Effect of Technological Learning Environments on Male and Female Senior Secondary School Two Students' Performance and Retention in English Grammar in Enugu State.

By

Ngwu, Martina Nnenna

&

Ochuba, O. O. (PhD)

Department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt.

Abstract

The study investigated the Effect of Technological Learning Environments on Senior Secondary School Students' Performance and Retention in English Grammar in Enugu State. The study adopted a quasi-experimental design which involved pretest, posttest, control and experimental groups. There was a follow-up test after four weeks of administering the posttest which was used to test retention. The population of the study was one thousand nine hundred and eight senior secondary two students in nine public senior secondary schools in Enugu North Local Government Area of Enugu State that were enrolled in the 2019/2020 academic session. The sample size was 250 senior secondary two students from three selected public senior secondary schools. The three schools represented two experimental groups and one control group. A Researcher Made Achievement Test titled Performance and Retention Achievement Test contained forty multiple-choice questions. The reliability of the instrument was tested using a test-retest method and the result obtained was analysed using Kuder-Richardson Formula 21 to determine the consistency of the instrument. A reliability index of 0.83 was obtained which was high enough to consider the instrument reliable. The study was guided by two objectives, two research questions and two hypotheses. Mean standard deviation were used to analyse the research questions while t-test, One-way and Two-way Analysis of Covariance were used to test the null hypotheses at 0.05 level of significance. The study concludes that the 21st-century style of learning allows the learners to be in charge of their learning with the teacher as a facilitator despite the gender influence. The study recommended that irrespective of the gender influence, Google Classroom Communicative Strategy and Edmodo Communicative Strategy should be used to teach English Grammar in senior secondary in Enugu North Local Government of Enugu State.

Keywords: learning environment, technological learning environment, Google Classroom, Edmodo, gender, performance and retention

---

Introduction

A positive academic learning environment involves good teaching, emphasizes self-learning, unambiguous standard goals, proper assessment and appropriate etc. Many educators have agreed that learning environments ranging from the structure of the classroom, the ventilation, the class size, the learning resources or even colours of the class wall

and decorations/pictures have a great impact on the learners' performance and retention. This is because the way the students learn has a lot to do with the place in which the learning takes place. Kaitkheeree (2017) asserts that the learning environment has a peculiar influence on the extent to which the learners attain proficiency in the English language. For instance, students' and teachers' interaction in the classroom as part of the learning environment is seen as an important factor that promotes retention and performance therefore building a strong learning environment has a splendid effect on L2 learners. A conducive learning environment enhances optimal visual study conditions, increases students' motivation and level of language acquisition (Kuama & Usa, 2016). Kuama and Usa further stated that a good learning environment helps to kill anxiety in the students and gives them relaxation to be effective English language learners. Lipings (2013) in Kiatkheeree, (2017) states that a learning environment filled with school facilities improves students' performance in English language.

Technological learning environment on the other hand is all the digital toys and modern environments that promote perceptions and acquisitions of contents (Rudite, 2017). Rudite further explained that the significant roles played with modern technologies in the teaching and learning process that allow the flow of tasks by the learners is part of the technological learning environment. It helps the teachers to be more innovative, using modern learning methods in their teachings like flipped classroom, project-based learning (PBL) and personalised learning. A technological learning environment creates flexible classroom spaces and integrates technology, helping the teacher to engage the students and facilitate learning.

In addition, technological learning environments incorporate three key elements which are connected devices like laptops, tablets or even smartphones, audio-visual tools like projectors and touch-screen display and purposeful furniture that allow the students to learn in different ways and at different times. Technological learning environments increase students' engagement and motivation, create a stronger relationship with peers and teachers, enhance collaboration in addition to a sense of ownership in the students that are in charge of their learning (Indian Society for Technical Education, 2016). Technological learning environment is all the digital toys and modern environment that promotes perceptions and acquisitions of contents (Rudite, 2017). The learning environment is seen from the angle of digital tools that are trending now like Google Classroom and Edmodo.

However, due to the fascinating environment provided by Google Classroom, learning is bound to be retained for a longer time. This is because it makes learning students centred (Donald, 2017). Google Classroom is a learning environment that gives room for learning materials to be uploaded and the students view them in and outside the class. It can be video from the teacher or YouTube, word documents, excel, power points etc. It is done according to Sukumawati and Nensia (2019) to accommodate the students' learning style that aids retention.

