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Implementing Cooperative Learning Based-Approach in Mathematics Classroom Context: The Experiences of High School Teachers

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ABSTRACT

There are varied nuances with the implementation of Cooperative learning (CL). This study explored the experiences of 8, high school mathematics teachers in some selected Senior High School (SHS) in Ghana. The participants were purposively sampled to implement CL-based lessons after undergoing a 3-day professional development training (PDT). The study took a period of 16 weeks where each teacher taught a 2-hour lesson once a week. Data from the interview showed that, teachers' prior preparation in the design of CL-based lessons served as guided steps in planning an orderly and systematic presentation of instructional learning materials (ILM) reflective of the pillars of CL to drive teaching strategies during the lesson. Further, the implementation stage of lesson was characterised by a number of activities. Thus, teachers reported positive dispositions towards CL as positively interdependent, promotive of face-to-face interactions, individually accountable, socially skilled and allowed students to group process their thought to the assigned task. The study established at the teacher's post implementation stage that, the incorporation of the CL encouraged full participation, made lessons learner centred, fun, and eliminated boredom. Moreover, the study revealed that the conduct of PDT was critical for the successful implementation of CL-based lessons. Nonetheless, issues of physical investment in preparing notes, ILM, curricular constraints and financial commitment especially when the teacher has to foot the cost of the materials involved were found to be major impediments to the implementation of CL-based lessons in the classroom context of Senior High Schools.

Keywords: Cooperative Learning; Positive Interdependence; Individual Accountability; Promotive Face-to-face Interaction; Social Skills and Group Processing

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1. Introduction

The introduction of a pedagogical strategy leaves an impression on instructors who implement it. These impressions could be positive or otherwise depending on the complexities involved in its use in the classroom context. One such teaching strategy with varied forms of experiences from the perspectives of both students and teachers is cooperative learning (CL). This is because CL as a pedagogical tool in the learning environment advances a particular kind of reasoning that is superior to the conventional means of instruction [1]. Thus, CL is more relaxed and enjoyable than traditional classes [2]. Further, CL motivates and improves the inter and intra-relationships among individual group members during instructions in the classroom context [3]. It has also been observed that CL creates a harmonious environment for learning to thrive [4]. From the perspective of students, the literature indicates that, the use of CL positions students to think logically and support each other during the teaching and learning process [5].

In this way, the individual differences that inhibit student's ability to make meaning of academic materials individually and collectively as a group in the learning environment are minimised [6]. This attests to the student's favourable attitude towards CL when deployed as a means of instruction in the classroom context [7,8]. In view of the effectiveness of CL [9] in improving students' understanding of the subject matter [3], projects CL as the appropriate pedagogical strategy in the classroom environment [10]. Interestingly, the pillars that characterize an effective implantation of CL in the classroom context are largely ignored. Hence, teachers misconstrue the assignment of students into groups during the teaching process as CL [11].

Nonetheless, studies [12–15], have all argued that, the pillars of CL have the requisite potential in the exploration of varied abilities of students. This is because the consciousness of these pillars positions teachers to add to the cognitive base of the students in understanding the subject matter. The research [16] contended that teachers' inability to comprehend the nuances of the pillars of CL inhibits students' performances psychologically and socially. In Ghana, empirical studies that purport to report on the experiences of the teacher's use of CL as a pedagogical tool especially at the SHS level are rare. Thus, in spite of the immeasurable advantages of CL in comparison with the individualistic and conventional teaching strategies [17] many teachers struggle with its enactment in their classrooms [18]. This leaves doubt about the successful implementation of CL to achieve the desired impact [19]. Thus, a study that adds to the literature on the challenges and opportunities of teachers at the SHS on their prior, during and post-implementation practices with CL cannot be over-emphasized.

