulated or observed to see their effect on the dependent variables.

Teacher preparedness

Teacher Experience: Number of years that a teacher has taught physics, for example, 0-5 years, 6-10 years, and 11+ years.

Teacher Qualification: Academic level of the teacher such as diploma, degree, and postgraduate qualification.

Training on Collaboration Techniques on the part of the teacher (for example, YES/NO); variety in using collaborative learning teaching methods like group work, peer teaching, and solving activities

Class Size: The number of students in the class (e.g., 30-40 students, 41-50 students, 51+ students).

Students' perception

Collaborative Learning (CL) has been widely recognized in educational settings as an effective teaching strategy that involves students working together in groups to achieve shared learning goals. From a student's perspective, CL can be analyzed across several key categories: social interaction, cognitive development, motivation, and challenges. Each of these categories highlights different aspects of how students experience CL and the impact it has on their academic journey.

Limiting factors

Classroom Environment: Availability of space and classroom arrangement to facilitate group work (e.g., well-arranged desks, availability of lab space).

Resource Availability

Learning Materials: Availability of collaborative learning resources (e.g., textbooks, laboratory equipment, educational technology).

Group Size

The objective is to evaluate how the size of a group impacts the learning of students, including their participation and collaboration.

Engagement rate in a group of varying sizes

In-depth discussion and critical thinking

Efficiency in group activities, for example, creation, problem solving, and teaching peers

Research Questions

Do the students believe that in small groups they have ample opportunity to participate?

How does the group size affect a student's ability to keep focused and collaborate on a continuous basis throughout the task?

3.2.2 Dependent Variables

These are the outcomes or effects that depend upon the independent variables. In this case, dependent variables measure the extent and effectiveness of collaborative learning in physics.

Extent of Collaborative Learning Implementation

Frequency of Use: Frequency with which collaborative learning is employed in physics lessons, such as every week, every two weeks, occasionally.

Duration: The length of time devoted in each lesson to collaborative learning activities. For example, 10-15 minutes, 16-30 minutes, 31+ minutes

Teacher preparedness

Teacher Experience: Time period in years, for example, 1-5 years, 6-10 years, and so on.

Teacher Qualification: Level of Education, for instance, Diploma, Degree, Postgraduate

Training in Collaborative Learning: Yes/No - as a binary variable

Teaching Methods: Frequency of application, for example Never, Sometimes, Often, and Always

Student perception

Student Attitude toward Physics: Likert scale: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree.

Resource Availability

Learning Materials: Yes/No, or Scale of Availability: Poor, Adequate, Excellent.

Extent of Collaborative Learning Implementation

Frequency of Use: Frequency scale (e.g., Weekly, Bi-weekly, Monthly).

Duration: Time range (e.g., 10-15 minutes, 16-30 minutes, etc.).

The table 3.0 below shows the categories of analysis

Table 3.0 Categories of Analysis

Category	Independent Variables	Dependent Variables
Teacher preparedness	Teacher Experience, Qualification, Training.	Effectiveness of Collaborative Learning
Student perception	Attitude, Class Size	Extent of Collaborative Learning Implementation
Limiting factors	Classroom Environment	Extent of Collaborative Learning Implementation
Extent of Utilization	Frequency, Duration,	Extent of Collaborative Learning Implementation
Group size	evaluate how the size of a group impacts the learning of students	Extent of Collaborative Learning Implementation

3.3 Study Locale

The study was carried out in Nandi North Sub- County of Nandi County, Kenya. Its main office is in Kabiyet Town. It shares borders with the following, Kakamega County to the western side, Nandi Central Sub- County to the southern part, Nandi East to the eastern part, Uasin-Gishu to the northern side. The sub-county is split into the Kabiyet and Kipkaren Divisions. The Nandi County contains the Nandi North Sub-County, which is located there. It has coordinates of 00 / 0 34' N latitude and 34^0 34'/35^0 25'E longitude. It is 1300–2500 feet above sea level. Estimated county population is 752,965 people, of which 102,281 (or 13.6%) live in urban areas, according to the 2009 Census. Keeping livestock, maize and tea farming, along with other smaller economic activities, are the main economic activities in the region. Economic, cultural and religious activities are done in cooperative groups. The sub-county was chosen because the student achievement in Physics in KCSE is lower contrasted with the performance in physics in other sub-counties within Nandi County.

3.4 Target Population

The targeted population in this study entailed all physics students and teachers in public secondary schools in Nandi North Sub-County, Kenya. From the Nandi North Sub-County Education Office, the sub-county has 58 public secondary schools divided into 13 county schools and 45 sub-county schools. The total number of students in the sub-county is 12,626 with 6,099 females and 6,527 males.

3.5 Sample Size and Sampling Procedure

Sampling is defined as the process of choosing a representative group from the whole population. According to Cohen and Manion, 2003, in most instances, limitation of time, cost, and accessibility hinders the researchers from collecting data from the whole population; hence, there is a need for the researcher to carefully select a sample that will be representative of the whole population.

In this study, stratified random sampling was adopted, in which the 58 public secondary schools were categorized into three strata of boys' schools, girls' schools, and co-educational schools. An important advantage of using stratified random sampling is that subgroups, particularly the small ones in population, get well represented in the sample.

Among the 58 public secondary schools:

5 boys' school

10 girls' school

43 mixed-gender school

A sample of 20% of the schools to make sure that the sample was representative was selected. Thus, a total of 12 schools were used, which is recommended by Cohen (2003) in noting that a sample size may range from 10 percent to 30 percent of the population. The breakdown is explained below for the schools:

3 girls' school: 30% of girl schools

2 boys' school: 40% of boy schools

7 mixed school: 16% of mixed school

In fact, this research has sampled all the Form 1 to Form 4 physics students within the 12 chosen schools, along with the physics teachers across the selected schools. This gave this study a comprehensive representation on the trends and levels of collaborative learning of physics in different levels and types of schools. As represented in table 3.1 below

Table 3.1: Secondary Schools by Type in the District

Type of School	Number of Schools	Sample	Percentage
Girl Schools	10	3	30%
Boy Schools	5	2	40%
Mixed Schools	43	7	16%
Total	**58**	**12**	**20%**

Source: District Education Office, Kabiyet (2019)

3.6 Research Instruments

Research instruments are tools for gathering data such as a standardized quantitative instrument as Creswell (2003) and Van Manen (1990) advocates. The research tools are resources used to gather, quantify, and analyze data pertaining to the study's subject. A questionnaire, an observation schedule, and a document analysis were the research tools used in this study.

3.6.1 Questionnaire

A questionnaire is an inquiry form and was the primary tool used to collect the data. There were two sets of questionnaires, one set for the students and the other set for teachers of Physics. The questionnaires were developed and administered by the researcher. This made it possible for the researcher to gather a lot of data in a limited amount of time. Given that it is a standard research tool, it enables constancy in the way the questions are posed which enables noting similarities and differences between respondents as suggested by Cohen and Manion (2003). Using this approach is also economical and enables the coding and analysis of the information gathered.

3.6.2 Document Analysis

This is a critical examination of records containing information in respect of collaborative teaching and learning accessed from the teachers of Physics and the school Principals of the secondary schools where the study was done. The records analysed are; KCSE examination results records, KNEC Reports, SMASSE impact assessment reports, teacher records, student enrolment data, Quality Assurance and Standards assessment reports. These documents were given a thorough analysis, and conclusions were drawn and put up against the primary data for comparison. Document analysis enables the researcher to critically examine recorded information that is related to the issue under investigation.

3.6.3 Lesson Observation Schedule

Lesson observation was done to determine the use of collaborative learning approaches in a Physics class. According to Marshal and Rossman (1998), observation is the systematic description of activities and objects in the social context that has been selected for the study. Through observation, a researcher can describe current circumstances using all five senses, which is a real picture of the situation under study as suggested by Erlandson, Harns, Skipper and Allan 1993), hence providing in-depth and reliable information about a study. Furthermore, the method provides insights into underlying information related to behaviour and attitudes of both teachers and students towards a collaborative approach to teaching and learning of physics.

3.7 Validity and Reliability of Research Instruments

The research tools should be valid and reliable in order to guarantee that the study produced accurate findings. Below is a discussion of the validity and reliability of research instruments.

3.7.1 Validity of Research Instruments

Validity is the degree to which findings from data analysis accurately reflect the phenomenon being researched (Orodho, 2005). It is the accuracy and significance of conclusion drawn from research findings. In quantitative research, researchers use terms like credibility, transferability, dependability, and conformability (Jwan and Ongondo, 2011). Credibility is the degree to which a study finds out what it claims to be inquiring and reports what exactly happened in the field (Yin, 2003, Creswell and Miller, 2000). Dependability is the extent to which the research procedure is clear to enable replication or use by other researchers (Mason, 2002). Conformability refers to the level of neutrality of the researcher and how those influences finding recorded (Gillham, 2000). In quantitative research use of triangulation does assist to ensure validity. This study, being mixed method, all the above is relevant; in addition, the researcher consulted his supervisors who assisted to ascertain content validity which is the interest of this study; this is meant to ensure the study has the right content. Their recommendations led to the revision of the tools, which were then used for data collection.