According to Matthew (2018), Google Classroom has to be proven to be a life wire of teaching which boosts performance and facilitates retention because it can be combined with any model, strategy or method. It is so developed that the students can be blocked from viewing each other's grades or comments under another students' comment. It has the feature to deal with the students individually and collectively. It allows the teacher to set the learning wall with the school's colour or logo, reuse assignments, tests or other course material or content in future classes. According to Kaur and Erturk (2017), Google Classroom is a typical example of a cloud application designed for educational use by Google. It provides an opportunity to make blended online learning environment easier. It does not take much time to set up and it is quite easy to use. Schools and educators that aim at streamlining teaching and learning are encouraged to use Google Classroom because of its unbeatable features (Kaur & Erturk, 2017).

Furthermore, Edmodo is another technological learning environment that makes teaching and learning interesting. It allows the students to be in charge of their learning. Edmodo is a global education network that helps connect all learners with the people and resources needed to reach their full potential. Since its inception in 2008, Edmodo has been housing millions of users worldwide, comprised of teachers, students, and parents. As of March 2016, over 63 million users have been actively working together regarding academic affairs (Edmodo, 2018). Edmodo offers a learning environment that is welcoming that helps the students combines their social lives with their academic lives.

This is because Edmodo shares the same features with social network platforms like Facebook which is why Edmodo is called Facebook for education.

Edmodo was designed to protect the privacy and security of students and teachers by providing a closed, private platform in which they can collaborate, share content, and leverage educational apps to augment in-classroom learning (Business Wire, 2014 in Mokhtar 2018). Business Wire further asserted that Edmodo also organizes an online global educator conference known as "EdmodoCon" that attracts more than thirty thousand virtual attendees annually. The conference caters to idea sharing and collaboration among some of the world's most creative educators. Moreover, EdmodoCon is a free, live-streamed 11-hour event highlighting innovative educators who wish to showcase various ways to employ Edmodo with other digital tools in classrooms.

According to Mokhtar (2018), Edmodo was launched as escapism to issues such as professional versus private, security, functional buttons and others because the aforementioned issues became hindrances in online learning, particularly in social networking platforms. In addition, Edmodo simultaneously implements a "bottom-up" approach by targeting individual educators to use the application rather than getting entire educational institutions to sign up. This grants educators the liberty to choose instead of forcing them into using an unfamiliar social learning platform. Edmodo (2018) further illuminates its main aim on its website as follows:

From a technical perspective, Bayne (n.d) stated that Edmodo has three important criteria, i.e., usability, accessibility and compatibility. The usability of Edmodo is that it is easy to use. Students/teachers/parents/administrators can learn to use the tool in a short time and therefore will be more inclined to use it for classroom discussion, content and learning management. From the perspective of accessibility, it is accessible for all users. Students/teachers/parents/ administrators can access the tool of using various devices, with all browser types and from anywhere, anytime, and anyplace. In terms of compatibility, Edmodo is compatible with multiple devices and equipment. Since users will not all have the same devices or equipment, the tool must be flexible enough to be used with a variety of devices or equipment. Again, due to the informal environment created by Edmodo, students who find it difficult to communicate fluently in the class because of shyness find the Edmodo learning environment interesting. It helps the teachers to plan lessons for students that include video and audio files, as well as other resources. Teachers can create connections with other students from different schools, states, or cultures**.** By having an online class at Edmodo, the teacher has a chance to communicate with their students within and outside the class to improve the students' performance.

Performance is the measurement of students' success in academics. It is done to find out how well the students meet the standards set for them by the teacher, local government and institution itself. Performance is the completion of tasks with the application of knowledge, skills and abilities (Vizeshfar & Torabizadeh, 2018)). Performance is an achievement or an outcome of set objectives. Performance is the fulfilment of an obligation in a way that releases the performer from liabilities under the contract. It is an accomplishment and completion of a task performed. Performance is a mental test used to check what an individual has done rather than said. When the learners' performance is improved due to the active and interesting learning environment used by the teacher, retention of the acquired concept will be guaranteed.