2. Materials and Methods

2.1. Teachers Challenges in the Implementation of CL

The use of CL as the instructional approach is not in doubt. The research [20] promoted the concept and purpose of CL as "more than a teaching strategy, more than an instructional technique". They argued that implementation of CL "has the potential to completely transform all aspects of your classroom and the school environment so as to promote the sharing of power, responsibility, and decision-making throughout". (p. 16). Nevertheless, its implementation in educational establishments has been researched to be saddled with problems [21]. In particular, the research [18] recognised the complexity of teachers' inability to ensure a fair representation in relation to the student's academic abilities during group composition and task assignments. Further, time management, lack of coordination and concentration during group-related activities were identified as hampering teacher's efforts in establishing a CL-based environment in the classroom [18]. In a similar study [22] highlighted the weaknesses in the implementation of CL in their study. They argued that, in using CL, teachers struggled to keep control of the class owing to the large number (11 members) involved in the group composition at the secondary school level. Moreover, the research [22] alluded to the lack of knowledge on the part of teachers as the cause of the limited application of this pedagogy to enhance the student's socialization and learning. Also, the unwillingness on the part of teachers to adopt this method of teaching is attributable partly to the strain teachers go through to sustain such means of instruction in class [23].

In a more recent study [24], revealed in their cross-cultural analysis of the use of CL in Iran and Australia that notwithstanding, the teachers' inability to enact lessons

anchored on the CL primarily as a result of unfamiliarity and lack of the requisite knowledge of CL, assessment and time management also impeded their ability to implement CL based lessons. However, the study reckons the benefits of deep learning in the successful implementation of CL in the two countries. Research indicates a challenge, teachers' lack of competencies to make most of the students' dependency on their colleagues during CL-based lessons into a shared understanding of the subject matter [24] and the knowledge pre-requisite to get learners to build consensus in class [25]. From the perspective of the school, curricular activities have been studied to affect the CL approach as the time allotted does not support lessons that are CL-based [21].

In the Ghanaian context, the research [1] argued that teachers' misconceptions and inappropriate as well as limited knowledge in the explicit deployment of the pillars of CL have often characterised the conduct of CL in Ghanaian schools. Further, in a related study, the research [10] affirmed that, the findings as found elsewhere [18,21,] and discussed in this study make the enactment of CL based lessons a practical challenge to teachers. However, equipping teachers with the knowledge and skills on the pillars of CL produces the competencies pre-requisite for a successful implementation of CL [11].

2.2. The Pillars of CL

There are pillars that characterise pedagogically inclined means of instruction in the classroom context. These features facilitate students' understanding of the subject matter [8]. In the case of CL, according to the research [26] pillars such as Positive Interdependence (PI), Individual Accountability (IA), Promotive face-to-face Interaction (PFFI), Social Skills (SS) and Group Processing (GP) ought to be present before a learning environment is regarded as CL based.

2.2.1. Positive Interdependence (PI)

PI is pivotal to the functioning of CL as an instructional approach [27]. In view of the importance attached to PI during instruction, it is worthy to note that, an effective implementation of this construct requires students to appreciate the need to: (a) build on the inter-connectivity among group members and note that, individual members' success in the group is contingent on their collective effort as a group and (b) benefit from each other's work [28] In addition, in the classroom context, PI is usually associated with the assignment of students to groups with the aim of finding solutions to the task [25]. The placement of students into groups allows them to master the content of the subject matter individually and collectively as a group [29]. In the context of this study, facilitators are positioned to achieve these goals during instruction. Thus, create an atmosphere in the learning environment such that, student success is reliant on the ideas, involvement, and accomplishment of the others in the group [30]. In this way, learners in a PI-oriented environment are dependent on their ideas and contributions with the aim of finding a solution to the task [31].

2.2.2. Individual Accountability (IA)

The element (pillar) of IA is purposed to promote individual mastery of the subject matter in CL. In this regard, each group member contributes his or her fair share of the group's learning task [32]. Thus, it entails carrying out one's part of the task and offering support to other group members to finish off their task in the learning environment [33]. Again, it enables "students to learn together to gain greater individual competency" [28]. This is vital for the cognitive development of the students since learners with different academic backgrounds and modes of learning are inherently activated and brought to bear on the task assigned to the group. To this end, weak students in the assigned teams are influenced positively in the learning environment as ideas are shared during discussions [10,34]. This positions IA as an important element where learners in teams are held accountable for their participation in a learning task assigned to the group [35]. In this study, IA positions students to learn together, but perform alone to ensure they master the content of the concept taught [14,26].