3.7.2 Reliability of Research Instruments

The degree to which scores obtained using an instrument is consistent measures is referred to as reliability (Frankel and Wallen, 2000). A pilot study was carried out by the researcher in one secondary school in Nandi North Sub- County, where the research instruments was administered to sampled students and teachers of physics. The school that was used for piloting was not encompassed in the main investigation. The reliability of the research instruments was evaluated with the test-retest method. This included the questionnaire, observation, and document analysis. To determine the degree to which the questionnaire's contents elicit the same responses each time the instruments are used, the Pearson's product moment formula for the test-retest was used. For the purpose of this study, a correlation coefficient of more than 0.7

indicated the accuracy of the research tools used in collecting data from the respondents (Orodho, 2009).

3.8 Piloting

Forty physics students were used by the researchers for the pilot study. The researchers developed the items for the pilot study in accordance with the research questions and objectives. Within a week, the pilot study was completed, and the researchers entered the findings into Microsoft Excel within the SPSS software application. The results of the pilot study demonstrated the reliability of the items utilised. The Cronbach Alpha score of 0.857 was provided by the SPSS software.

3.9 Data Collection Procedures

3.9.1 Preparation

Ethical Considerations: The researcher Secured permission from the relevant educational authorities in Nandi County as well as from the school administration. The researcher Informed both teachers and students, seeking their consent to the research, explaining the aims, confidentiality, and voluntary participation in the study.

Piloting: The researcher pre-tested data collection tools to identify potential problems for prior refinement before the actual data collection exercise.

3.9.2 Data Collection

Surveying/Questionnaires

The researcher distributed questionnaires to chosen students. The researcher provided a clear indication of the best way of completion and period of completion.

The researcher collected them after a certain period, Ensuring confidentiality of the responses.

Classroom Observation:

The researcher arranged visitation schedules for the selected schools, Scheduled observations in class when the physics lessons could possibly accommodate collaborative learning activities.

The researcher observed a representative sample of lessons in each school, such as at least 1 lesson in each school.

Interviews

The researcher scheduled and conducted interviews with the selected teachers and recorded the interviews with permission, and later transcribed them for analysis.

Organization of Data

The researcher organized the data collected in a manner that reflected the research questions and categories of analysis.

Quantitative data: The researcher tabulated and coded responses to facilitate statistical analysis by means of frequency distribution and mean scores, for instance. Transcribed interview responses along with observation notes in qualitative data

3.10 Data Analysis and Presentation

Making deductions and inferences from the information gathered during an experiment or survey is known as data analysis (Kombo and Tromp, 2006). The Statistical Package for Social Sciences version 20 (SPSS 20) program was used to organize, code, and analyze the collected data. In this analysis, descriptive statistics (frequency, percentage, mean and Standard deviation) was calculated and the distribution characteristics revealed. Data will be presented in pie charts, histograms and bar graphs. The specific data analysis for every objective is presented in Table 3.2.

Table 3.2: Data Analysis Techniques

Objective	**Independent Variables**	**Dependent Variable**	**Analysis Technique**
1. To Determine The Frequency At Which Collaborative Learning Methods Are Being Utilized In Physics Classrooms In Secondary Schools	Frequency Of Utilization Of Collaborative Learning	Frequency At Which Collaborative Learning Methods Are Being Used In Physics Classroom	Mean, Frequency, Percentages, And Standard Deviation
2. To Establish Teacher Preparedness For Collaborative Learning	Frequency Of Utilization Of Collaborative Learning	Students' Perceptions Of Collaborative Approaches In Teaching Physics	Mean, Frequency, Percentages, And Standard Deviation
3. To Establish Students' Perspectives On Collaborative Approaches In Teaching Physics In Secondary Schools	Frequency Of Utilization Of Collaborative Learning	Factors Influencing The Utilization Of Collaborative Learning	Mean, Frequency, Percentages, And Standard Deviation

4. To Assess Factors Influencing The Utilization Of Collaborative Learning In Physics Classrooms In Secondary Schools	Frequency Of Utilization Of Collaborative Learning	To Assess Factors Influencing The Utilization Of Collaborative Learning In Physics Classrooms In Secondary Schools	Mean, Frequency, Percentages, And Standard Deviation

3.11 Logistical and Ethical Considerations

The researcher requested approval from the appropriate authorities. To be accorded with a research permit and authorization from the National Commission for Science and Technology Innovation (NACOSTI), the researcher was given a letter from the dean of the graduate school at Kenyatta University. The researcher entered the study area through the county government offices after receiving the research permit. The county government offices issued letters enabling the researcher to conduct research in the area of study. The letter asked the secondary head teachers to grant permission for the researcher to use their respective schools for the study. The study's objectives were explained to the respondents, and their participation was requested in order to accomplish those goals. Research instruments were then administered personally by the researcher. Where clarifications were needed, they were made, and the respondents had enough time to respond. The respondents' completed questionnaires were personally collected by the researcher.

The study's goals were explained to the respondents, and they were encouraged to help the researcher carry them out by offering their assistance. To conduct the actual study, informed consent will be obtained, all respondents will remain anonymous, and information confidentiality will be guaranteed and ensured. Honesty and objectivity were used to report the research's findings. There was full acknowledgment of all available support.

CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.0 Introduction

This chapter presents data analysis and interpretation based on the objectives of the study. The study's goal was to ascertain the frequency of utilization of collaborative learning, teachers' preparedness, learner perspectives and limiting factors for this approach in physics classrooms. This will help improve the performance in physics and increasing student enrolment in the subject. The study aimed to achieve the following objectives:

a) To establish extent at which Cl is being utilized in physics classroom

b) To find out teachers' preparedness for CL

c) To evaluate students' perceptions of CL.

d) To find out factors limiting utilization of CL.

e) To establish preferred group size for CL learners.

4.1 Response Rate

Questionnaires distributed to the students were 400 out of which total 359 were completed fully with all the information required. The response rate response rate was 89.8%. Mugenda and Mugenda (2003) state that a response rate of 50% is sufficient for analysis and reporting; a rate of 60% is good; a rate of 70% or higher is excellent. This response rate was sufficient for analysis.

4.2 Socio-demographic and other characteristics of the Respondents

This section presents the demographic information of respondents in order to establish the general background of respondents. The findings discussed include: school type/category, gender of respondents, level of teacher education, teachers teaching experience, SMASSE attendance and teachers' workloads.

4.2.1 School Types and Category

The type and category of the schools under study were to be indicated by the respondents. SQ section tool 1 to 3 were used to obtain findings. The findings were as represented in table 4.1.

Table 4.1: Social-Demographic

Variable	Category	Frequency (N=359)	Percentage (%)
School	Boys Boarding	152	43.3
	Girls Boarding	108	30.8
	Mixed Day	61	17.4
	Mixed Boarding	30	8.5
	non-response	*8*	
Grade	Form 1	53	15.0
	Form 2	82	23.2
	Form 3	77	21.8
	Form 4	141	39.9
	non-response	*6*	

Table 4.1 presents the socio-demographic characteristics of the 359 respondents. The majority of respondents were from boys' (43.3%) and girls' (30.8%) boarding schools. Few respondents were in mixed-day schools (17.4%), and 8.5% comprised students from mixed boarding. With regards to the class/grade the respondents were in, the proportion of form four was 39.9%, form three 21.8%; form two 23.2%, and form one 15.0%.

4.2.2 Gender of Respondent

The socio-demographic characteristics of the 359 respondents obtained using Student questionnaire section A item 1 are presented in table 4.2.

Table 4.2: Sex Of Respondents (Learners)

Variable	**Category**	**Frequency (N=359)**	**Percentage (%)**
Gender	Male	196	54.6
	Female	163	45.4

Slightly more than half (54.6%) were males and 45.4% were females.

Socio-demographic for teacher’s despondence obtained using Teacher’s questionnaire section A item 1 were represented on table 4.3

Table 4.3: Gender Respondent (Teachers)

Variable	Category	Frequency (N=12)	Percentage (%)
Gender	Male	7	58.3
	Female	5	41.7

More than half (58.3%) of the teachers were male whereas 41.7% were female. This shows that there were more male teachers of physics than female.