The American Heritage Dictionary of Medicine (2018) defines retention as an ability to recall or recognise what has been learnt or experienced. Maintaining high retention is crucial to the higher education goal. Brittany (2013) defined retention as the length of time students continue to increase in their academic performance in a particular subject and the extent to which the students remain in that high grade until they have a complete good academic performance in that subject. He further stated that educational institutions which fail to consider the necessity of the students' academic retention are at risk of becoming unprofitable and can only fight it by finding out what is going wrong and the quality of the problem. University of Tasmania (2017) sees retention as the key strategic factor for the institution that has students that are deeply engaged in their studies and complete their course work for success.

According to Semb & Ellis (1994) in Andrew (2013), retention of knowledge is the ability to recall or remember pieces of knowledge, processes or skills that were taught. However, retention is different from knowledge transfer. Although retention is the ability to remember information as it has been learnt, knowledge transfer is both recalling of information and making use of it to solve problems but retention has to take place before transfer comes (Andrew 2013).

In psychology, retention is seen as one stage in a dynamic model of the learning process (Kohen, & Kipps 1979 in Andrew, 2013). They further submitted that a successful learning process has structures and these grow out of consistent experiences with common traits. The way we assimilate our learning environment depends on the understanding and knowledge we have and this knowledge depends on our memorization of what we have learnt. The new information taken is stored in the brain, maintained and recalled depending on the needs. This happens because our brain has a way of adapting to a new environment. If the environment is conducive with educative digital tools, the information sinks and get retained.

Statement of the Problem

The ability to perform after an instructional delivery does not happen in isolation, some things are involved. The academic performance of the students in the English Language can be observed through the students' grammatical ability and written proficiency. The performance of students on any subject taught including English Language depends on the interactions the students have with their learning environment. The issue of poor performance of the students on English language in external examination has been a great concern to the government, parents, teachers, researchers and even the students themselves. This is one of the reasons this study is vital. So, the problem statement of the study is "What Effect do Technological Learning Environments Have on Male and Female Senior Secondary Two Students' Academic Performance and Retention in English Grammar in Enugu North Local Government Area of Enugu State"?

Aim and Objectives

The aim of the study is to examine the effect of technological learning environments on male and female Senior Secondary two Students' academic performance and retention in English Grammar in Enugu North Local Government Area of Enugu State.

The specific objectives of the study are to:

1. determine the difference in the performance mean scores of the male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/ Edmodo Communicative Strategy (ECS) and those taught English Grammar using Conventional Classroom Face-to-Face Strategy (CCFS).
2. examine how the retention mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught English Grammar using Conventional Classroom Face-to-Face Strategy (CCFS) differ.

Research Questions

1. What is the difference in the performance mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught using Conventional Classroom Face-to-Face Strategy (CCFS)?
2. How do the retention mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught using Conventional Classroom Face-to-Face Strategy (CCFS) differ?

Hypotheses

1. There is no significant difference in performance mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught English Grammar using Conventional Classroom Face-to-Face Strategy (CCFS).
2. The retention mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught English Grammar using Conventional Classroom Face-to-Face Strategy (CCFS) do not differ significantly.

Methodology

Research Design: The study adopted a quasi-experimental design

Study Area: This study was carried out in Enugu North Local Government Area of Enugu State. It is a Local Government in Enugu State, South-East Nigeria with its headquarter situated at Opara Avenue in the commercial upbeat of the city of Enugu. It is one of the four local governments that fall within the Eastern Senatorial District of Enugu.

Population of the Study: The population of the study was all the nine public senior secondary schools in Enugu North Local Government Area of Enugu State which comprised 1,908 SS2 students admitted in the 2019/2020 academic year.

Sample and Sampling Technique: The sample size of the study was 250 senior secondary two (SS2) students (120 males and 130 females) from three public senior secondary schools out of all the (9) public senior secondary schools in Enugu North Local Government Area of Enugu State. The control group was 80 students (38 males and 42 females) while the experimental groups were 170 students (82 males and 88 females).

Results and Discussion

Research Question One: What is the difference in the performance mean scores of male and female students taught English Grammar using Google Classroom Communicative Strategy (GCCS)/Edmodo Communicative Strategy (ECS) and those taught using Conventional Classroom Face-to-Face Strategy (CCFS)?