2.2.3. Promotive Face to Face Interaction (PFFI)

One pillar crucial to the effective implementation of CL is the PFFI. It allows students to be active participants in their assigned groups during discussions. Thus, the PFFI

stimulates students' success through deliberate activities during group interactions on the task. Each other's success in the group is achieved through assistance, support and negotiation of each other's solutions to an assigned problem [13]. In addition, employing PFFI in the classroom context entails cognitive processes such as dialogue on the nature of the assigned task, oral presentations, teaching, brainstorming and challenging each other's reasoning and conclusions, and connecting present with past learning [9]. Further, PFFI involves interpersonal processes and joint celebration of the group's success [3]. In this study, PFFI creates the enabling environment for students to deliberate, question and offer the needed assistance to one another to complete the work assigned to the group [28]. Hence, it is a significant step in establishing CL during instructions.

2.2.4. Social skills (SS)

A cardinal element that maintains, promotes and ensures serenity in the CL is the SS. In this medium, students in assigned groups are invited to contribute to collaborative efforts as pre-requisite interpersonal and small group co-habituating skills [26]. This pillar anchors a conducive atmosphere pre-requisite for learning [30]. Thus, leadership, trust-building, communication, decision-making, and conflict-management skills need to be taught just as purposefully and precisely as academic skills [25,29]. SS is acknowledged as a desirable proficiency for effective learning in the classroom context [31].

In this way, a learning environment reflective and promotive of students' opinions, and hierarchical orderliness in the coordination of the group's activities displays mastery and establishment of SS [21]. Thus, for a fruitful discussion to occur in the context of this study, facilitators foster whole-class discussions on the dos and don'ts that guide the conduct of individual members during group activities in class. This establishes and stimulates co-habitation which is a considerable factor for learning to take place [36].

2.2.5. Group Processing (GP)

Feedback loops promote comprehension in CL and position facilitators to provide clarity to students' questions [1]. One element crucial in achieving this is the GP [37, 38]. GP uses feedback as a means of improving students' comprehension levels during instruction. It positions facilitators to effectively examine the processes used in teaching in order to get students to maximise their own and each other's learning in class [9]. In this regard, setbacks experienced during instructions are improved. Moreover, this pillar requires members in the group during group activities to ensure (a) effective relations, (b) decisions taken are in the group's interest and (c) the group's success as a result of their individual input [39]. In view of this, an environment is created to enable members of the group to offer collective views on the solution to the task assigned to them [40]. It is against this background, that the current study conceptualises GP as the medium through which members in the groups profess diverse solutions to an assigned task during instruction [27].

To this end, these five pillars as discussed served as the items that informed the preparation of lessons by the participants in this study. This was purposed to position them to: (a) structure their lessons to be reflective of the pillars of CL [29,41], (b) fine-tune and adapt CL to the specific needs and circumstances of their students [42] and (c) intervene in malfunctioning groups to improve their effectiveness [43]. Thus, the CL positions facilitators to conduct lessons where students are actively engaged in the learning task with the aim of making meaning of the materials individually and collectively as a group [25,28].

2.3. Purpose of the Study

Taking into cognizance, the innumerable benefits of the deployment of CL as a pedagogical tool inures to students, vis a viz the challenges as elucidated from the perspectives of teachers. It could be argued, a study conducted to explore the teacher's prior preparation, during teaching and post-teaching experiences might be insightful in understanding the teachers' challenges. Thus, the current study purports to report on the experiences of 8 high school teachers prior to, during and post-implementation of CL as a medium of instruction at the high school level and the challenges thereof.

2.4. The Context of the Study

The study engaged 2 cohorts of 4 teachers in 4 out

of the 10 SHS in the Cape Coast metropolis of southern Ghana. Participants accredited with Bachelor of Education degrees were purposively sampled for the study. This enabled the study to select SHS teachers who were professional, available and possessed pre-requisite content knowledge in a subject matter. The essence of this was to allow these participants to bring to bear critical and reflective thinking in their analysis of curricular and pedagogical issues in the study [1, 44]. In all, 8 teachers participated comprising 7 males and a female. A PDT was organised for the participating teachers. For the purposes of identification and encouraging cooperation among the teachers, they were placed in teams of four. Thus, Team One and Team Two comprise Team One Teacher One (T1T1) and Team One Teacher Two (T1T2) as well as Team Two Teacher One (T2T1) and Team Two Teacher Two (T2T2) respectively. Similarly, teams three and four were represented as team three teacher one (T3T1) and team three teacher two (T3T2) as well as team four teacher one (T4T1) and team four teacher two (T4T2) respectively as the nomenclatures in the study. The PDT was purposed to get the teachers to develop insight into the underlying theories (pillars of CL) that underpinned the conduct of the study.