4.2.3 Level of Education of the Teachers

Level of education were obtained using Teacher's questionnaire item 3 and finding presented in table on table 4.4

Table 4.4: Teachers' Level of Education

Variable	Category	Frequency (N=12)	Percentage (%)
Level of Education	Dip Ed	3	25.0
	BEd	8	66.7
	MEd/MSc/MA	1	8.3

When it comes to level of education, majority (66.7%) of the teachers were BEd holders while 5(25.0%) were Diploma of education holders. However, only 1(8.3%) were holders of master's degrees. This indicates all respondents were capable to teach physics in secondary schools.

4.2.4 Teaching experience

Findings on teachers teaching experience were obtained using TQ tool 3 and was as shown on table 4.5.

Table 4.5: Teaching Experience

Variable	Category	Frequency (N=12)	Percentage (%)
How long have you been in the teaching profession?	1-5 Years	3	25.0
	6-10 Years	4	33.3
	11-20 Years	5	41.7

As shown in Table 5, most of the teachers (41.7%) have taught for between 11 to 20 years, while 33.3% have taught for between 6 to 10 years. However, a quarter (25.0%) has taught for one to five years.

4.2.5 SMASSE attendance

The researcher also sought information on physics teacher attendance to SMASSE training. The teachers were asked whether they have been attending the Physics SMASSE INSET cycle. TQ 6 was used to obtain this information and the finding was recorded in table 4.6

Table 4.6: SMASSE Attendance

Variable	Category	Frequency (N=12)	Percentage (%)
Have you gone to any physics SMASSE INSET cycle?	Yes	9	75.0
	No	3	25.0
a) If yes, how many? (N=9)	1-2 cycles	4	44.4
	3-4 cycles	3	33.3
	more than 5 circles	2	22.2
If no, why not? (N=3)	No Invitation	1	33.3
	Sick	1	33.3
	No Reason	1	33.3
How frequently do you attend Physics SMASSE INSETs?	Once a Year	6	66.7
	Once after 2 years	3	33.3

The results reveal that over half,75% of the teachers, had attended a Physics SMASSE INSET cycle, whereas 25% had not attended any Physics SMASSE INSET cycle.

For those who had attended SMASSE INSET, 44.4% of the teachers had attended once or twice (1-2), while 33.3% had attended three or four (3-4) times. Further smaller (22.2%) had attended more than five (5) cycles. A third did not attend. The reasons for not attending were as follows, one was not invited while one was sick and the other had no reason.

4.2.6 Workloads

The researcher also sought information using TQ tool 5 and 7 about teachers' workload in terms of 40-minute lessons. The finding was recorded in Table 4.7.

Table 4.7: Workloads In Terms of Lessons

Variable	Category	Frequency (N=12)	Percentage (%)
What is your teaching load per week?	13-18lessons	8	66.7
	19-24lessons	4	33.3
What is the student-teacher ratio in your physics classes?	30-40 students	3	25.0
	41-50 students	5	41.7
	Above 50	4	33.3

In terms of teaching load, it should be noted that majority (66.7%) of the teachers had 12-18 lessons a week, 33.3% had range of 19 to 24 lessons.

4.3. Objective A): To determine the extent of use of CL in the Physics classroom.

The study sought to find the extent to which collaborative instructional method is being utilized in physics classroom. The findings were obtained using section A item 5 and section B item 1 of the student questionnaires and section A item 6b,8,9 of the teachers' interview

4.3.1 Time allocated and frequency of use of collaborative instructional methods

The teachers were asked to state length time in an average week they committed to collaborative learning activities. The teachers were also asked to state the number of collaborative learning lessons they have taught in the previous one week. Teachers Questionnaires section 1 tool 8 and 9 were used to obtain this information and presented in Table 4.8.

Table 4.8. Frequency Use Of Collaborative Instructional Method By Teachers.

Variable	Category	Frequency (N=12)	Percentage (%)
Overall, how much class time in an average week is committed to collaborative learning activities?	0-10%	1	8.3
	11-30%	6	50.0
	31-50%	4	33.3
	Above 50%	1	8.3
During the past week, how many collaborative learning lessons have you taught?	0	6	50.0
	1-2	5	41.7
	3-5	1	8.3

As shown in Table 4.8, very few (8.3%) of the teachers stated that they devoted 0-10% and above 50% of class time to collaborative learning activities while half(50.0%) devoted 11-30% of class time. A third,33.3% of teachers devote 31-50%. The study established that half,50% had not taught collaborative learning lessons for the past week while only 41.7% had taught 1-2 collaborative learning lessons. Only a few (8.3%) had taught more than 3 lessons.

Learners were also asked frequency at which they solve problems in groups and findings presented as shown in table 4.9

Table 4.9: Frequency At Which Learners Solve Problems in Collaborative Groups.

Variable	Category	Frequency (359)	%
Frequency of Problem-Solving Skills	Never	168	46.7
	Daily	122	34.0
	Weekly	34	9.4
	Monthly	35	9.7

In terms of frequency of problem-solving skills in groups in a classroom setting close to half (46.7%) indicated that they never have problem solving skills organized in their classrooms, 34.0% indicated they have it daily, 9.4% weekly and 9.7% monthly.

The findings suggest that the frequency at which collaborative instructional method is utilized in physics classroom is low. This supports a study by Johnson DW, Johnson RT, and Smith K. (2007) that found that although students can discover a lot from group work, collaboration's learning potential is underutilized in real-world settings.

4.4 Objective B Establish Teacher Preparedness for implementation of CL

The study sought to determine the teacher's activities that enhance collaboration activities. The findings were obtained using TQ Section A item 12 and presented as shown in Table 4.10 and figure 4.1

Table 4.10: Enhancing Activities for Collaboration by Teachers

Statement	Never	Rarely	occasionally	Usually.
1. Provide the groups with limited materials to force students to share materials.	1(8.3%)	2(16.7%)	7(58.3%)	2(16.7%)
2. Provide individual group members with special materials to force sharing if there is to be a successful completion of the group task	1(8.3%)	3(25.0%)	6(50.0%)	2(16.7%)
3. Assign special roles to certain group members to ensure that all must work together to produce a final product.	2(16.7%)	4(33.3%)	5(41.7%)	1(8.3%)
4. Provide grades or rewards to individual group members based on the performance of the entire group	2(16.7%)	7(58.3%)	2(16.7%)	1(8.3%)
5. Monitor and intervene in group activities to encourage balanced participation and to stimulate collaboration.	0(0.0%)	0(0.0%)	4(33.3%)	8(66.7%)
6. Usually, provide groups with feedback on my observations of group behavior and the use of collaborative skills.	2(16.7%)	5(41.7%)	3(25.0%)	2(16.7%)
7. One group member is designated to observe group action and to report on group activities.	5(41.7%)	5(41.7%)	2(16.7%)	0(0.0%)
8. Provide groups time to summarize activities and to hold debriefing sessions after group projects are completed.	0(0.0%)	0(0.0%)	0(0.0%)	12(100.0%)

