

## Impact of Cooperative, Flipped Digitalized Classroom on the Attitude of Male and Female Undergraduate Biology Education Students

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### Abstract

*In a bid to affect the student attitude positively and to make the class more interesting, an otherwise theoretical class was restructured into a Cooperative, Flipped, and Digitalized Classroom (CFDC). The study investigated the attitude of undergraduate biology education students taught in a CFDC. A causal-comparative -design was adopted. Purposive sampling was used to sample 64 students (34, male and 30 female). An instrument, Student Attitude Toward Cooperative Flipped Digitalized Classroom (SATCFDC) was used to collect the data for this study. The reliability coefficient of SATCFDC was 0.78 using Cronbach alpha. Data analysis was done using descriptive statistics and an independent sample t-test at a 0.05 significance level. The result showed no significant difference in the attitude of both male and female undergraduate students. It was concluded that CFDC is an activity-driven classroom that enhances a positive attitude among undergraduate students irrespective of gender. Some recommendations were given, which include that the government improve infrastructure to support better internet connectivity to support CFDC.*

**Keywords:** Cooperative learning, Digitalized, Flipped Classroom

### Introduction

It has been observed that a typical undergraduate classroom lacks collaboration and is often less activity-driven. Kimberly and Tanner (2013) observed that many undergraduate students in biology classrooms can navigate an entire term without speaking aloud in a course. In the same vein, Abubakar (2017) lamented that as one progresses upward in our educational system the use of traditional lecture methods becomes a common practice. Kimberly and Tanner (2013) argue that the active participation of every student is essential for learning, as it allows them to construct their own ideas. Abubakar (2017) equally opined that with the economic, social, political, and technological distractions of today's world, we need a touch of new pedagogy to make learning in our lecture room meaningful. It won't be easy to get the attention of our youth in a pure lecture atmosphere. Mehta and Kulshrestha (2014) argued that the approach to education and pedagogy has undergone significant changes in the modern era of science and technology, particularly in the realm of information technology. Recently, the attention of practitioners and stakeholders has been drawn to pedagogy like cooperative learning instructional strategy and digital or technologically

aided classroom like the flipped classroom. In a bid to affect the student attitude positively and to make the class more interesting, an otherwise theoretical class was restructured into a Cooperative, Flipped, and Digitalized Classroom (CFDC).

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning (Johnson and Johnson, 2017). In cooperative learning situations, students' goal attainments are positively interdependent. Students believe that they can achieve their learning goals only if other students in the group also meet their goals. (Deutsch, 1962; Johnson, Johnson, & Holubec, 1991). According to Johnson and Johnson (2017), within cooperative activities, individuals seek outcomes that are beneficial to themselves and all other group members. The authors advocated a shift from an individualistic and competitive structure to a high-performance cooperative team-based structure. Cooperative learning supports students' achievement and has no gender interaction (Nnorom, 2015). It also significantly impacts science test scores (Najmonnisa & Saad, 2017).

This study is anchored to the Social Interdependence theory (Deutsch, 1940). The basic premise of social interdependence theory is that the type of interdependence structured among students determines how they interact with each other which, in turn, largely determines instructional outcomes. Structuring situations cooperatively results in promotive interaction, structuring situations competitively results in oppositional interaction, and structuring situations individualistically results in no interaction among students. In this study, the course was structured in a form that the students were taught cooperatively.

The flipped classroom model is an innovative approach to teaching that focuses on maximizing in-class engagement and critical thinking. It involves shifting traditional lectures and homework activities to take place outside the classroom while reserving in-class time for interactive learning activities. The approach has been described by Yarbrow (2014) as one that prioritizes individual learning and dynamic group learning environments. Shao and Liu (2021) have also defined the flipped classroom as a teaching technique that encourages active participation and engagement from students, challenging traditional teaching methods. This study investigated the attitude and performance of undergraduate biology education students taught in a CFDC.

## **Purpose of Study**

The specific objectives of this study were:

- i. To investigate the impact of CDFC on the attitude of undergraduate Biology Education Students.
- ii. To investigate the impact of CDFC on the performance of undergraduate Biology Education Students.

## **Research Questions**

1. What is the difference in mean attitude score of male and female undergraduate students taught in CFDC
2. What is the mean difference in mean performance score of male and female undergraduate students taught in CFDC

## **Research Hypotheses**

1. There is no significant difference in the mean attitude score of male and female undergraduate students taught in CFDC.
2. There is no significant difference in the mean performance score of male and female undergraduate students taught in CFDC

## **Methodology**

The study employed a quasi-experimental, posttest-only design. From a target population of 151 students that have registered for a compulsory course, educational technology. A sample of sixty-four 64 (34, males, 30 females) was purposively selected. The students were first grouped. Each group chose its identity (i.e., Barcelona, Arsenal, Chelsea, etc). The groups were briefed on how the class will run. All the groups created a WhatsApp platform and the researcher was added to each group. This enabled the researcher to monitor interaction and collaboration on the platform. The students were taught in a CFDC for four weeks. Basic tenets of cooperative learning like positive interdependence, face-to-face interaction, and group accountability were ensured. For each class, selected YouTube videos and websites were given to the students to watch and study at home and in hostels. Students were also directed to the university E. library for access to the internet network. In class, an interaction was done with the researcher before new materials were given for the next flipped class. Two instruments were used to collect the data for this study. An instrument Student Attitude Toward Cooperative Flipped Digitalized Classroom (SATCFDC) was used to collect the data. SATCFDC was a Likert scale instrument containing ten (10) items. The reliability coefficient was calculated to be 0.76 using Cronbach's alpha. However, a multiple-

choice test of ten (10) items was used to generate the performance test score. Both the attitude scores of the students and the performance scores were analyzed using descriptive statistics and an independent sample t-test at a 0.05 level of significance.