Further, an exposition of the pedagogical approaches that place the student at the centre of the teaching and learning process of the subject matter was discussed. In particular, the teachers at the workshop were exposed to *Positive Interdependence, Individual Accountability, Promotive face-to-face Interaction, Social Skills and Group Processing* pillars of CL [3,12,26] as the key ingredients that characterised the pedagogical strategy adopted in this study. The discussions in relation to every single pillar of the CL and the relationship between them were extensively exhausted at the PDT. This was aimed at enhancing teachers' understanding of the pillars and their utility in the learning environment [14,27,45]. Thus, developing the teachers' competencies to ground their pedagogical approach on the use of CL as a medium of instruction in their classroom context.

Moreover, in achieving the practical effect of using the CL, additional activities were initiated at the workshop stage to get the teachers to design and develop comprehensive lessons and activities on classroom-related subjects. In light of this, a sample demonstration of an exemplary CL-based lesson was enacted by the researchers at the PDT. Thus, giving meaning to the practical effect of modelling and demonstrating the application of the pillars of CL as a medium of instruction in a real classroom situation. The implementation period lasted for 16 weeks with a 2-hour instructional lesson conducted once each week in the respective schools of the teachers. Finally, the PDT positioned the participants to achieve a practical insight into how the relationships that exist in the CL theories as well as the ideas discussed characterized the development of CL-based lessons in the classroom context. The deployment of CL was prefaced on the idea that the participating teachers were informed of what constitutes a CL-based lesson.

2.5. Data Collection Tools

The teachers were interviewed individually at the end of the 16-week teaching period. We employed semi-structured interviews as a means of sourcing data from the participants. The duration for each interview lasted 55–60 minutes. The questions were open-ended and purposed to solicit responses from the participants in relation to their experiences with the use of CL as a means of instruction in the classroom context. The consent of the teachers who participated in the study was sought prior to the PDT. This includes permission to grant the researchers an interview in relation to their experiences post-implementation of the intervention. The questions were themed along the experiences of teachers prior to, during and after post-implementation of the CL-based lessons. This is because the teacher's decision to enact or not to enact lessons anchored on the CL is subject to his/her knowledge of that particular pedagogy. Hence, our interest in the experiences of how these teachers enacted lessons based on the CL. Additionally, we adopted an approach of rephrasing the questions posed during the interview session aimed at erasing statements that were inconsistent and unreflective of the views of the teachers. The dialogues that were transcribed from audio to text were given to respondents to cross-check for the purposes of confirming if their responses to the questions were reflective of their views during the interview sessions, and that, they were the true representations as captured.

2.6. Data Analysis Tools

The deductive and inductive constant comparative methods [45] were employed in the analysis of the respondent's answers to the interview questions. In order to achieve this, the analysis was informed by the studies [42].

2.7. Validity and Reliability

To ensure the validity and reliability of the study, the questions in the interview guide were informed by previous studies [18]. After which they were given to experts for appraisal. The inputs received were incorporated before approving the final themes. To ensure the reliability and validity of data analysis, we worked independently of each other in transcribing and coding the interviews and observations. Further, we analysed 35% of the transcriptions of the interviews. The inter-rater reliability between the coders was initially 72.45%. After our discussions and negotiations of the results of the coding, the inter-rater reliability among the coders reached 87.52%.

3. Results

We sequenced the various themes that emerged from our interview under the sections of teacher's prior preparation, during and post lesson experiences as well as the difficulties encountered in the implementation of CL-based lessons.

