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Using Cooperative Teaching and Learning Approach to Improve Students' Attitudes and Achievement in Biology: A Case Study of Tamale Business Senior High School in the Northern Region of Ghana

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ABSTRACT: The study sought to improve the attitudes and achievement of Home Economics students in Biology through cooperative teaching and learning approach. The study used action research design. A sample size of 66 students was used for the study. Questionnaire and tests were the instruments used in gathering data. Descriptive statistics and paired t-test were used in analysing the data collected from the questionnaire and tests. There was a significant difference in mean values of students' attitudes and achievement scores between the pre-test and post-test using cooperative teaching and learning approach. It was therefore recommended that cooperative teaching and learning should be employed in teaching Biology at Senior High Schools in Ghana to help instil positive attitudes in students and to address poor attitudes towards Biology.

KEY WORDS: Cooperative teaching approach, Attitudes, Achievement

I.INTRODUCTION

Home Economics is an applied, multi-disciplinary subject that provides students with a wide range of learning experiences and the knowledge, and skills necessary for living as individuals and as a family. In Home Economics, various phenomena, observations, and incidents are explained on the basis of both behavioural and natural sciences [10, 11, 31]. In the Finnish Home Economics curriculum, practical in everyday management is emphasized and is an important part of a lesson's pedagogical content.

The study of Home Economics in Ghana places emphasis on the physical, emotional, intellectual and social needs of the individual, the family and society. The welfare of the individual, the family and society are therefore the primary concern in home Economics. This concern is manifested by assisting the student to acquire skills that he/she would need to be able to improve the quality and meaning of life in a changing society.

Changing conditions allow pupils to follow reactions and make observations. A deeper understanding of reactions and phenomena require, however, that pupils master the basics of Chemistry, Biology and Physics. It is in this direction that Home Economics students are required to select one of the sciences as an elective which is actually a requirement for admission into the University.

Biology is one of the four elective subjects under the vocational (home economics) category. Home Economics Students' performance in Biology has been very poor as compared to their counterparts who offer pure science. This is as a result of several factors including inadequate materials and equipment, the poor entry grades in science (Biology) of Home Economics students, lack of qualified Biology teachers, and the students' own attitude towards the subject. Several efforts have been made by stakeholders in Ghana to improve students' attitude toward and achievement in science by organising science programmes such as Science, Technology, and Mathematics Education (STME's), Vocational training for science students and girls in particular in the Metropolis.

The factors that account for the poor achievement could be the teacher factor (teaching approaches, professional qualification and use of TLMs) and the learner factor (entry behaviour, relevance of the subject, future prospects/jobs



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and students' attitudes). Research on the relationship between learners' attitude and achievement is fundamental in science education [40].

In general, attitudes and interest have been identified as important for student's understanding, learning and their academic success. This underscores the desire to investigate the attitudes of Home Economics Students towards biology to employ the Cooperative teaching and learning approach to improve upon their academic achievement.

II.STATEMENT OF THE PROBLEM

The general performance of Home Economics students in Biology since its inclusion in the Vocational Programme in 2001 has been poor in Ghana. Several factors such as lack of well-equipped laboratories, unqualified teachers, and lack of teaching-learning materials as well as the students' attitudes account for the poor achievement of Home Economics students in Biology [14]. Also, many factors influence attitudes and achievement among adolescents. Some of the factors are associated with parental background and family environment. Other factors relate to individual characteristics such as self-concept, locus of control, achievement and motivation.

Researchers have incorporated a range of components in their measures of attitudes to science including: the perception of the science teacher; anxiety toward science; the value of science; self-esteem at science; motivation towards science; enjoyment of science; attitudes of peers and friends towards science; attitudes of parents towards science; the nature of the classroom environment; achievement in science; and fear of failure in course [29]. These and many other factors are responsible for poor attitudes and achievement in Biology by these students.

However, recent researches in attitudes toward Biology [30] as well as the [8] on Biology has indicated that, the performance of Home Economics students in Biology has been poor due to factors such as difficulty in providing descriptive answers to questions, spelling mistakes of Biological terminologies, candidates also exhibiting lack of knowledge of the subject matter.

Also, the researcher's observations, evaluations and enquiries, revealed that Home Economics students' attitudes toward the subject differ from their counterparts of pure science which invariably may lead to low achievements in the subject. Both teacher and learner factors need to be addressed if the students' attitude has to be improved which would result in better achievement in the subject. This calls for innovative ways of teaching Biology that would address the factors outlined. One of such innovative approaches is Cooperative teaching and learning.

Contextual teaching and learning (CTL) is a conception of teaching and learning that helps teachers relate subject matter content to real world situations and motivate students to make connections between knowledge and its applications to their lives as family members, citizens, and workers and engage in the hard work that learning requires [9]. Contextual Teaching and Learning approach is a relatively new concept in the field of education, its principles and practices have been around for centuries [12].

Cooperative learning is a component of the contextual teaching learning approach. Although Cooperative learning students work together in small groups and focus on achieving a common goal through collaboration and with mutual respect [37]. Each student within the group is viewed as making a significant contribution to the goal. Cooperative learning is a mode of learning in which students work in small groups to achieve a purpose. Here there is an emphasis on the importance of group work, students in a group help each other in learning the content, but achievement is judged individually.