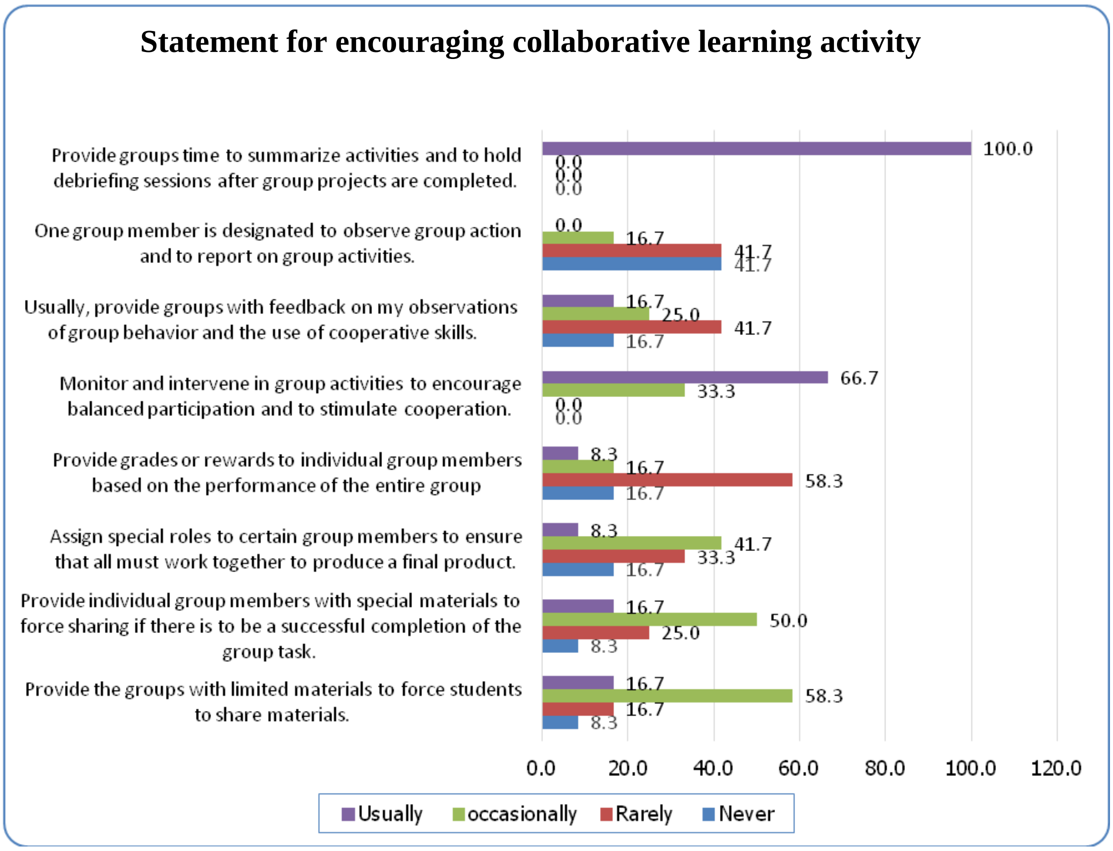
NOTE

*Rarely- not often or infrequently

*Occasionally-irregular interval

*Usually-most often

Figure 4.1: Statement To Organize and Encourage Collaborative Learning Activity



The results show that more than half, 58.3% of the teachers occasionally give the groups of students some limited materials to share, while a smaller number 16.7% do so rarely and frequently. Additionally, 50.0% of the teachers occasionally assign special materials to each group member to force sharing if the group project is to be successfully completed, compared to 25.0% who do so rarely, 16.7% who do so frequently, and 8.3% who never do so. According to the study, 41.7% of teachers occasionally put special positions in place for individuals in a group to ensure that everyone must collaborate to produce a final product, compared to 33.3% occasionally, 16.7% never, and 8.3% usually. The findings show only 8.3% of teachers usually assigns roles to group members. According to studies by Gillies and Boyle(2010),task organisation by role assignment is one of the key component of productive collaborative groups.

Likewise, all teachers give the group time to summarize the activity and hold debriefings after the group's project is completed. The finding can be interpreted that teachers plays there role well to create and ensure effectiveness of collaborative learning. According to a study by Woolley (2015), however, proportionate participation has been demonstrated higher performance than significant for students' accomplishments than makeup of the group because when everyone participates equally, students are more likely to make best use of each other's expertise. The results show that, despite the fact that teachers set up situations to encourage collaboration, slightly more than half (58.3%) of teachers rarely give each group member their own grades or incentives based on the performance of the entire group, with 16.7% of teachers never and occasionally. While two thirds (66.7%) of teachers usually oversee and act immediately in group activities to promote cooperation and balanced participation, a third (33.3%) of teachers do so occasionally. This can be interpreted that teachers ensure productive collaborative group work. A study by Kuwabara *et.al,* (2020) shows monitoring and ensuring balanced workloads makes CL meaningful. Further 41.7% of the teachers rarely provide groups with feedback on their observations of group behavior and the use of collaborative skills while a quarter (25.0%) occasionally, an equal proportion of 16.7% usually and never. The result also shows that 41.7 % of the teachers occasionally assign a group member as a leader to observe and report on group activities. In comparison, an equal proportion (41.7%) rarely do and a few (16.7%) occasionally. This can be interpreted that despite teachers organizing collaborative activities they rarely provide feedback on observations of group behaviour and the use of collaborative skills.

According to a 2009 study by Johnson and Johnson, students' efforts to achieve group objectives—both in terms of group dynamics and subject matter—are encouraged and facilitated by one another. It is necessary for learner have feedback on their group behavior.

Stevens, R. J., Slavin, R. E (1995) advocates that one of the components of successful collaborative groups is monitoring students by giving timely feedback

4.5 Lesson Observation Findings

The researcher organized lesson observation with teachers. The aim was to observe what takes place in the classroom when collaborative learning is used in Physics classroom. The researcher was to observe activities organized by teacher and learners' interaction in group work. ASEI PDSI SMASSE was used to develop check list for what was taking place in classroom. **A**ctivity-based teaching- here the teacher is seen to make the lesson more practical and actively involving the learners in the activities and discussions to develop the lesson. **S**tudent-centered- here the teacher enhances student-teacher interactive learning strategies systematically. **E**xperiment- here the teacher uses experiments to achieve the lesson objective; i.e practically finding out through experiments. **I**mprovisation- here the teacher is seen to be more innovative in using locally available material to make or design some scientific equipment and materials to increase student curiosity level, have more students involved in those activities and to reduce costs by substituting real science equipment. **P**lan- here the teacher develops a lesson plan called ASEI-lesson plan to guide him or her to go through the lesson systematically based on learner's needs. **D**o- here the teacher is seen to be systematic and focused when going through the lesson. **S**ee- here the teacher is supposed to keenly track learners' growth in knowledge, skills, and attitudes at all stages of the lesson, so as to be advised on the next move. **I**mprove- here the teacher gives the students another chance to perform an activity. The following list was observed;

a. Teaching experience of the teacher
b. Circles of SMASSE attended by the teacher.
c. Lesson plan

d. Classroom size
e. Linking of previous Topic/sub topic with the current
f. Stating of the objective
g. Collaborative activity planned/ work sheet
h. Group sizes formed
i. Composition of members in a group
j. Supervision of the groups by the teacher
k. Presentation of outcome/results of cl task by learners
l. Evaluation/ assessment of cl work
m. Conclusion / summary of Collaborative task by the teacher
n. Time management in the Collaborative Classroom.

The study was conducted observation in three classes, one in each of three different schools, and the following findings;

School one was a Form Three boys' school. The teacher had nine (9) years teaching experience and had attended at least five (5) SMASSE insets. The lesson took place in physics laboratory. The room had good spacing with fixed tables. Number of students present was 34. Previous topic was reviewed with question answer method. Lesson objectives were stated. Topic being taught was Electricity II. The teacher had prepared an ASEI lesson plan. After objectives had been explained, learners were placed in groups of five who randomly organised themselves. The learners were involved in distribution of apparatus. Each group was given a worksheet to complete as they do the task. There was seen a lot of interaction among learners as they worked on the task given. The teacher was seen moving and could be heard asking a group to do reconnection while observing the activity. Learners were asked to present their finding on already draw table on the board. Because of limited time results of five groups was used because three groups had not finalized the data. The teacher asked the learner to state what they noticed on relationship between voltage and current. There were number of hands raised to respond to the teacher question. The teacher summed up the lesson by stating the law describing the relationship. Learners were given the task of finding gradient of the graphs drawn and state its meaning as an assignment.

The second school observed was a Form Two mixed school. The teacher had less than five (5) years teaching experience and had attended SMASSE inset once (1). The lesson was a single lesson done in a classroom. The classroom was spacious and number of student present were 42. The teacher had lesson plan. The topic was magnetism sub-topic properties of magnets. Previous lesson was reviewed and the objective of the lesson stated. The learners were organised into six groups. The class was very noisy as the learners turned lockers to face each other. The groups composition was of mixed gender. Learners were asked to open certain page of a textbook and study a certain experiment and with the help of lab technician the teacher distributed apparatus very fast. Some precautions were stated by the teacher and as learners to go ahead with the task. A lot of interaction could be heard among learners as the moved around. The task took a very short time. Learners were asked what they observed and there were numbers of hands raised. One student stated what she observed and the teacher inquired if there was any different observation. There was none. The teacher summed up the lesson by explaining north south position of the magnet of a magnet.

School three was a Form Two girl school. The teacher was with more than five (5) years teaching experience and had attended SMASSE at least twice (2). He had a prepared lesson plan. Topic of study was measurement II numbers of student present was 48. The teacher reviewed the previous lesson with the chart of micro meter screw gauge. The objective of the lesson was stated and task of the day explained. The procedure was written on the board.

Learners were grouped in six. Tasks were to measure diameter of a marble and calculate its volume. There was a lot of interaction among learners. There were a number of learners hands raised in need of help. Some micro meter screw gauge seemed faulty. Learners were asked to fill the table on the board. All groups had almost similar value except two group who re did the work very fast with the help of the teacher. It was active class. The lesson was summed the lesson and gave practise questions on micrometre screw gauge.

The findings from the lesson observation conducted show that all the teachers who participated have knowledge and skills in using collaborative instructional method. They had at least attended SMASSE training and had equipped well for collaborative lesson as evident by lessons plans with work sheets. Classroom sizes was conducive for groups formations and group sizes was practical for collaborative learning. It was also observed learner were actively involved. Teacher monitoring and evaluation group work was observed and most task was completed within the time given. Summary of the task were given by the teacher.