This research question was answered using mean and standard deviation from the pretest and posttest scores of the male and female students from three different groups. The results obtained are presented in **Table 1.**

Table 1: Mean and Standard Deviation of male and female students taught English Grammar using GCCS/ECS and CCFS.

Group	Gender	N	Pre-test		Post-test		Gained Mean
			Mean	SD	Mean	SD	
GCCS	Male	42	43.81	11.36	76.31	7.58	32.50
	Female	44	46.93	13.43	81.70	6.46	34.77
	Total	86	45.41	12.49	79.07	7.50	33.66
ECS	Male	40	35.75	9.97	73.25	7.30	37.50
	Female	44	41.14	10.56	73.75	9.28	32.61
	Total	84	38.57	10.57	73.57	8.35	34.94
CCFS	Male	38	35.00	9.93	55.39	10.49	20.39
	Female	42	35.60	8.71	55.00	11.73	19.40
	Total	80	35.31	9.26	55.19	11.09	19.88
Total	Male	120	38.33	11.14	68.67	12.46	30.34
	Female	130	41.31	11.95	70.38	14.53	29.07

	Total	250	39.88	16.64	69.56	13.58	29.68

Group	**N**	**Pre-test**		**Post-test**		**Gained**
		Mean	**SD**	**Mean**	**SD**	**Mean**
GCCS	86	46.41	12.49	79.07	7.50	33.66
ECS	84	38.57	10.57	73.51	8.35	34.94
CCFS	80	35.31	9.26	55.19	11.09	19.88

The results in **Table 1** show the performance of the male and female students in GCCS. It was observed that their male had mean scores of 43.81 (SD=11.36) and 76.31 (SD=7.58) respectively for the pretest and posttest. So, they gained a mean value of 32.50. Then, the female students in the same group (GCCS) had mean scores of 46.93 (SD=13.43) and 81.70 (SD=6.40) for their pretest and posttest periods. Their gained mean values indicated that GCCS is more effective on the female students with a mean difference of 2.27 than the male students.

For the ECS group, it is shown in **Table 1** that the male students in this group had mean scores of 35.75 (SD=9.97) in their pretest and 73.25 (SD=7.30) at their posttest. So, they gained a mean value of 37.50. then their female counterpart had mean scores of 41.14 (SD=10.56) and 73.75 (SD=9.28) in their pretest and posttest periods. This mean score gave rise to a gained mean value of 32.61 from their pretest and posttest periods. In comparison, it is noted that ECS was more effective on the males than the female with a gained mean difference of 4.89.

Furthermore, **Table 1** revealed that for CCFS, the male students had mean scores of 35.00 (SD=9.93) and 55.39 (SD=10.49) in their pretest and posttest periods so they gained a mean value of 20.39 from their pretest to that of the posttest. On the other hand, the female students had mean scores of 35.60 (SD=8.71) and 55.00 (SD=11.73) respectively in their pretest and posttest periods. These mean values yielded a gained mean value of 19.40 from their pretest to posttest periods. Based on the gained mean values for the male and the female students in CCFS, it was deduced that CCFS is more effective on the male students than the female students by a mean difference of 0.99.

Finally, **Table 1** also showed that the male students irrespective of their treatment groups had mean scores of 38.33 (SD=11.14) and 68.67 (SD=12.46) from their pretest and posttest periods. These mean scores yielded a gained mean value of 30.34 from pretest and posttest periods. Then the female students irrespective of their treatment groups had mean scores of 41.31 (SD=11.95) and 70.38 (SD=14.53) in their pretest and posttest periods so they gained a mean value of 29.07 from their pretest to that of the post-test.

In comparison, it was found out that the male students irrespective of their treatment group gained higher than their female counterparts by a mean difference of 1.27 from their pretest to posttest periods.

Research Question two: How do the retention mean scores of male and female students taught English Grammar differ?