III.PURPOSE OF THE STUDY

This study seeks to improve the poor attitudes and academic achievement of Home Economics students' in Biology through cooperative teaching and learning approach.

IV.OBJECTIVES OF THE STUDY

The objectives of the study sought to:

- 1 determine the attitudes of Home Economics students towards biology.
- 2 determine the factors account for Home Economics Students' attitudes toward Biology.
- 3 ascertain the effect of cooperative teaching and learning approaches on student's attitudes toward Biology.
- 4 find out the impact of the cooperative teaching and learning approach on students' academic achievement.



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V. RESEARCH QUESTIONS

The following questions guided the study:

1. What is the attitude of Home Economics Students' towards Biology?
2. What factors account for Home Economics Students' attitudes toward Biology?
3. What is the impact of the Cooperative approach on Home Economics students' attitudes toward Biology?
4. What is the impact of the cooperative approach on Home Economics students' academic achievement in Biology?

VI. NULL HYPOTHESIS

The null hypothesis tested in the study was:

Ho: There is no significant difference in the use of the Cooperative teaching learning approach on Home Economics students' academic achievement in Biology in the Tamale metropolis.

VII. SIGNIFICANCE OF THE STUDY

The study would help students to develop a much more positive attitude towards the learning of Biology. The study would also help address the persistent poor academic achievement of students in the subject. Again, when the findings are made available to teachers and other stakeholders in Science Education, it would help in their decision-making concerning methods of teaching Biology at the Senior High School level. It is hoped that the outcome of this research findings would motivate Biology teachers to incorporate it into the teaching and learning of Biology which is likely to improve Biology teaching and learning in Business Senior High School and Ghana at large.

VIII. LITERATURE REVIEW

The theoretical base of this research is embedded in the cooperative learning approach under the constructivist and social cognitivist theories of learning. Constructivism is an approach to teaching and learning based on the idea that learning is the result of mental construction [6]. Constructivists believe that learning is as a result of context based on which an idea is taught as well as beliefs and attitudes of students. The theory suggest that students construct knowledge and meaning from their experiences with the teacher as a guide. Cooperative learning is the instructional use of small groups so that students work together to maximise their own and each other's learning [19].

With this 21st century, the use of cooperative learning revealed that many students had very few social skills, therefore the need for teachers to incorporate the teaching of social skills into the used of cooperative learning [20]. Cooperative learning helps each group member to individually account their efforts of the work in order to strengthen the responsibility forces generated. Besides, cooperative learning promotes social interdependence which make group members acquire necessary social skills such as communication, decision making, leadership and conflict resolution needed to work effectively with each other to produce positive results [15, 16]. Cooperative learning technique has two major theoretical perspectives thus, motivational and cognitive. The motivational theories of cooperative learning emphasize the students' incentive to do academic work, while the cognitive theories emphasize the effects of working together. Cooperative learning experiences promote more positive attitudes toward the instructional experience than competitive or individualistic methodologies. In the implementation of the cooperative strategy, the group investigation was employed by the researcher where students worked in smaller groups to make findings on various tasks and present their findings to the whole class. The approach has numerous benefits such as instilling in learners' important behaviours that prepare them to reason and perform in an adult world [1, 26]. Again, attitudes and values of learners are formed through social interaction. Research efforts on cooperative-learning indicated that it enhances student achievement [17, 35, 39].

XI. METHODOLOGY

The study was an action research which aimed at improving students' attitude towards Biology and their academic achievement. Action research is a form of investigation designed for use by teachers to attempt to solve problems and improve professional practices in their own classrooms [5].

The intervention process involved the use of the Contextual Teaching and Learning (CTL) model (Cooperative learning approach), to teach a major Biological topic thus, interactions in nature with units as ecological habitats, factors of the ecosystem, the soil, biological associations, food chains and webs, pyramids and concept of symbiosis. Cooperative Learning, a CTL approach, is the instructional use of small groups so that students work together to maximize their own and each other's learning [21]. It is a successful teaching strategy in which small teams, each with students of different levels of ability, use a variety of learning activities to improve their understanding of a subject. Each member of the team is responsible not only for learning, but also for helping teammates learn.