4.6 Objective C: Learner Perspective on Collaborative Learning

The researcher sought find out learners' views when collaborative instructional method is used in class room. Student questionnaire Section B Tools 1-19 was used to obtain information. The findings were presented in table 4.11 and figure 4.2

Table 4.11: Individual Perceptions of students to Physics

Item	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	M±SD
We always learn in collaborative groups in physics classroom	41(11.5%)	11(3.1%)	28(7%)	176(49.4%)	100(28.1%)	3.8±1.2
We have a fixed physics study group	33(9.2%)	40(11.2%)	41(11.5%)	140(39.2%)	103(28.9%)	3.7±1.3
Activities done in groups are always evaluated	18(5.1%)	26(7.4%)	29(8.2%)	153(43.3%)	127(36.0%)	4.0±1.1
I get better grades when I work in a group	16(4.5%)	12(3.4%)	31(8.8%)	139(39.5%)	154(43.8%)	4.1±1.0
It is easier for me to learn when I work in a group	21(5.9%)	27(7.6%)	23(6.5%)	156(43.8%)	129(36.2%)	4.0±1.1
I don't know what to do when I work in groups*	175(49.3%)	111(31.3%)	24(6.8%)	17(4.8%)	28(7.9%)	1.9±1.2
I learn more by working in groups	13(3.7%)	17(4.8%)	24(6.8%)	129(36.4%)	171(48.3%)	4.2±1.0
The work gets done sooner when I work in a group	24(6.9%)	34(9.8%)	46(13.2%)	128(36.8%)	116(33.3%)	3.8±1.2
It is easier to talk to fellow students when I work in a group	25(7.2%)	28(8.0%)	32(9.2%)	148(42.4%)	116(33.2%)	3.9±1.2
I like other students in the group	32(9.1%)	26(7.4%)	66(18.9%)	127(36.3%)	99(28.3%)	3.7±1.2

I like to help other students in the group	9(2.5%)	5(1.4%)	21(5.9%)	147(41.6%)	171(48.4%)	4.3±0.9
I get to know other students better when I work in a group	25(7.0%)	25(7.0%)	27(7.6%)	158(44.4%)	121(34.0%)	3.9±1.2
Other students listen to me in the group	21(6.1%)	21(6.1%)	74(21.3%)	145(41.8%)	86(24.8%)	3.7±1.1
We g*et.al,*ong with each other when working in groups in the group	27(7.9%)	30(8.8%)	61(17.9%)	115(33.8%)	107(31.5%)	3.7±1.2
It is fun to work with other students in the group	66(18.9%)	58(16.6%)	45(12.9%)	96(27.4%)	85(24.3%)	3.2±1.5
I like to hear what others think when I work in a group	40(11.2%)	20(5.6%)	41(11.5%)	127(35.7%)	128(36.0%)	3.8±1.3
It's boring to work in groups*	206(58.7%)	79(22.5%)	21(6.0%)	26(7.4%)	19(5.4%)	1.8±1.2
I long for physics lessons where we solve problems in groups	32(9.2%)	33(9.5%)	69(19.9%)	128(36.9%)	85(24.5%)	3.6±1.2
I prefer to work alone*	143(40.2%)	114(32.0%)	39(11.0%)	26(7.3%)	34(9.6%)	2.1±1.3
Total						72.1±11.6

Note * Reverse coded

Figure 4.2: Students perspective on collaborative learning

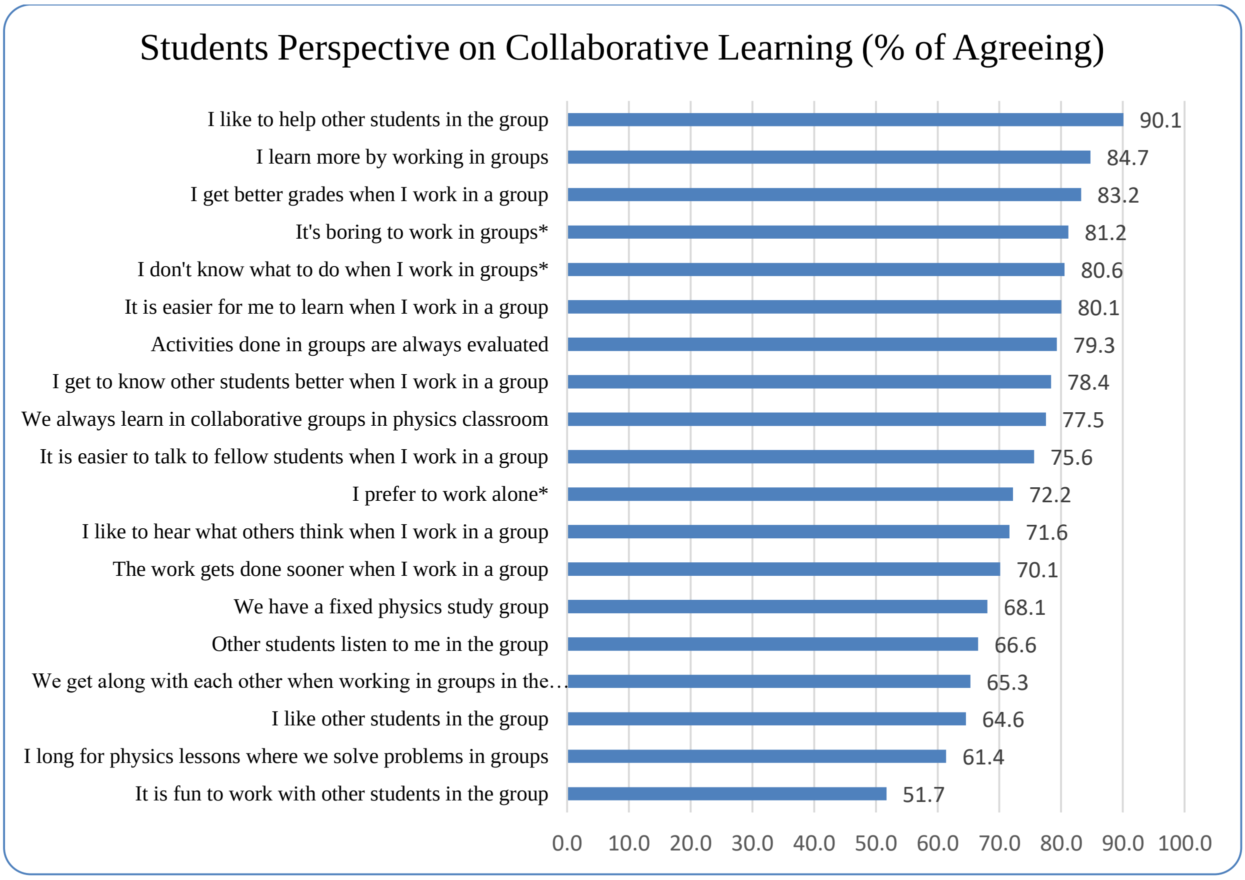


Table 4.11 and figure 4.2 presents' individual students perspectives on collaborative learning. The respondents were asked a total of 19questions in a Likert scale ranging from 1-5. Strongly Agree=5; Agree=2; Uncertain=3; Disagree=4 and strongly disagree=5. All questions were positively asked apart from questions 6, 17, and 19 which were negatively asked and were subsequently reverse coded for scoring purposes. The total scores were then calculated with higher scores indicating positive perspective towards collaborative learning in physics classes.

The mean score was 42.1; median 76.0; SD=11.6 and ranged from 31-94. Among the most endorsed items was like helping other students in the group (90.1%); Learning more by working in groups (84.7%), getting better grades in groups (83.2%) groups not boring (81.2%) and knowing what to do in a group (80.6%). Among the least endorsed items were; it's fun to work with other students in the group (51.7%) , longing for physics lessons where problems are solved in groups (61.4%) and liking other students in the group (64.6%).The findings can be interpreted learners have a positive perspective when this instructional method is utilized in their classroom. This supports findings from other studies conducted in the past (Springer 1999; Tanner 2003; Johnson and Johnson, 2009; Johnson 2014). It has been demonstrated that group work that fosters student collaboration to meet common learning objectives raises student achievement, perseverance, and attitudes toward science.