3.1. Teachers' Prior Preparation Experiences of CL-based Lessons

The teachers were asked how instructional learning materials (ILM) informed their prior preparation towards the lessons on CL. There were varied responses from the participants. However, most of them saw it as a guided step towards practice and techniques to drive the lesson. The following responses were recoded,

T4T2: "For practice and to assist in planning the orderly presentation of the features during the lesson".

T3T2: "It ensured an orderly and systematic presentation of the concept".

This view also shared by a teacher one from team one who opined that, the use of the ILM provided an "insight into the teaching and learning activities and methods of delivery" (T1T1). Further, the responses from teacher two in team one and two respectively were recorded.

T1T2: "The ILM helped in mobilizing all the base needed to guide the conduct of the activities during the lesson".

T2T2: "Felt motivated and argued that "they motivated me to develop good lesson anchored on the CL where its objectives were achieved".

On the effect of the workshop organised prior to the study, the participants were unanimous on its positive contribution towards the use of the pillars of the CL.

T2T2: "It enhanced my understanding of assigning roles to students in groups [Positive Interdependence] and the students become responsible for their own learning individual [Accountability]".

T4T1: "I got the students to build consensus [Face to face Promotive Interaction] and provided clarity to questions they got it wrong [Group Processing]".

The workshop succeeded in changing some perceptions of the participants. To this, the following were observed.

TIT2: "It changed my way of looking at CL, I think it's better now".

T2T1: "It isn't as complex as I thought, I was able to implement although sceptical initially".

Again, the participants revealed how the workshop informed their decision on the design, use and implementation of the ILM in their classroom context.

T1T1: "My use of the ILM and learner-centred activities during group activities provoked students understanding of the subject [Social skill]".

T3T1: "The workshop introduced me to the conceptual framework [theories of CL] and the model [the practical effect of the five pillars of CL] this assisted in the conduct of my lessons".

It is worthy to note the workshop's contribution in aiding some of the participants to avoid errors thereby enriching the lesson. Thus, team four teacher remarked that "*it enabled me to avoid errors and made the lesson very rich"* (T4T2). Again, T3T2 supported this assertion by adding that *"was able to elude some mistakes which usually characterise my group composition in class* [Positive Interdependence]".

3.2. Teacher's Experiences During the Enactment of CL-based Lessons

The enactment of lessons using the CL was characterised by a number of activities. As a result, we asked the participants whether the students liked the new method of teaching (CL) he/her had introduced in the class. To which we elicited the following responses from the teachers.

T1T1: "Yes, the level of participation from the groups was encouraging" [Face to face Promotive interaction].

T3T1: "Yes, they participated individually [Individual Accountability] and collectively as a group [Positive Interdependence] also did the activities by themselves in a peaceful environment" [Social skill].

T2T2: "Yes, the learners were excited about the approach. In a case where the learner had no idea of the question [individual accountability], they don't feel embarrassed [social skills] to ask their colleagues in the group" [Positive Interdependence].

T4T2: "They liked it so much. They interacted freely [Social skill] during group activities [positive interdependence] and found solution to the problem" [Group Processing].

T2T1: "Yes because it involved student full participation" [Face to Face Promotive interaction].

Specifically, we asked them to specify an aspect of the lesson that went well and supported the students learning. To this, team three teacher two, team one teacher two, team four teacher two and team two teacher two commented as follows:

T3T2: "During the group discussion [Face to face Promotive Interaction] and presentation by the students" [Group Processing].

T1T2: "The use of the activity sheet [Positive Interdependence], the commitment from the individual group members [Individual Accountability] as well as the atmosphere created" [Social skill].

T4T2: "Contributions from other learners [Face-to-face Promotive Interactions] made the ideas shared [Individual Accountability] in the lesson more understandable" [Group Processing].

T2T2: "Students working in groups [Positive Interaction] since it fostered interaction [Positive Interaction] among the creating conducive learning environment from learners" [Social skill].

T3T2: "Individual discussions [Individual Accountability], group work [Positive Interdependence] made students learning from each other" [Promotive face-to-face interaction].

In addition to the sets of information received, the general atmosphere created as a result of the introduction of the new method of teaching (CL) was of concern to us. Hence, proceeded to inquire as to the changes in behaviour that were exhibited by their students during the lesson (thus, in using CL as the means of instruction). The participants shared their views as:

T4T2: "They were excited in class judging from their active participation in the group activities".