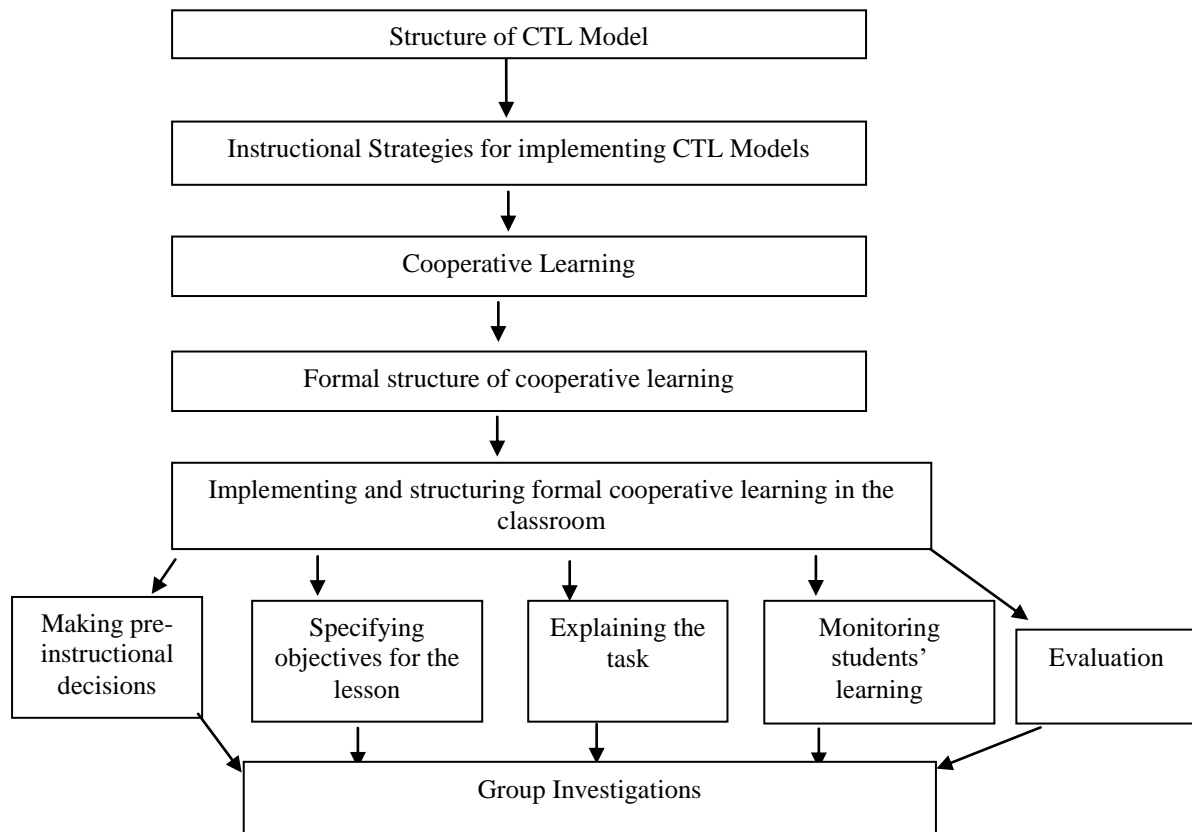


Fig 1: CTL (cooperative learning approach) model

The cooperative learning strategy was employed by the researcher for this study because of the identified factors from the questionnaire that contribute to the students' poor attitudes towards Biology. The model consists of five steps as making pre-instructional decisions, specifying objectives for the lesson, explaining the task, monitoring students' learning and evaluation. The researcher implemented this model through the group investigation during the intervention stage.



A plan of activities for six weeks instructional lessons during the intervention stage are outlined as follows:

Table 1: Activities during the intervention stage for a period of six weeks

weeks	Group	Content/Topic	Objectives	TLMs/Activities	Presentations/Evaluation
1	All	Terrestrial habitats, Aquatic habitats	outline the general characteristics of aquatic and terrestrial habitats	Biology Text books. Observation of Habitats by students, groups' discussions.	Groups presentations in class; organisms are on land, aquatics in water. questions and answers
2	All	Biotic & Abiotic factors, effects	explain the effects of abiotic, biotic factors	Texts books/ observe and discuss interactions of the two different f actors.	Presentations: Photosynthetic organisms, chemical, Physical environment. Individual questions: e.g. what is the effect of light on plants, animals? etc.
3	All	Soil components and properties, experimental determination methods	list and explain soil components, determination of Air and water	Text books/discussion on findings, Illustrations on determination of water and air in soil samples	Presentations/properties: Air, water, organic and inorganic substances. Sandy retains less water while loamy holds moderate, clay retains high. Questions
4	All	Food chains & webs, methods of determining food chains & webs	explain food chains, webs. how to determine them	Videos/Observations in surroundings/ discussions.	Presentations: food chains, webs by means of diagrams. Explanations: direct method observation of organisms as they feed. Eg. Goat, fowl
5	All	explain the components of pyramids, concept of symbiosis	explain the components of pyramids, concept of symbiosis	Presentations: Charts of pyramids. Explanation of concept of symbiosis.	Presentations: Charts of pyramids. Explanation, symbiosis is feeding relationship involving two orgs. Questions: parasitism; affects one
6	All	Post test	All questions	Written test for 40 minutes	Section A;10 questions, B; two

In implementing the cooperative model in the classroom, the researcher employed the Group Investigation which is one of the major formal structures of cooperative learning for the intervention. In this method, ten groups of six students were formed.

Students were made to form a line at the front of the room. They lined up alphabetically by last name. Then, count off in groups 1, 2, 3, 4, 5 and 6. All the ones form a group, all the twos for a group, and continue until all groups are formed. The researcher based on previous instructions and evaluation to reassign some students to different groups based on gender, below average, average and high average. Students were assigned roles such as facilitator, recorder, and spokesperson in each group. They were provided with textbooks and other sources (internet) by the researcher. At this point, objectives for the various groups' topics were clearly stated to them by the researcher to guide participants in their findings. All groups were assigned the same task or project, and within groups, students decided what information to gather, how to organize it, and how to present what they have learned as a group project to classmates. Students worked together in assigned groups. The researcher estimated the period and time allotted to the various groups' presentation was 15 minutes each.