4.7 Objective D: Factors Influencing the Utilization of CL In The Physics Classroom.

4.7.1 Factors Limiting Use of Collaborative Learning

The teachers were further asked to give their views about what limits them in using collaboration learning approach in physics classroom. Teachers Questionnaires Section A item 11 was used and response presented in the Table 4.12

Table 4.12 Factors Limiting Frequency Use Of CL

Variable	Category	Frequency (N=12)	Percentage (%)
Factors influencing the frequency use of collaborative learning in classroom	Inadequate time	8	66.7
	workload	5	41.7
	Large classes	7	58.3
	Limited resources	7	58.3
	Student entry behaviour	2	16.7

Their response were as follows 66.7% said inadequate time , 41.7% work load , 58.3% large class size , 58.3% limited resources and a few(16.7%) said students' entry behaviour . Gillies and Boyle's (2010) study. It is suggested that structuring collaborative activities presents teachers with a number of difficulties, including establishing teamwork beliefs and behaviours, managing the time for group work, providing appropriate materials, individual roles are assigned, and keeping students on task. An earlier study (Lizzio and Wilson, 2015) discovered that having staff support heightened efficiency of collaboration in a learning environment so there is a need to make teaching easier in any way that is possible. Popov *et.al,* (2014) notes that the entry behavior of the learners as a factor is consistent with a prior study that discovered that cultural contexts, such as individualistic or collectivistic cultures, affected the students' perceptions of teamwork

4.7 Objective E Group size used in collaborative tasks

The study also sought to find group size used by teacher in collaborative activities. TQ Section A tool 10 was used to find the information. The findings were presented in table 4.13

Table 4.13: Collaborative Group Size Used By Teachers

Variable	Category	Frequency (N=12)	Percentage (%)
What is the typical group size in your classroom?	2-3	1	8.3
	4-6	7	58.3
	6+	2	2
	Depends on task	2	16.7

The findings indicate that few (8.3%) use a group of 2-3. More than half (58.3%) use groups of 4-6 and while 2% use a group with more than 6 learners. Those who said the size of groups they use depends on task were 16.7%.

Information on collaborative group size preferred by learners were obtained by SQ Section A tool 7 and findings were presented in table 4.14.

Table 4.14: Collaborative Group Size Preferred By Learners

Variable	**Category**	**Frequency (N=359)**	**Percentage (%)**
Gender	Male	196	54.6
	Female	163	45.4
Number of Student in a Group	2- 3	35	10.0
	4- 6	183	52.3
	6+	107	30.6
	Depends on task	25	7.1
	non-response	*9*	

With regards to student population per group, slightly more than half of learners (52.3%) indicated that they have 4-6 persons, about a third (30.6%) have more than six (6) persons while a few(25) say group size depends on task. Findings can be interpreted that both teacher and learners prefer small groups. This supports research from (Lou 2001) and (Johnson 2007). Small groups (three to five students) are necessary for effective collaborative learning in order to achieve meaningful interaction.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The purpose of this study was to investigate utilization of collaborative instructional method in teaching and learning physics in secondary schools in nandi county.

5.2 Summary of the findings

The author here summarises findings inform the three objectives which guided this study. The purpose of the current study was; (i) To find out the extent at which collaborative learning is being utilized in Physics classrooms in secondary schools in Nandi County. (ii) To find teachers' preparedness to use collaborative learning (iii)To evaluate students' perspectives on collaborative instructional methods in learning of physics in secondary schools Nandi County. (iv) To find out factors influencing the utilization of collaborative learning in Physics classrooms in secondary schools in Nandi County.

5.2.1 Extent at which collaborative learning method is being utilized in Physics classrooms in secondary schools in Nandi County

The pupils were asked about collaborative learning activities they normally undertake in physics classes. In terms of frequency of problem-solving skills in groups in a classroom setting close to half (47.6%) indicated that they never have problem-solving skills organized in their classrooms, over a third (38.3%) indicated they have it daily, while CL problem-solving for weekly and monthly were minimal (4.0%) and (10.0%) consecutively.

With regards to the number of members in a group majority 52.3% of learners indicated prefers to have 4-5 persons, 30.6% prefer to have 6-8 persons, while minimal 10% and 7.1% of learners prefers 2-3 persons and above 8. This concurs with the teachers' response the teachers were also asked to state the group size they usually use in class. The findings indicates that 1(8.3%) use a group of (2-3). More than half 7(58.3%) use groups of (4-6) and 2(16.7%) use a group with more than 6 learners. 2(16.7) said that size of groups they use depends on the task given.

In terms of the criteria used in forming the groups more than half (50.3%) said composition of members are of mixed abilities informed the grouping, more than a third 38.4% indicated members are selected by performance in physics, 7.9% indicated friendship and 3.4% said composition is by gender.

The teachers were asked to specify the duration of time in an average week they committed to collaborative learning activities. As shown in Table 4.8, very few (8.3%) of the teachers stated that they devoted 0-10% and above 50% of class time to collaborative learning activities while majority 6(50.0%) devoted 11-30% of their time. Slightly above a third (33.3%) devotes 31-50% of their time. The findings show large number of teachers devote less time for collaborative learning.

The teachers also requested to state the number of collaborative learning lessons they have taught in the previous one week. According to the study half (50%) of teachers had not taught any collaborative learning lessons for the past one week while only 41.7% had taught 1-2 collaborative learning lessons. Only 8.3% had taught more than 3 lesson. These findings shows frequency with which collaborative learning is utilized is low.

Some of the reasons the learners gave for the group size above include large class sizes, a large workload, inadequate time, and a lack of equipment and teaching and learning resources.

The study sought to determine the teacher's preparedness for collaborative learning. The findings are shown in Table 4.10. The findings indicate that more than a half (58.3%) of the teachers occasionally provides the groups with constrained resources to the students to share materials while equal proportion of (16.4%) rarely and usually. (8.3%) never provide. Also half (50.0%) of the teachers occasionally provide individual group members with special materials to force sharing while 25.0% rarely, 16.7% usually and 8.3% never. This suggests that good number of teachers prepares active group activities.

Further the study established that 41.7% of the teachers occasionally assign specific group members special roles to make sure that everyone must collaborate as produce a final product while a third 33.3% occasionally, 16.7% never and 8.3% usually. There were more than half (58.3%) of the teachers who rarely offer grading or incentives to individual group members on the basis of the overall performance of the group while 16.7% never, 16.7% occasionally and 8.3% rarely. A third 33.3% of the teachers occasionally observe and get involved to help in group activities to encourage balanced participation and to stimulate cooperation while two thirds (66.7%) usually monitor. Further 41.7% of the teachers rarely ensure groups receives feedback on their observations of groups behaviour and the use of collaborative skills while 25.0% occasionally, equal proportion of 16.7% usually and 16.7% never.

The result also shows that 41.7 % of the teachers occasionally assigns the group members to watch group interactions and give outcomes from group task while equal proportion rarely and 16.7% do occasionally. Similarly, all of the teachers give groups time to wrap up activities and organize report discussions after completing group tasks.

While collaborative learning has been employed in physics classrooms in Nandi County, frequency, quality, and effectiveness are greatly influenced by class size, resource availability, preparedness of the teacher, and how the groups are configured. In order for collaborative learning to be more effective, there is a need for greater teacher training in managing collaborative tasks, improved resource allocation, and a stronger emphasis on monitoring and feedback to ensure active participation and learning outcomes for all students. Addressing these challenges will enhance the impact of collaborative learning on students' understanding of physics and foster a more interactive and supportive learning environment.

5.2.2 Teacher preparedness to utilize collaborative

The finding reveals that over half,75% of the teachers, had attended a Physics SMASSE INSET cycle, whereas 25% had not attended any Physics SMASSE INSET cycle. This can conclude that most teachers are trained with collaborative skills advocated in SMASSE training.

Findings on task preparation also indicate teacher organise tasks well when collaborative learning is used in the classroom. The results show that more than half, 58.3% of the teachers occasionally give the groups of students some limited materials to share, while a smaller number 16.7% do so rarely and frequently. Additionally, 50.0% of the teachers occasionally assign special materials to each group member to force sharing if the group project is to be successfully completed, compared to 25.0% who do so rarely, 16.7% who do so frequently, and 8.3% who never do so. According to the study, 41.7% of teachers occasionally put special positions in place for individuals in a group to ensure that everyone must collaborate to produce a final product, compared to 33.3% occasionally, 16.7% never, and 8.3% usually. The findings show only 8.3% of teachers usually assigns roles to group members. According to studies by Gillies and Boyle (2010), task organisation by role assignment is one of the key components of productive collaborative groups.