Table 2: Mean and Standard Deviation on the retention mean scores of students in English Grammar based on their Groups and Gender

Group	**Gender**	**N**	**Post-test**		**Follow-up**		**Gained**
			Mean	**SD**	**Mean**	**SD**	**Mean**
GCCM	Male	42	76.31	7.58	77.38	8.43	1.07
	Female	44	81.70	6.46	79.43	7.33	4.72
	Total	86	79.07	7.50	78.43	7.91	0.64
ECM	Male	40	73.25	7.30	74.13	9.93	0.88
	Female	44	73.75	9.28	76.48	7.36	2.73
	Total	84	73.57	8.35	75.36	8.70	1.85

CCFM	Male	38	55.39	10.49	39.87	10.94	-15.52
	Female	42	55.00	11.73	44.53	10.41	-10.47
	Total	80	55.19	11.09	42.31	10.85	-12.88
Total	Male	120	68.67	12.46	64.42	19.43	-4.25
	Female	130	70.38	14.53	67.15	17.84	-3.25
	Total	250	69.56	13.58	65.84	18.63	-3.72

An observation in **Table 2** revealed that the students taught English Grammar using GCCS had a post-test score of 79.07 (SD=7.50) and Follow-up mean scores of 78.43 (SD=7.91). Thus, from the posttest to follow-up test, the GCCS group had a mean gain of 0.64.

The students in ECS irrespective of their gender had a mean score of 73.57 (SD=8.35) at the posttest stage and Follow-up mean scores of 75.36 (SD=8.70). These mean scores yielded a gained mean value of 1.85 from the periods of the posttest to the follow-up test.

Then students taught English Grammar using CCFS irrespective of their gender had mean scores of 55.19 (SD=11.09) and 42.31 (SD=10.85) at their posttest and follow-up respectively. These yielded a gained mean value of -12.88 indicating that CCFS inhibits retention.

In comparison of the retention mean scores in the three different groups, their gained mean values indicated that ECS had the highest gained mean value followed by GCCS and then CCFS which did not retain knowledge rather lost the already acquired ones.

Considering the students' gender in three groups, it is shown in **Table 2** that the male students in GCCS had a mean score of 76.31 (SD=7.58) at the posttest stage and 77.38 (SD=8.43) at the follow-up stage. So, they had a gained mean value of 1.07 from the posttest to follow-up test periods. On the other hand, the female students taught with the GCCS had mean scores of 81.70 (SD=6.46) and 79.43 (SD=7.33) respectively from their posttest and follow-up stages. These mean scores yielded a gained mean value of 4.72 from the posttest stage to the follow-up test stage. To this effect, it is obvious that GCCS favoured females more than males.

Again, **Table 2** revealed that those taught English Grammar using ECS had the mean scores of the males are 73.25 (SD=7.30) and 74.13 (SD=9.93) respectively from posttest to follow-up stages. So, the males in this group (ECS) had a gained mean value of 0.88 from the posttest stage to the follow-up test stage. Then the females who were taught with the same ECS had mean scores of 73.75 (SD=9.28) at the posttest stage and 76.48 (SD=7.36) at the follow-up stage. Thus, they had the gained mean value of 2.73 from the posttest stage to the follow-up test stage. In comparison, the ECS was more effective for retaining knowledge among the females than the males.

Furthermore, when the gender influence on the treatment was considered, it was found out that CCFS, the male students had the mean scores of 55.39 (SD=10.49) and 39.87 (SD=10.94) respectively for their posttest and follow-up test stages. These mean scores yielded a gained mean value of -15.52 indicating that the male students taught with CCFS did not retain the knowledge acquired. For the female students in CCFS, their mean scores are 55.00 (SD=11.73) and 44.53 (SD=10.41) respectively for the posttest and follow-up stages. These yielded a gained mean value of -10.47 from posttest and follow-up test stages which indicated that the female students in the same group (CCFS) did not also retain acquired knowledge. However, the effect of CCFS was slightly better on females than males.

Generally, when the retention level of the male and female students was considered irrespective of their group, it was also observed from **Table 2** that both male and female students did not retain the acquired knowledge which was more with the males than the females.

Hypothesis 1: There is no significant difference in performance mean scores of male and female students taught English Grammar using GCCS/ECS and those taught using (CCFS).

The null hypothesis was tested using a two-way analysis of covariance (2Way-ANCOVA) based on the pretest and posttest scores of male and female students in three different groups (GCCS, ECS and CCFS). Thereafter, the results obtained are summarised and presented in **Table 3.**

Table 3: Summary of Two-way Analysis of Covariance (2-way ANCOVA) on the performance mean scores of students in English Grammar based on their groups and gender.