The next stage was the explanation of the tasks. The researcher clearly defined the assignments, taught the required concepts and instructional guidelines. The researcher then introduced the unit on Interactions in Nature and students were guided on the task to be completed (that is, what should be included, what they needed to complete the task, the source, and how long they had to complete the assignment). Since this was a graded activity, students were informed about the evaluation for criteria. For the first week, all groups were tasked on the topic; general characteristics of aquatic and terrestrial habitats. These are based on the physical environment, chemical and the photosynthetic and animals. The researcher moderated various groups presentations by their leaders. Since groups' topics were to be taught the same week, a preliminary tuition was made by the researcher before going for their activities for findings.

The second week of instruction for the groups was on the topic; effects of biotic/biological and abiotic/physical factors of the ecosystem. Again, the various concepts of ecological components such humidity, light, wind, herbivorous organisms, microorganisms etc. were discussed with students to enable them in their observations in the environment and in turn identify effects of such factors.

Week three's topic was; the soil. The concept of soil as the finest substances covering the earth crust and how it supports life was explained to students during the last instructional lesson in week two to enable learners prepare adequately for the lesson. Some equipment such as measuring cylinders, beakers, stirring rods and so on were provided for groups' experiments.

The fourth week topic was; components of food chains and food webs. Content of these concepts were briefly discussed with students in class in the third week during the intervention. The researcher also projected a screen to show pictures of food chains, food webs (Appendix I).

Week five's activities were on the topics; ecological pyramids and concept of symbiosis. Explanation of symbiosis was discussed in class with students as well as charts (Appendix K) showing the various pyramids to be taught.

The final stage involved groups' presentations and evaluation. The researcher monitored students' learning within the groups. When necessary, the researcher intervened to assist students in working together effectively. During the groups' presentations, the researcher moderated the activities through questions and answers, clarified statements and assessed individual groups. At the end of all presentations weekly, individual members within the groups were evaluated through oral questions and answers for scores.

X. RESULTS

The first and second sections presented results of the pre-intervention of Home Economics Students Attitude towards Biology (HESAB) data to answer research questions 1 and 2 respectively. The third section dealt with research question 3 and finally, the fourth section presented results of the tests to answer research question 4.

Table 2: Means and Standard Deviations of Responses before intervention

Sub-scales	S/NO	Items	Mean	SD
The teacher	10	Getting a teacher to take me seriously in Biology is a problem	2.98	1.51
	3	Doing well in Biology is not important for my future	4.18	1.51
	2	Biology will not be important in my life's work	4.58	1.02
Total mean			3.91	1.35
Relevance of Biology	8	Attending Biology courses help understand better the surrounding world	4.41	1.12
	1	Biology is a boring subject	4.39	1.25
	9	I discuss with my friend's things I learn in Biology courses	3.85	1.21
Total mean	4	I don't expect to use Biology much when I get out of school	4.11	1.09
	11	My teachers have been encouraged in my progress in Biology	4.21	0.71
			4.19	1.08
Interest or Confidence	5	I would like to attend biology classes in all school grades	4.32	1.18
	13	I'm not the type to do well in Biology	3.92	1.60
Total mean			4.52	0.96
Over all mean sum			4.25	1.25

As presented in Table 2, students had interest in Biology (highest mean score) and they see the relevance of Biology as important accordingly. However, the assistance of the teacher was observed to be rather slightly significant.

From the results, best mean scores were found for items focused on the relevance and interest in Biology. Especially items such as “knowing biology will earn me a living”, “Attending Biology courses made me understand better the surrounding world” and “Biology is a boring subject (scored in reverse order)” had mean scores above 3 (i.e., agreement of participants). In contrast, mean scores of two items “I discuss with my friend’s things I learn in Biology courses” and “I’m not the type to do well in Biology [scored in reverse order]” were below 3 (i.e., disagreement response of participants). This indicates that a significant number of the students do not clearly realize the relevance of biology to them. Also, mean scores of item 10 “Getting a teacher to take me seriously in biology is a problem [scored in reverse order]” was below 3 (i.e., disagreement of participants). This suggested that a significant part of the students showed some learning difficulties in the study of Biology. Percent of responses before intervention presented under the three sub-scales.

Table 3: The Teacher

Response	Teacher to take me is a problem		Doing well in biology is not important for my future		Biology will not be important in my life’s work	
	Number	%	Number	%	Number	%
SD	15	23	11	17	4	6
D	15	23	0	0	0	0
N	7	11	3	5	2	3
A	14	21	4	6	8	12
SA	15	23	48	73	52	79
TOTAL	66	100	66	100	66	100

With regards to the teacher in lessons presentation Table 3 shows that 46 % (30) of the students agreed that getting a teacher to them seriously in Biology is a problem whilst 44% (29) did not agree. However, 11% (7) remained neutral. Responses in connection with importance of students’ performance in biology, 79% (52) disagreed that their performance will not be important in future and only 17% (11) agreed. With respect to the importance of biology for life’s work, 91% (60) disagreed that Biology will not be important for life’s work whilst only 6% (4) agreed. This gives an indication that Biology teachers do not present lessons in a manner that will motivate students to learn effectively.