T3T2: "They showed interest in the lesson and participated very well".

T2T1: "The students were urging me on, even after time was up for another lesson*"*.

T3T2: "Interestingly, they contributed actively to their group without external support".

T1T2: "Happy since they had a better understanding of the concept taught and as such were motivated to share their ideas during the lesson".

Finally, being conscious of the different roles played by teachers during instructions, we asked the participants the role they played during the use of the CL as the medium of instruction in their classrooms. They were unanimous in their response to the effect of having played the role of a "*facilitator*" or "*guide*" during instruction.

3.3. Teacher's Post-Implementation Experiences of CL-based Lessons

The rationale behind the post-implementation review was to afford the participants an opportunity to reflect on their use of CL and share their experiences taking into consideration activities prior to and during the teaching stages of the lessons. To this end, we asked the participants whether the incorporation of the CL as a pedagogical tool was helpful in achieving their set objectives in class.

T1T1: "It encouraged full participation of the students in class and as such positioned them to offer suggestions in areas, where they felt challenged".

T2T2: "Learner-centred which made the learners dis-

cuss the concept taught by themselves during instruction".

T4T2: "The activities engaged students and made learning fun".

T3T2: "Learner-centred, each group was responsible for coming out with solutions to the problem assigned to them".

T4T1: "learner-centred, students went through the activities by themselves to arrive at the concept".

T2T2: "The students could be seen reasoning logically in relation to the presentations made in class on the task assigned to them".

T3T1: "The active participation of the students during the lessons eliminated boredom as group members were observed arguing out their point".

Most importantly, in hindsight, we asked the teachers about preparations (factors) one would need to incorporate CL as a teaching approach in the classroom context. The views were multiple and varied.

T4T2: "Students' background, ILM for the topic, the teacher's preparedness to use to use the CL as a teaching method and the pedagogical knowledge required for the conduct of the lesson".

T3T2: "More effort needs to be invested in order to produce challenging activity sheet and ILM prior to the lesson".

Interestingly, team one teacher made the case for one to design a comprehensive lesson aimed at allowing the students to make meaning of the materials in class. Thus, he opined that "*a good lesson plan with activities reflective of the CL should be designed to allow students construct their own knowledge by following the drafted instructions on the activity sheet during instructions in class*" (T1T1). Similarly, T2T2 also advanced an argument that "*preparing lesson notes directed at the new method of teaching (CL) and preparing a lot of activity sheets for group activities*". On the need for lesson notes as espoused, T2T1 simply added "*teaching materials and lesson preparations*".

Finally, the participants were asked to state their general impression of the use of CL as a pedagogy at the high school level. Generally, all the participants were unanimous about the positive impact of the use of CL at the classroom level. The following responses were advanced.

T2T1: "Takes into account all the needs of the students".

T3T2: "*It improves the teaching and learning of the subject matter and hence, the performance of the students".*

However, T4T2 shared a rather conflicting account, he observed that "*teachers need more time to prepare*" *but was quick nevertheless, to add that* "*the student benefit from the activity-based teaching so it was worth it*". Further, T1T1 was impressed by the use of CL as a means of instruction and as such suggested that "*it should be fully adapted by the authorities responsible for education in Ghana since it will help increase the passing rate of students in the high school*". In addition, the effectiveness of the CL was commented on by T2T2, that the use of this teaching method was effective. Thus, "*it is an effective approach to provoke students' understanding when employed as an instruction in class*". This was supported by the comments of T1T2 thus, "*it enhances and gives room for the less disadvantaged students to make up what they probably didn't understand in class*".

3.4. Teacher' challenges in the implementation of CL

Challenges in the enactment of lessons using CL have been researched to exist as discussed. It is for this reason the current study sought to solicit the views of the participants in relation to the difficulties encountered during the enactment of the lessons based on the CL in the study. Thus, we asked the participants „Did you experience any difficulty in using this method of teaching (CL)?". In response to this, the majority of the participants responded in the negative, in particular, T1T2, T2T2, T3T1, T4T1, and T1T1, argued that they did "*Not*" encounter any difficulty during the lessons with the CL. Perhaps, this could be attributable to the successful conduct of the PDT organised in the study. However, some offered some reason for their response. For instance, T2T1: „No, learners cooperated very well during the lesson and questions were promptly responded to". However, T4T2 also pointed out "*time constraints*" as the difficulty encountered during a lesson using the CL-based approach. Perhaps T3T2 offered the most insightful point when she highlighted that "*it involves a lot of investment physically in preparing notes, ILM, curricular constraints and also financially especially when the teacher has to foot the cost of the materials involved*".