Source of Variation	Sum of Squares	df	Mean Square	F-value	P-value	Partial eta Squared
Engl. Gram. Scores (pre-test)	2.941	1	2.941	0.036	0.849	0.000
Group	230005.30	2	11502.65	142.25	0.0005	0.539
Gender	212.35	1	212.35	2.63	0.106	0.011
Group & Gender	409.54	2	204.77	2.53	0.082	0.020
Error	19650.02	243	80.86			
Total	45901.60	249				

The result in Table 3 revealed that for the group (source of variation) the calculated F-value of 142.25 was obtained at the degree of freedom of 2 and 243 for group error at 0.0005 level of significance ($p<0.05$). Since the significance level of 0.0005 is less than 0.05 the chosen alpha level, it is concluded that the performance mean scores of the students in the three groups (GCCS, ECS and CCFS) differ significantly. It is also observed that the difference in the mean performance of the students in the three groups had a moderate effect. This is because the partial eta squared is 0.539. The null hypothesis was accepted based on the group hence $p>0.05$.

Again, Table 3 also revealed that for gender, another source of variation, the F-value of 2.63 was obtained at the degree of freedom of 1 and 243 at 0.106 level of significance ($p>0.05$) which is greater than 0.05 the chosen level of Alpha. Thus, it is deduced that the mean performance of the students in English Grammar did not differ significantly based on gender. This implies that the observed difference in the mean performance of the male and female students in all the groups was by chance. The null hypothesis was accepted based on gender hence $p>0.05$.

Furthermore, it was also revealed that for the interaction effect between group and gender, the F-value obtained is 2.53. This is at the degree of freedom of 2 and 243 at 0.082 level of significance ($p>0.05$) which is greater than 0.05 the chosen level of significance. Thus, it is deduced that there is no significant interaction effect of group and gender on the mean performance of the students in English Grammar. The null hypothesis was accepted based on the interaction effect hence $p>0.05$.

Nevertheless, since it was earlier observed that the mean performance of the students in English Grammar differs significantly based on their groups, there is a need to determine the direction of the significant difference. This was done by employing a post hoc multiple comparison test via the Least Significant Difference (LSD) test.

Table 3b: Determination of the direction of significance performance difference in three groups compared.

	Mean difference	**P-value**
GCCS and ECS	5.58	0.0005
GCCS and CCFS	23.91	0.0005
ECS and CCFS	18.34	0.0005

The results in Table 3b revealed that when the pairwise comparison was done using the mean values of the three groups, all the compared groups yielded mean difference values that were all significant. This is because, the mean difference value was obtained when GCCS and ECS, GCCS and CCFS, and then ECS and CCFS group mean scores were compared, their mean differences were all significant at 0.0005 level which is less than 0.05 the chosen level of significance. This implies that a significant mean difference existed in the comparison of all the group mean scores.

Hypothesis 2: The retention mean scores of male and female students taught English Grammar using GCCM, ECM and CCFM do not differ significantly.

This hypothesis was answered using a Two-Way Analysis of Covariate. This was executed using posttest scores as the covariate and follow-up scores as the dependent variable. The results obtained are as presented in **Table 4.**

Table 4: Summary of 2-Way ANCOVA of the retention mean scores of the students based on their groups and gender

Source of Variation	**Sum of Squares**	**df**	**Mean Square**	**F-value**	**P-value**
Engl. Gram. Scores (covariate)	1104.31	1	1104.31	14.01	14.01
Group	21704.84	2	10852.42	137.66	137.66
Gender	412.09	1	414.09	5.23	5.23
Group & Gender	163.96	2	81.98	1.040	1.040
Error	19156.56	243	78.83		
Total	86423.60	249			

Results in Table 4. revealed that F-value for Group (treatments) 137.66 was obtained from the degree of freedom of 2 and 243 at 0.0005 which is less than 0.05 the chosen level of probability. Thus, there is a significant effect of treatment on the mean retention of the student in English Grammar among the three groups.