Table 4: The Relevance of Biology

Response	Biology help me understand the world		Biology is a boring subject		I discuss Biology with my friends		No Biology after school		My teachers encouraged me in Biology	
	Number	%	Number	%	Number	%	Number	%	Number	%
SD	4	6	5	8	5	8	2	3	0	0
D	4	6	4	6	5	8	5	8	0	0
N	3	5	1	2	8	12	9	14	11	17
A	11	17	6	9	25	38	18	27	30	45
SA	44	67	50	76	23	35	32	48	25	38
TOTAL	66	100	66	100	66	100	66	100	66	100

Table 4 shows the relevance of biology to students. Most of the students 84% (55) indicated that Biology helped in understanding the world and 12% (8) did not agree. With the issue of Biology being a boring subject, 85% (56) agreed that it is a boring subject whereas 14% (9) disagreed. In connection with discussions with colleagues, 73% (48) indicated that they discuss with friends and 16% (10) indicated they do not. However, 12% (8) remained neutral. With the issue of the use of biology after school, 75% (50) disagreed that Biology will not be of use after whilst 14% (9) were neutral and only 11% (7) agreed. With regards to students being encouraged by the teacher, 83% (55) indicated that they got encouragement from teachers and the remaining 17% (11) were neutral. This suggested that though some of the students know the relevance of biology to them, there are some that did not.

Table 5: Students’ Interest or Confidence to Study Biology

Response	I would like Biology in all school grades		I’m not the type to do well in Biology		knowing Biology will earn me a living	
	Number	%	Number	%	Number	%
SD	5	8	12	18	1	2
D	2	3	2	3	4	6
N	2	3	2	3	4	6
A	15	23	9	14	8	12
SA	42	64	41	62	49	74
TOTAL	66	100	66	100	66	100

Students’ interest or confidence in biology as shown in Table 5, 87% (57) indicated that they would study Biology all school grades whilst only 11% (7) indicated they will not. With regards the type to do well in Biology, 76% (50) disagreed that they are not the type to do well in biology whilst 21% (14) agreed. In connection with students earning a living through biology, 86% (57) indicated they will earn a living through biology whilst only 8% (5) indicated it will not earn them a living and 6% (4) were neutral. Thus, though some of the students had confidence in themselves in studying Biology there were some who did not.

The results on the research question that sought to identify the factors responsible for students’ poor attitudes towards Biology is shown on Table 6.

Table 6: Factors Responsible for Students’ Poor Attitudes towards Biology

Factor	Statement	Frequencies and (% frequencies)					Mean	SD
		SD	D	N	A	SA	Mean	SD
	Getting a teacher to take me seriously in Biology is a problem	15 (23%)	15 (23%)	7 (11%)	14 (21%)	15 (23%)	2.98	1.51
F1	Doing well in Biology is not important for my future	11 (17%)	0 (0%)	3 (5%)	4 (6%)	48 (73%)	4.18	1.51
	Biology will not be important in my life’s work	4 (6%)	0 (0%)	2 (3%)	8 (12%)	52 (79%)	4.58	1.02
	TOTAL	15%	8%	6%	15%	58%	3.91	1.35
	Attending Biology courses help understand better the surrounding world	4 (6%)	4 (6%)	3 (5%)	11 (17%)	44 (67%)	4.41	1.12
F2	Biology is a boring subject	5 (8%)	4 (6%)	1 (2%)	6 (9%)	50 (76%)	4.39	1.25
	I discuss with my friends’ things I learn in Biology courses	5 (8%)	5 (8%)	8 (12%)	25 (38%)	23 (35%)	3.85	1.21
	I don’t expect to use Biology much when I get out of school	2 (3%)	5 (8%)	9 (14%)	18 (27%)	32 (48%)	4.11	1.09
	My teachers encouraged me in Biology	0 (0%)	0 (0%)	11 (17%)	30 (45%)	25 (38%)	4.21	0.71
	TOTAL	5%	6%	10%	27%	52%	4.19	1.08
	I would like to attend Biology classes in all school grades	5 (8%)	2 (3%)	2 (3%)	15 (23%)	42 (64%)	4.32	1.18
F3	I’m not the type to do well in Biology	12 (18%)	2 (3%)	2 (3%)	9 (14%)	41 (62%)	3.92	1.60
	Knowing Biology will earn me a living	1 (2%)	4 (6%)	4 (6%)	8 (12%)	49 (74%)	4.52	0.96
	TOTAL	9%	4%	4%	16%	67%	4.25	1.25
	OVERALL TOTAL	10%	6%	6%	18%	59%	4.13	2.11

Factor 1= the teacher (T)

Factor 2= relevance of biology (R)

Factor 3= students’ interest or confidence (IN)

As clearly observed from Table 12, the overall mean for the three factors was 4.13 (high mean score) indicating a significant positive attitude towards Biology. The total mean for factor 1 was 3.91, indicates a slight significance about the teacher’s role as an instructor. The first item under factor 1 revealed that 46% of respondents agreed that the Biology teacher as an instructor is a problem whilst 44% disagree and 11% were neutral. Factor 2 had a total mean score of 4.19 which indicates a significant positive attitude towards Biology with 1.08 as the standard deviation and 79% indicated the relevance of Biology whilst 11% did not agree. However, item 2; “I discuss with my friends’ things I learn in Biology courses” had a mean score below 4 indicating a negative attitude towards biology. Factor 3 had a total mean score of 4.25 (high mean score of participants) and 83% in agreement indicating that students had interest in Biology whilst 16% did not have interest in biology. However, item 2 under this sub-scale; “I’m not the type to do well in Biology had a mean score below 4 indicating a slight significance of students’ confidence in studying biology. As the findings indicate, students seem to have interest in studying Biology and know the relevance of biology. In contrast, students feel the Biology teacher and instructional strategies is a problem in the learning of Biology.