4. Discussion

The finding in relation to teachers' prior preparation experiences of CL-based Lessons showed that, teachers' prior preparation in the design of CL lessons served as guided steps in planning an orderly and systematic presentation of instructional learning materials (ILM) reflective of the pillars of CL to drive teaching strategies during the lesson. To a large extent, the practical effect of how these pillars informed the design of the lessons and its consequent application in the classroom context is synonymous with the studies [1,3,14,15] which found the use of CL as the appropriate pedagogical strategy in the classroom environment. Again, the prior preparation embarked on by the teachers to ensure the successful implementation of the lessons based on CL in part could be attributed to the PDT and the personal commitment of the participants in the study. This agrees with the findings of a "personal commitment" on the part of the teachers who participated in the studies [18,24] whose participants similarly invested time and energy to the realisation of the study.

Further, with regards to teacher's experiences during the enactment of CL-based lessons revealed that, the implementation stage of lesson was characterised by a number of activities as a result of which they served as facilitators during instruction. The role of a facilitator in CL-based lessons resonates with the study [16] which argued that the position of instructors as a facilitator adds to the cognitive base of the students in understanding the subject matter and consequently limits the psychological as well as social problems encountered by students which improves their performance. However, the capabilities as expressed by the teachers in the current use of the pillars of CL as a teaching method are at variance with the findings of the study conducted by the research [24]. These studies found that teachers were unable to explore the pillars of the CL to the advantage of their students. Thus, teachers lacked the knowledge to get students to build a network of understanding among themselves during instruction. In addition, students' dependence on one another could not translate into a shared understanding of the subject matter in the group. Further, the current found that the teachers were able to build a teaching environment using the CL where students fully cooperated, participated and shared ideas individually and collectively as a group. Hence, the current findings align with the studies [5–7,9,10]. These findings are suggestive of students' favourable attitude towards the CL-based approach when deployed as a means of instruction [7] as a result of its effectiveness [9,12] and the ability to suppress individual differences in the classroom context [6].

In response to teacher's post-implementation experiences of CL-based lessons, this study established that, the incorporation of the CL encouraged full participation, made lessons learner centred, fun, and eliminated boredom. These views expressed by the teachers in the current study agree with a number of studies. For instance, in a recent study conducted by the research [4], they averred that the use of CL created an enabling environment conducive learning to take place. This view is supported by the narratives expressed by the participants in the current study. The general impression of the participants towards CL in the current study contrasts with the findings of studies [1,21] which argue for difficulties in the implementation of lessons based on CL. Further, the findings of this study are synonymous with the issues raised in the studies [14,15] in relation to the pillars of the CL being fundamental in provoking student's interest and understanding of the subject matter when employed during the teaching and learning process in the classroom context. However, the current study's findings as discussed are at variance with the positions of studies that argue that the unwillingness on the part of teachers to employ CL based approach could partially be attributed to the burden on the already tightened curricular activities in the schools as well as personal commitment on the part of teachers to make conscious effort to sustain it [23].

Nonetheless, issues of physical investment in preparing notes, ILM, curricular constraints and financial commitment especially when the teacher has to foot the cost of the materials involved were found to be major impediments to the implementation of CL-based lessons. The findings of this study in relation to the constraints teachers face during lessons sharply contrast with some of the findings articulated in the studies [18]. For instance, the study reported on the perceived problems of 10, middle-year teachers who implemented CL in a unit of work across two school terms [18]. The study articulated a number of difficulties encountered by the teachers among whom was a lack