Likewise, all teachers give the group time to summarize the activity and hold debriefings after the group's project is completed. The finding can be interpreted that teachers plays there role well to create and ensure effectiveness of collaborative learning. According to a study by Woolley (2015), however, proportionate participation has been demonstrated higher performance than significant for students' accomplishments than makeup of the group because when everyone participates equally, students are more likely to make best use of each other's expertise. The results show that, despite the fact that teachers set up situations to encourage collaboration, slightly more than half (58.3%) of teachers rarely give each group member their own grades or incentives based on the performance of the entire group, with 16.7% of teachers never and occasionally. While two thirds (66.7%) of teachers usually oversee and act immediately in group activities to promote cooperation and balanced participation, a third (33.3%) of teachers do so occasionally. This can be interpreted that teachers ensure productive collaborative group work. A study by Kuwabara *et.al*, (2020) shows monitoring and ensuring balanced workloads makes CL meaningful. Further 41.7% of the teachers rarely provide groups with feedback on their observations of group behaviour and the use of collaborative skills while a quarter (25.0%) occasionally, an equal proportion of 16.7% usually and never. The result also shows that 41.7 % of the teachers occasionally assign a group member as a leader to observe and report on group activities. In comparison, an equal proportion (41.7%) rarely do and a few (16.7%) occasionally. This can be interpreted that despite teachers organizing collaborative activities they rarely provide feedback on observations of group behavior and the use of collaborative skills.

The study concluded that, overall, while the teachers of Nandi County are adequately prepared for the implementation of collaborative learning, there exist some gaps regarding the frequency of role assignment, individual assessment, and feedback provision. Strengthening these could further enhance the effectiveness of collaborative learning and ensure the involvement of active participation by all students during group activities.

5.2.3 Students' perspectives on collaborative instructional methods in teaching and learning of physics in secondary schools in Nandi County.

The finding on student perspective on CL in physics classroom as recorded in table 4.11 and figure 4.2 indicates positive perspective. More than three quarters (80.0%) of learner said they learn more and get better grades when solving activity in groups. More than two thirds (65.3%) of learners said its fun working with others to solve a problem. More than three quarter disagree that learning in CL boring. It can also be noted from their response more than two thirds (72.0%) don't prefer working alone. A bout Two thirds (61.4%) longs for lesson where problem are solved in groups.

The findings indicate that the students in Nandi County attribute a great deal of significance to collaborative learning in a physics classroom. They believe this improves their learning outcomes and enjoyment of the subject, building teamwork. These positive student perceptions are indicative of the need for collaborative instructional methods in physics teaching, toward creating an interactive relevant learning environment.

5.2.3 Factors Influencing the Use of Collaborative Learning

The teachers were further asked to name elements that limit them from use of collaboration learning approach in physics classroom. The finding were more than two thirds (66.7%) of teachers said inadequate time, about half (41.7%) said work load, more than half (58.3%) said large class size, half (50.0%) inadequate time, more than half (58.3%) limited resources and very few (16.7%) said students' entry behaviour. Lesson observation conducted also showed there were challenges of learner completing and presenting their findings within lesson time.

In conclusion, several key factors influence the use of collaborative learning in physics classrooms, with inadequate time, large class sizes, and limited resources being the most significant challenges identified by teachers. These factors highlight the need for improvements in time allocation, classroom management, and resource provision in order to effectively implement collaborative learning strategies and maximize their potential in enhancing student engagement and learning outcomes.

5.2.4 Group Size

The results on group size based on the data from Nandi County provide insight into the preferences and practices of both teachers and students in collaborative learning in physics classrooms. Data from Table 4.13 on the typical group size according to teachers and Table 4.14 on students' preferred group size give a full picture of how group size is used and preferred in physics education.

The data from the teachers' responses show that the most common group size in physics classrooms is 4-6 students, while 58.3% of teachers reported that this is the typical size of collaborative groups. A smaller proportion, 8.3%, uses groups of 2-3 students, and only 2% use more than 6 students. Another 16.7% of the teachers explained that the size of the group depends on the nature of the task at hand.

Why 4-6 is preferred:

Teachers prefer a group size of 4-6 students, and this probably has to do with them offering the best balance between classroom dynamics and diversity in the group. In these dimensions, a group of 4-6 participants encourages various opinions to be brought up and increases the chances for engaging in problem-solving with students. This size is large enough to bring different ideas yet small enough for the teacher to effectively monitor the group's progress. According to Johnson *et.al,* (2007), such size groups promote better interaction and participation unlike in the case of a bigger group whereby dominance by one or more members inhibits contributions by others.

Classroom management considerations: The medium group size would be likely preferred for ease by the teachers in managing classroom space, utilizing resources, and managing time. With a larger group size, the teachers may face problems in observing all their interactions, specifically in subjects requiring more focused attention, like physics, where the experiments or problem-solving may need critical guidance. At times, it is imperative that the tutors have to leave some amount of the students' engagements to the realities of the class, and this 4-6 happens to present an optimal compromise.

Students' Preferences on Group Size

From the student side, the preferred group size for collaborative learning is also mainly in the range of 4-6, with 52.3% students showing their preference for the number. Quite a good percentage, 30.6%, preferred groups of more than 6 students, while 7.1% said the ideal group size depends on the task. Only 10% preferred small groups of 2-3 students according to Table 4.14.

Why students like 4-6 members: For similar reasons as the teachers, students may also prefer the group size of 4-6. A good balance between having enough people to share ideas and not growing so large that the contribution of one member becomes less significant. The diversity in perspectives and ideas is important for collaborative learning, and having 4-6 students allows rich discussions and effective problem-solving, particularly in physics, which often involves complex and challenging concepts.

Larger Groups and Their Appeal: Although the larger than 6 in size groups include fewer students, yet as many as 30.6% have opted to go for it. Maybe a big group provides good networking opportunities and also enables the group members to interactively learn from peers. The main obstacle here in big groups is getting all group members' contributions into participation and active involvement in activities. According to Lou (2001), the larger the group is, the more difficult it is to keep up a balanced interaction among its members. This may lead to turning a few students into passive participants.

Task-Dependent Preference: A minority of students (7.1%) mentioned that their preference about group size depends on the nature of the task. It therefore goes to imply that collaborative learning is not an all-size-fits-one approach; meaning, there have to be differing tasks executed with differing levels of collaboration, larger groups are fit for complicated activities or experiments when there might be a variety of roles to distribute while smaller groups are suited to more simple activities or problem-solving activities as everyone will then be in a better position to be fully engaged in the activity.

Small Groups for Effective Collaborative Learning Aligning with the Literature

Data from both teachers and students indicate that smaller groups of 3-5 are preferred, which corroborates more established research into collaborative learning. As Lou (2001) and Johnson (2007) have noted, smaller groups tend to provide meaningful interaction, more participation, and better peer support-all important in successful collaborative learning in subjects such as physics. This is of great importance in Nandi County, where the complexities in physics may require clear communication and problem-solving.

Small Group Benefits: The studies support that small groups of approximately 3-5 students are effective in enhancing active participation for a better and deep understanding of the subject matter. This is particularly relevant to learning physics, with much more hands-on practice, where the students are able to do experiments and solve complex problems in small groups, which motivates group collaboration and teaching among their peers. Smaller groups will therefore ensure more sharing of ideas and doubts, higher-order thinking amongst the students, hence a better grasping of the lesson.

Problems with Larger Groups

Even though bigger groups may be appealing for some students, there are several disadvantages with larger groups (6+ students). It is more difficult to obtain equal participation in larger groups, since some students will dominate the discussions while others may remain passive. This can adversely impact the performance of the group as a whole. Furthermore, larger groups make the process of classroom management even more impossible and relevantly, particularly in lessons relating to physics where experimentation or solving of complicated problems pertains. Therefore, teachers' roles in large groups are rendered challenging because the teacher cannot give personal time to all simultaneously. The consensus required for larger groups often takes longer and may postpone the completion of tasks while lessening the depth of the learning experience possible.

In conclusion, group size plays a pivotal role in the success of collaborative learning in physics classrooms. Both teachers and students show a preference for moderate group sizes of 4-6 students, which strike an optimal balance between diversity of ideas and manageable classroom dynamics. While larger groups may offer networking benefits, they come with significant challenges related to unequal participation and classroom management. For collaborative learning to be most effective in physics education, the findings suggest that small to medium-sized groups should be prioritized, with flexibility in group size depending on the specific task at hand. These insights should inform future approaches to group organization in physics classrooms, ensuring that group sizes foster optimal interaction, participation, and learning outcomes.

5.3 Conclusions

From the finding of the study following conclusion were made guided by objective:

i. Based on students and teachers' response it is clear that frequency at which collaborative learning is being utilized in the classroom is very low.

ii. Teachers have skills in preparing collaborative tasks. Despite these skills, there is a need of improvement in rewarding and giving of feedback on collaborative tasks. It is noted that very few teachers (16.7) provide grades and rewards after CL activity. Feedback on group behaviour and the use of collaborative skills as observed by teachers is rarely given to learners.

iii. Learners have a positive perspective regarding CL in a Physics classroom. This is in terms of understanding concepts and academic performance.

iv. Despite the collaborative learning method being advocated by researchers as seen from the study and embraced by learners, it is underused due to some limiting factors which include: Time, resources, workloads, class sizes, and background of the learners.

v. The findings from both teachers and students in Nandi County on the ideal group size for collaborative learning of physics were a medium-sized group size of 4-6 students. These group sizes are able to create an optimal balance between the diversity of thought and effective participation of students in meaningful discussions and problem-solving activities. However, small groups of only 2-3 students would be relatively rare, while the benefit of closer interaction in such tasks is even greater.