This research question aimed at finding out whether the cooperative teaching learning approach could develop positive attitudes in Home Economics students towards Biology. Table 6 is a detailed analysis of Home Economics students’ attitude towards Biology based on 3 sub-scales thus; the teacher, relevance of biology and students’ interest or confidence after the intervention.

Table 7: Means, Standard Deviations and percent of Responses after intervention

Sub-scales	Statement	Frequencies and (% frequencies)					Pre-mean	SD	Post-mean	SD
		SD	D	N	A	SA				
The teacher	Getting a teacher to take me seriously in Biology is a problem	0 (0%)	2 (3%)	0 (0%)	24 (36%)	40 (61%)			4.54	.66
	Doing well in Biology is not important for my future	1 (2%)	4 (6%)	4 (6%)	27 (41%)	30 (45%)			4.22	.93
	Biology will not be important in my life’s work	0 (0%)	1 (2%)	2 (3%)	31 (47%)	32 (48%)			4.42	.64
TOTAL		1%	4%	3%	41%	51%			4.39	.74
Relevance of Biology	Attending Biology courses help understand better the surrounding world	0 (0%)	1 (2%)	0 (0%)	22 (33%)	43 (65%)			4.62	.58
	Biology is a boring subject	0 (0%)	1 (2%)	2 (3%)	34 (52%)	29 (44%)			4.37	.63
	I discuss with my friends’ things I learn in Biology courses	0 (0%)	1 (2%)	1 (2%)	20 (30%)	44 (67%)			4.57	.68
	I don’t expect to use Biology much when I get out of school	0 (0%)	3 (5%)	3 (5%)	43 (65%)	17 (26%)			4.11	.69
	My teachers encouraged me in Biology	0 (0%)	2 (3%)	2 (3%)	24 (36%)	38 (58%)			4.48	.71
	TOTAL		0%	3%	3%	43%	52%			4.43
Students’ interest or confidence	I would like to attend Biology classes in all school grades	0 (0%)	2 (3%)	2 (3%)	28 (42%)	34 (52%)			4.51	.56
	I’m not the type to do well in Biology	0 (0%)	1 (2%)	0 (0%)	29 (44%)	36 (55%)			4.51	.59
	Knowing Biology will earn me a living	0 (0%)	2 (3%)	2 (3%)	27 (41%)	35 (53%)			4.43	.71
TOTAL		0%	3%	2%	42%	53%			4.48	.62
Overall Total		0%	3%	3%	42%	52%			4.43	.67

Indications from Table 7 revealed that respondents’ mean scores after intervention ranged between 4.11 and 4.62 (i.e., attainable mean) indicating the development of positive attitudes toward Biology. All items mean scores were above 4 (i.e., high agreement of participants) such as; “I discuss with my friends things I learn in Biology courses”, “getting a teacher to take me seriously in Biology is a problem [scored in reverse order]” “I’m not the type to do well in Biology [scored in reverse order]” and “Biology is a boring subject [scored in reverse order]”. The overall mean score for the

sample was 4.43 (higher mean) as compared to the pre total mean score. This suggested the development of positive attitudes by students after the intervention. The first sub-scale; the teacher had a high mean score as against the pre which suggested a significant development of positive attitudes towards biology. The relevance and confidence both indicated high mean scores above 4 which revealed significant positive attitude of respondents towards biology. Percentages of all items were very high in agreement with only 3% not in agreement.

Comparatively, the low mean range (2.98 and 4.58) and the total mean score for the first sub-scale, the teacher before the intervention indicated that students had negative attitudes toward biology.

Table 8 is a paired t-test analysis of Home Economics students' performance in two (2) tests scores before and after instrumentation.

Table 8: Pre-test&Post-test scores of participants and t-test results

Test	No.	Mean	SD	T	Df	P-value
Pre-test	63	48.06	16.49			
				-20.39	62	0.00
Post-test	63	65.71	13.92			

From Table 8, the total number of students assessed was 63 for both tests. Both the pre-test and post-test were scored over 30 marks with 15 marks as the pass mark. The average mean score of the pre-test was 48.06 (SD=16.49) whilst that of the post test was 65.71 (SD=13.92), yielding a difference of 17.65. The t-test analysis was found to be significant at 0.05 significance level at ($t(62) = -20.39; p = 0.00$), meaning that for the whole class the difference between the pre-test average score and the post-test average score was statistically significant (see Table 8).