of coordination and concentration during group-related activities. These were identified as hampering teacher's efforts in establishing a cooperative learning-based environment. These observations were in contrast with the current findings of this study. Perhaps these variations in findings could be attributable to the differences in the longevity of the two studies as the current study was undertaken in a 2-hour instructional period which lasted for 16 weeks. Again, the gaps in the teaching experiences of the participating teachers (high school and middle year) and the cultural settings cannot be ruled out as recent study [24] established that differences in the cultural settings have an effect on the implementations of CL. However, time management and positive experiences of the teachers with CL as found in the study [18] largely agree with the current study as discussed. Further, the problems encountered in the study as highlighted are synonymous with the findings in the study [3] to the effect that, curricular activities and the time allotted do not support lessons anchored on CL. In a similar, study at the secondary school level in the UK, the research [22] reported the teacher's struggle in controlling group-related activities primarily as a result large group size of 11 students. However, this problem never arose in the current as teachers rather managed class size of 4 students in a group. This led to the full cooperation and the congenial atmosphere enjoyed during instructions with the CL. The largely positive experiences of the teachers in the enactment of lessons using CL as reported in the current study is inconsistent with the findings in the study of the research [19].

5. Conclusions

The study shed light on the experiences of 8 high school teachers prior to, during and post-implementation of the lessons based on the CL. Thus, the activities the teachers embarked on before they taught their lessons (prior), how the features of CL based approach informed the methodology of the lessons (during the lesson) and the reflections on how the features of CL facilitated their lesson in their classroom context (post implementation of the lesson). Evidence adduced in the study suggests that the teachers enjoyed a favourable teaching experience with the CL-based approach, provoked student's interest and understanding of the subject matter and assumed the position of a facilitator throughout the lessons. However, issues of constraints in relation to time, curricular activities, and commitment on the participant's part were reported as challenging in order to ensure the successful implementation of lessons anchored on CL.

Notwithstanding the challenges, the teachers advocate for the use of CL based approach as a pedagogical tool in all high schools in Ghana. To this end, teacher education institutions are urged to consider training prospective teachers on how to enact lessons reflective of the CL pillars. Further, heads of high schools and other training institutions should consider providing PDT to the in-service teachers on what constitutes lessons that are cooperative-based. The study was not without limitations. First, the selection process was based on the availability and the willingness on the part of the teachers in the high school to participate in the study. As such, there could have been other teachers who would have enriched the study but for some considerations could not be part. Secondly, owing to logistical challenges, 8 teachers in 4 out of the 10 high schools in the study's setting participated in the study. We are of the considered opinion that quite a number of issues would have been brought to bear if the numerical strength of the sample had been higher. Finally, our presence in the participating schools and the conduct of the interview sessions made some of the teachers (interviewees) nervous as was observed. Nonetheless, the teachers who took part in the study were dedicated, availed themselves and promptly responded to all queries raised during the course of the study.

Author Contributions

Conceptualized, R.K.A.; designed the study, R.K.A.; supervised the data collection process, R.K.A.; conducted the data analysis, R.K.A.; drafted the manuscript, R.K.A.; reviewed and validated the methodology, D.D.A.; provided critical revisions to the manuscript, D.D.A.; supported the interpretation of findings, D.D.A. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board [INSTITUTIONAL REVIEW BOARD, GHANA–Ethical Clearance Form ID-UCCIRB/CES/2021/75], who can be contacted at [UNIVERSITY OF CAPE COAST, GHANA].

Informed Consent Statement

In this study, stringent adherence to ethical principles with the aim to protecting rights, privacy, and well-being were safeguarded. In particular, teacher consent was obtained via clear, voluntary forms, securely stored physically or encrypted digitally. The form outlined the study's purpose, procedures, potential risks and benefits, the voluntary nature of participation, the right to withdraw at any time without consequences, and contact information for the research team. Encryption keys of the stored data were managed securely, with access restricted to authorized personnel through multi-factor authentication. Hard-copy data were stored in locked cabinets in a secure, access-controlled office. To this end, only designated research team members with ethics training could access these materials. Anonymity was ensured through de-identification and random IDs. Again, confidentiality was maintained through restricted access and aggregated reporting. Further, only trained research personnel with IRB approval could access study data. All team members signed confidentiality agreements and completed ethics training.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The authors declare no conflicts of interest.

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