5.4 Recommendations

Based on the findings of the following recommendations are made:

5.4.1 Recommendation to policy makers

1. Schools should provide adequate resources that will enhance CL.
2. The Government should organise more insets on ASEIPDSI for physics teachers for those who have not underwent this in-service training.
3. MoE should ensure that schools have laboratories for science including physics.

5.4.2 Recommendation for practice

1. Collaboration among teachers teaching physics should be encouraged to ease workloads and have diverse collaborative tasks.
2. Physics teachers can organise frequent lesson studies and have improvements on collaborative instructions on their localised school settings.
3. Teachers should prepare students with abilities to work together prior to collaborative task, and equally assess the level of productivity of learning process of individuals and the whole group
4. Teachers should aim to form groups of 3 to 5 students for most collaborative learning activities in physics.
5. Teachers should actively work on building positive perceptions of group work among students, emphasizing the benefits of collaboration and how it contributes to both individual and collective learning.
6. Schools should consider rearranging classroom layouts and optimizing available resources to support collaborative group work effectively.

5.5 Suggestion for further research

The researcher recommends the following for further research:

i. Another study should be carried out in different counties for comparison.
ii. Other background characteristics of learners e.g grades and age can be studied in relation to CL

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APPENDICES

APPENDIX I: STUDENT QUESTIONNAIRE (SQ)

Student perceptions of collaborative learning in Physics classroom in Nandi North District

Dear student,

The aim of this questionnaire is for the researcher to explore utilization and student perception of collaborative learning.

All the information you give will be treated with confidentiality and only used for analytical purposes of this study. Please give your honest views by filling in the blank spaces or putting a tick [ ] in the appropriate space.

SECTION A: BACKGROUND INFORMATION

1. Gender: male ( ) female ( )
2. Type of school:

   Boys' Boarding ( ) Girls' Boarding ( ) Mixed Day ( )

   Mixed Boarding ( )

3. Class:

   Form One ( ) Form Two ( ) Form Three ( ) Form Four ( )

4. In Physics classroom problem solving activities, would you rather work in a group or independently?

a) In Groups ( ) b) Independent ( ) c) Doesn't matter ( )

Give reason for your answer.________________________________

5. How often do you solve problems in organised groups in Physics classroom?

a) Daily ( ) b) Weekly ( ) c) Monthly ( ) d) never ( )

6. What is the number of students in the group that you would prefer to work in?

a) 2-3 ( ) b) 4-5 ( ) c) 6-8 ( ) d) more than 8( )

SECTION B: STUDENTS' PERSPECTIVES ON COLLABORATIVE LEARNING

Indicate the extent to which you agree with the statements below . Tick only once against each statement.

KEY: SA-Strongly Agree, A- Agree, U-Uncertain, D-Disagree,

SD-Strongly Disagree

Statement	SA	A	U	D	SD
1. We always learn in collaborative groups in Physics classroom					
2. We have a fixed Physics study group					
3. Activities done in group are always evaluated					
4. I get better grades when I work in a group.					
5. It is easier for me to learn when I work in a group.					
6. I don't know what to do when I work in groups.					
7. I learn more by working in groups.					
8. The work gets done sooner when I work in a group.					
9. It is easier to talk to fellow students when I work in a group.					
10. I like other students in the group.					
11. I like to help other students in the group.					
12. I get to know other students better when I work in a group.					
13. Other students listen to me in the group.					

14. We g*et.al,*ong with each other when working in groups in the group.					
15. It is fun to work with other students in a group.					
16. I like to hear what others think when I work in a group.					
17. It's boring to work in groups.					
18. I long for Physics lessons where we solve problems in groups					
19. I prefer to work alone					

Thank you for your participation

APPENDIX II: PHYSICS TEACHERS INTERVIEW

PHYSICS TEACHERS INTERVIEW

Dear Physics Teacher,

The aim of this interview is to allow the researcher to explore utilization of collaborative learning and student perception of collaborative learning. Kindly give your honest response to each question.

SECTION A

1. What is your Gender

2. What is your Age

3. What is your highest academic qualification?

4. How long have you been in the teaching profession?

5. What is your teaching load per week? ………………………………………………

6. Have you attended any physics SMASSE INSET cycle? Yes/No

a) If yes, how many? ………………………………………………………………..

If no, why not?...

b) How frequently do you attend Physics SMASSE INSETs?

7. What is the student-teacher ratio in your physics classes?............................…

8. Overall, how much class time in an average week is devoted to collaborative learning activities

9. During the past week, how many collaborative learning lessons have you taught?

10. What group size do you usually use in your classroom?

Explain the reason for your answer above..

11. What are the factors influencing the frequency use of collaborative learning approach in your Physics classrooms?

12. When students work together in groups in your class, how often do you use the following to organize and encourage collaborative learning activity?

Statement	Never	Rarely	occasionally	Usually
Provide the groups with limited materials to force students to share materials.				
Provide individual group members with special materials to force sharing if there is to be a successful completion of the group task.				
Assign special roles to certain group members to ensure that all must work together to produce a final product.				
Provide grades or rewards to individual group members based on the performance of the entire group				
Monitor and intervene in group activities to encourage balanced participation and to stimulate cooperation.				
Usually, provide groups with feedback on my observations of group behavior and the use of cooperative skills.				
One group member is designated to observe group action and to report on group activities.				
Provide groups time to summarize activities and to hold debriefing sessions after group projects are completed.				

Thank you for your participation

APPENDIX III: OBSERVATION SCHEDULE FOR TEACHERS

The researcher used the checklist below for lesson observation.

•	Items to observe	What was observed
1	Teaching experience	
2	SMASSE cycles attended	
3	Availability of lesson plan	
4	Classroom size	
6	Stating the Objective of the lesson	
7	Linking the lesson to the previous lesson	
8	Group size	
9	Group composition	
10	Collaborative task/ worksheet.	
11	Learners’ interactions	
12	Availability of resources	
13	Presentations of group task	
14	Conclusion/summarization	
15	Time management	

APPENDIX IV: MAP OF NANDI COUNTY

APPENDIX V: LETTER FROM MINISTRY OF EDUCATION NANDI COUNTY

REPUBLIC OF KENYA

MINISTRY OF EDUCATION
STATE DEPARTMENT FOR BASIC EDUCATION

Email: cdenandicounty@yahoo.com
Telephone: 0773044624
When replying please quote

County Director of Education
NANDI COUNTY,
P. O. Box 36-30300,
KAPSABET.
Date 25/9/2019

Ref: NDI/CDE/RESEARCH/1/VOL.11/199

Benard Kipchumba,
Kenyatta University,
P.O Box 43844.
NAIROBI.

RE: RESEARCH AUTHORISATION

Reference is made to the National Commission for Science, Technology and Innovation's letter Ref: No. NACOSTI/P/19/1410 dated 19th September 2019.

The above named person has been granted permission by the County Director of Education to carry out research on "***Utilization of collaborative approach in teaching and learning physics in secondary schools in Nandi County***" for the period ending **19th September 2020.**

Kindly provide him all necessary support he requires.

For: County Director of Education
NANDI COUNTY

Odongo J.O
For: County Director of Education,
NANDI COUNTY.

APPENDIX VI: INTRODUCTION LETTER FROM GRADUATE SCHOOL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: E55/CE/25880/2011

DATE: 21st January, 2019

Director General,
National Commission for Science, Technology and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. BENARD KIPCHUMBA KIMOSO – REG. NO. E55/CE/25880/11

I write to introduce Mr. Benard Kipchumba Kimoso who is a Postgraduate Student of this University. He is registered for M.Ed. degree programme in the **Department of Educational Communication and Technology.**

Mr. Kimoso intends to conduct research for a M.Ed. thesis Proposal entitled, **"Utilization of Collaborative Approach in Teaching and Learning Physics in Secondary Schools in Nandi County, Kenya."**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

JL/cww

APPENDIX VI: RESEARCH AUTHORISATION LETTER FROM NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **195516**

Date of Issue: **19/September/2019**

RESEARCH LICENSE

This is to Certify that Mr.. Benard Kipchumba of Kenyatta University, has been licensed to conduct research in Nandi on the topic: UTILIZATION OF COLLABORATIVE APPROACH IN TEACHING AND LEARNING PHYSICS IN SECONDARY SCHOOLS IN NANDI COUNTY, KENYA for the period ending : 19/September/2020.

License No: **NACOSTI/P/19/1410**

195516

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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