XI. Hypothesis Testing

To determine whether there was statistically significant difference in the academic achievement of Home Economics students in Biology when they were taught with the cooperative teaching learning strategy, research question 4 was formulated into a null hypothesis as:

Ho: There is no significant difference in the use of the Cooperative approach on Home Economics students' academic achievement in biology in the Tamale Metropolis.

The Independent sample for 2-tailed t-test analysis was employed and the mean scores for the tests showed significant difference ($t(62) = -20.39; p < 0.05$). The difference was in favour of the post-test. Hence the Cooperative teaching learning strategy could significantly improve students' performance in Biology. It was therefore concluded that the use of the Cooperative strategy to teach topics in biology showed a significant difference in Home Economics students' achievement in biology in the Tamale Metropolis. Hence the hypothesis was rejected.

XII. Discussion/Findings

The findings of research question one showed that students had poor attitude towards Biology. Respondents' poor attitudes ran through all the three sub-scales. The results indicated that students had limited positive attitudes toward Biology and therefore possessed some negative attitudes toward the subject.

Attitude is a way of looking at things [27]. Again, [13] defines attitudes as an internal state that influences the personal actions of an individual, he recognized attitude as a major factor in subject choice. He considers attitudes as a mental and neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's responses to all objects and situations with which it is related.

The findings are connected to the work of [38]. They found out that information about students' interests may help teachers to devise strategies to enhance students' interest in Biology.

Findings with respect to research question two, it was revealed that students' poor attitude towards Biology emanated from all the three sub-scales since each of the sub-scales had items indicating negative attitudes. However, the first factor; teacher was the main factor from the findings whose overall mean score was below 4 thus, indicating poor attitudes towards Biology. Of course, teachers play vital roles in the teaching learning process. Unexpectedly, in this study this factor was the least important one in determining Home Economics students' attitudes toward Biology.

Again, factors identified in this study that strongly affect Home Economics students' attitudes toward Biology are mainly common and similar to what is in the related literature. However, the order of the influence or importance of these factors is different. How teachers teach and lack of motivation on students' part has been found to extremely affect attitudes toward biology. The findings could be attributed to lack of qualified professional teachers, lack of



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counselling services from teachers and other stakeholders, lack of parental support, lack of teaching learning materials, absence of science laboratories and equipment, and absence of in-service training to the teachers. The findings support [36], there are many factors that influence attitudes and achievement among adolescents. Some of the factors are associated with parental background and family environment. Other factors relate to individual characteristics such as self-concept, locus of control, and achievement motivation. Still other variables are associated with schools' influences such as class climate, teachers, and administrative styles. Furthermore, these categories of students are not selected for the study of Biology based on good grades obtained in science after graduation at the Junior High School level. One implication of this result is to continually work on improving attitudes of students. All appropriate conditions should be offered for these students to learn biology at all school grade levels and continue to have greater achievements in the subject.

Findings with regards to research question three; it was found out that there had been an improvement in students' attitude towards Biology since all the sub-scales statements were agreed upon after the intervention. Additionally, the overall mean scores for each sub-scale were above 4 indicating positive attitudes after the intervention and these are a plausible reasonable fact. The implication is that students were able to acquire some positive attitudes toward the subject after the implementation of the Cooperative strategy during instructions within the intervention period of this research. This is not surprising since there has been a conscious effort by the researcher to improve students' attitudes and performance, by introducing the cooperative technique of teaching the selected biology topics. The findings support [24], who reported that attitudes predict individuals' decision making and action taking.

However, [17] also reported that cooperative learning experiences promote more positive attitudes toward the instructional experience than competitive or individualistic methodologies. Also, [23] examined the relationships between student's attitudes toward cooperation, competition, and their attitudes toward education. The results of the study indicated that student cooperativeness, and not competitiveness, was positive related to motivation to learn. Apart from academic benefits, cooperative learning has been found to promote self-esteem, interpersonal relationship and improved attitudes toward school and peers [22].

The finding is in harmony with [2] that, although attitude changes gradually, people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences. The finding is connected with [32] suggests that the attitude of pupils is likely to play a significant part in any satisfactory explanation of variable level of performance shown by students in their school science subject. According to [28], reports that many students developed negative attitudes to science learning, probably due to the fact that teachers are unable to satisfy their aspiration or goals. Thus, the adoption of the cooperative teaching learning strategy significantly improved the attitudes and academic achievement of Home Economics students in Tamale Metropolis.

With respect to research question four, findings revealed that there was a significant difference between pre-test and post-test. The implication is that, the traditional-didactic method of teaching is different from the Cooperative teaching and learning approach. The average score difference between the two tests is highly significant at an alpha level of 0.00. This is not surprising since the cooperative teaching learning technique employed by the researcher enabled students to learn through groups, being encouraged to compete within groups for scores and became motivated as they work in the groups. Cooperative Learning is the instructional use of small groups so that students work together to maximize their own and each other's learning [21]. The finding is connected with the report of [40] the relationship between learners' attitude and achievement is fundamental in science education. In general, attitudes, goals and interest have been identified as important for student's understanding, learning and their academic success. Furthermore, [33] provide several benefits on the use of cooperative learning approach for students. First, cooperative learning promotes deep learning of materials. Second, students achieve better grades in cooperative learning compared to competitive or individual learning. Academic achievements of students have been found to be enhanced by the use of cooperative learning [25, 17, 34, 35, 39]. In addition, [3] showed that there is positive correlation between attitudes and performance in the science subjects.