## Results

The study investigated the impact of CFDC on the attitudes of male and female undergraduate students. The data collected were analyzed and the results are presented below.

**Research Question 1:** What is the difference in the mean attitude score of male and female undergraduate students taught in CFDC?

The mean and standard deviation of the female and male attitude scores were computed and the result is presented in table 1 below.

**Table 1: Descriptive Statistics of the Attitude Scores of Males and Females**

Gender	N	Mean	Std Dev.
Female	30	2.97	0.395
Male	34	2.98	0.375

From the table above, the mean aggregate of male undergraduate science education students (M=2.98, SD= 0.395) slightly higher than the female means scores (M= 2.97, SD =0.375). From the result, the mean scores of both groups are above the benchmark mean of 2.5. The mean difference is 0.01 in favour of the males.

**Research Question 2:** What is the difference in the mean performance score of male and female undergraduate students taught CFDC?

The mean standard deviation of the student's performance score was computed and the result presented below

**Table 2: Descriptive Statistics of the Performance Scores of Males and Females**

Gender	Mean	N	Std. Deviation
Female	8.200	30	2.84544
Male	6.710	34	3.12312

From the table above, the mean score of female undergraduate science education students (M=8.200) is slightly higher than the male mean scores (M=6.710). The result also showed the standard deviation of the male, SD =3.12312) is larger than that of the female, SD 2.84544. The

mean difference is 2.000 in favour of the female. The result I also indicative that the scores of the male students is less clustered compared to those of the female.

### Hypothesis testing

**H<sub>01</sub>:** There is no significant difference in the male and female attitude scores of undergraduate students taught in CFDC.

The attitude scores of male and female students were analyzed using an independent t-test and the result is presented in Table 2 below.

**Table 2: t-test Analysis of the Male and female Attitude Scores**

Gender	N	t - value	Df	P - value
Male	34	0.163	62	.871
Female	30			

$P < 0.05$

From the above table  $t(62) = 0.163$ ,  $p = .871$ . The p-value is above the set level of 0.05 which indicates that there is no significant difference between the scores of male and female students. For the overall mean score (Aggregate mean), the two groups were significantly different ( $p > 0.05$ ). Therefore, the null hypothesis is accepted.

**H<sub>02</sub>:** There is no significant difference in the mean performance score of male and female performance score.

A t-test statistic was computed and the result presented below

**Table 4: t-test Analysis of the Male and Female Performance Scores**

Group	N	Df	T - value	significant
Female	30	62	2.065	.043
Male	34			

From the above table  $t(62) = 2.065$ ,  $p = .043$ . The p-value is below the set level of 0.05 which indicates that there is a significant difference between the scores of male and female students. the two groups were not significantly different ( $p > 0.05$ ). Therefore, the null hypothesis I rejected.

### Discussion of findings

The study aimed to investigate whether gender had an impact on the attitudes of undergraduate science education students. The results indicated that the mean score of both male

and female groups was higher than the expected average score of 2.5. Additionally, there was no significant difference between the attitudes of the two groups, which was in line with the researchers' expectations. Several studies on activity-driven classrooms, such as the CFDC, have revealed that both male and female students perform well in such environments. For instance, Yusuf and Gamibri (2013), Reda (2015), Rice and Bain (2006), and Ezeudu&Gbendu (2018) reported that both genders showed positive attitudes towards flipped classrooms and digital technology, respectively. Cooperative learning environments have also been shown to be effective for both males and females. The study by Yau & Leung (2016) contradicts this finding as they found no significant difference in the attitudes of male and female students towards the use of tablet PCs in learning.

The CFDC's non-competitive environment may have played a role in fostering a positive attitude among undergraduate students. In a collaborative learning environment, group members share responsibility for individual failures, and students can interact and work together with their peers. Moreover, the use of smartphones for studying and learning may have contributed to this positive attitude. Rovai (2002) found that the increased use of mobile devices in universities helps students collaborate and communicate more easily, leading to better attitudes overall. These findings also suggest that digital tools, such as smartphone applications, can have a positive impact on students' attitudes.

## **Conclusion**

It can be concluded that cooperation supports a positive attitude. The CFDC is an activity-driven classroom that enhances a positive attitude among undergraduate students irrespective of gender. However, the CFDC seems to have a greater impact on female students than male as evidenced by higher test scores.

## **Recommendations**

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

- i. The government should focus on improving infrastructure to provide better internet connectivity, which will in turn support the development of CFDC.
- ii. Faculty members should be motivated to use CFDC in their teaching and learning practices to cultivate a more positive attitude in students towards learning.

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