XIII. CONCLUSION

In conclusion, the respondents' achievement in the post-test showed that the cooperative technique made an impact since their performance improved as compared to the pre-test

The following findings were arrived at in the present study:

The attitude of Home Economics students in all the three sub-scales before intervention revealed poor attitudes toward biology in three items whose mean scores were below 3. The topmost sub-scale was the teacher.

- The poor attitudes of students towards biology before intervention occurred within all the three sub-scales.



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- The factors responsible for students' poor attitudes toward biology were highly loaded on factor 1; the teacher.
- Positive attitudes were attained after the intervention. In all three sub-scales, all items indicated mean score above 4 (high mean)
- There is a significant difference in the two tests administered. Pre-test showed a mean value of 48.0635 and 16.49817 as the standard deviation whereas post-test indicated a mean value of 65.7143 with a standard deviation of 13.91846 yielding a difference of 17.65 in the average class score. The significance level is 0.00 at 0.05 alpha levels. Also, the correlation coefficient of the tests is at 0.912.

The poor attitudes of Home Economics students were similar irrespective of their sex and age. For almost all the items, all students showed poor attitudes towards Biology.

The study established the fact that Home Economics students in Business Senior High School have various attitudes that require immediate attention by stakeholders in the Ghana Education Service.

Students' developed positive attitudes toward biology in the school during the study after the intervention which invariably improved their achievements in the post-test administered.

It is worth mentioning that the development of students' positive attitude is necessary because attitude is linked with academic achievement, [7];

- In all the three sub-scales, no other item indicated poor attitudes toward biology after the intervention. This could be due to the fact that the Cooperative technique influenced students' attitudes positively during the period of intervention.
- All the three factors are classified as teacher factors, relevance of biology and students' interest or confidence. Since unqualified Biology teachers may not have the requisite subject matter for instructions. The students themselves may not have the confidence in learning Biology because of their grades obtained in science at the basic level. In addition, lack of science equipment and laboratories all account for students' poor attitudes towards the subject.

The achievement of students in the post-test attests to the impact of the Cooperative approach. Students who do not improve upon their performance require more assistance than their counterparts with higher scores.

XIV.RECOMMENDATION

Based on the findings of the study, the following recommendations were made:

A more in-depth study of curricula and biology textbooks is needed to identify the origins of problems in this grade and age group

- Home Economics students need to be selected into the S H Ss based on good grades obtained in general science from the Basic Certificate examination just as it is done with pure science students at the S H S. Based on such criteria in selection, students would have interest and confidence in themselves to learn. The current situation where Home Economics students are selected based on good grades obtained in Basic Design and Technology (BDT), thus catering option without the teacher's consent and other stakeholders to identify the appropriate qualification ought to be discarded. When stakeholder's example teachers are not consulted for inputs about their work environments, records of poor academic achievement will continue to exist since the teacher was the main factor identified in this study before the intervention.
- Heads of institutions in conjunction with guidance and counselling coordinators if any, should organize orientation programmes and counselling sections for newly admitted students for Home Economics programmes to instil positive attitudes towards biology in them. In addition, biology teachers should try to employ various approaches of Cooperative teaching learning approach for instructions since such teaching techniques motivate students to learn by competing to scores marks rather than the didactic traditional method of teaching.
- The government of Ghana should create more opportunities for biology teachers in terms of the quota system for further studies, bursary grants for science teachers and other related incentives. These will in a long ran, inspire more academia into the sciences to intend increase the personnel in this field of study. Also, the non-science schools should be supported with the necessary infrastructure and science learning materials for effective teaching and learning of science.

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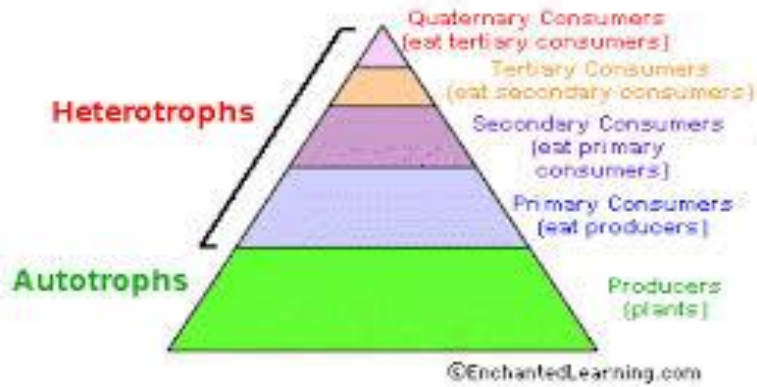
APPENDIX I

Sample Food Chains

Trophic Level	Grassland Biome	Pond Biome	Ocean Biome
Primary Producer	grass	algae	phytoplankton
Primary Consumer	grasshopper	mosquito larva	zooplankton
Secondary Consumer	rat	dragonfly larva	fish
Tertiary Consumer	snake	fish	seal
Quaternary Consumer	hawk	raccoon	white shark

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The Food Web



APPENDIX K