It is also revealed in Table 4 that the F-value of 5.23 for gender was obtained at the degree of freedom of 1 and 243 at 0.0005 level of significance ($p<0.05$) which is lower than 0.05 the chosen level of probability. Therefore, the mean retention of the male and female differ significantly. The null hypothesis was rejected

More so, it was also displayed in Table 4 that the F-value for the interaction effect of group and gender on the mean retention of the students in English Grammar was 1.040. This was obtained at the degree of freedom of 2 and 243 at 0.023 level of significance ($p<0.05$) which is lower than 0.05 the chosen level of probability. Thus, there is a significant interaction effect of group/treatments and gender on the retention mean score of the students in English Grammar.

Nevertheless, since a significant difference was observed among the three groups of the students in their retention level in English Grammar, there is a need to determine the duration of the significant difference. This was done by using a post hoc multiple comparison test via the Least Significant Difference (LSD) test. The results obtained after analysis are summarised and presented in **Table 4b.**

Table 4b: Determination of the direction of significance retention difference in three compared groups

	Mean difference	P-value
GCCS and ECS	30.57	0.202
GCCS and CCFS	1.800	0.0005
ECS and CCFS	28.77	0.0005

The result in Table 4b shows that the group mean of GCCS and CCFS and that between ECS and CCFS were significant. This is because their mean differences were obtained at 0.0005 level of significance which is lower than 0.05 the chosen level of probability. However, the group mean between GCCS and ECS was not significant. This is because 0.202 is greater than 0.05 the chosen level of probability. Based on these, the direction of the significant differences resulted from the mean comparison between GCCS, ECS and CCFS.

Discussion of Findings

It has been proved beyond reasonable doubt that technological learning environments have great advantages over conventional classrooms irrespective of the gender influence both in performance and in retention. Indeed, when all the male and female students are considered irrespective of their groups (learning classrooms) and gender (male and female), the results displayed in tables 3 and 4 respectively revealed that the male and female students in both Google Classroom and Edmodo Classroom outperformed the male and female students in the conventional classroom by acquiring more mean scores than their counterparts that were taught in a conventional classroom.

The acquired learning concepts were retained over time irrespective of the gender involved for those in both Google Classroom and Edmodo Classroom while those in conventional classrooms lost acquired concepts irrespective of their gender also. In support of this, researchers like Devis and Mayuri (2003), Egim (2003) and Obong (2007) in Fafunwa (2010) found out that students' performance can be influenced by a quality learning environment. Furthermore, a positive learning environment is an essential factor that promotes effective teaching and learning gender and group influence notwithstanding.

So, comparing the mean value for the male and female students in Google Classroom and Edmodo Classroom in the same table 3, it is obvious that the female students outperformed their male counterparts in Google Classroom with a gained mean value of 34.77 against 32.50 while the males outperformed the females in Edmodo Classroom with a gained mean value of 37.50 as against 32.61 as seen in table 3. For those in Conventional Classroom, the males outperformed the females with a gained mean value of 20.39 as against 19.40. Although in retention level, as shown in table 4, the mean retention level of male and female students is minimal in both Google Classroom and Edmodo while those in Conventional Classroom lost the acquired concepts over time irrespective of their gender. According to Arbaugh 2000; Ashong and Commendar 2012 in Lori et al 2015, it was found out that female students performed better than male students because female students are more likely to seek collaboration and interaction with fellow students than their male counterparts whose interactions are based on competitions.

It is not out of place that the female students always outperform their male counterparts as supported by Mankumari and Ajay, (2017) who discovered that female students show more seriousness in academics because they have limited opportunities, unlike the males. Irrespective of gender, the advances in technology have led to many options for learning English Grammar in context and focusing on meaning. The classroom environment of the digital age learning ecosystem includes both the physical and online areas that are used, curated by the teacher and students. So, performance attainment depends on who adapted more to the provided learning environments.

Conclusion

The study concludes that the 21st-century style of learning allows the learners to be in charge of their learning with the teacher as a facilitator despite the gender influence. There will be an encouraging result if the learning environments where English Grammar is taught is active, lively and student-centred, especially in Enugu State. Again, teaching and learning English Grammar should not end in the physical classroom with a row of desks and a teacher in front. There should be a continuation of the classroom with active and didactic pictures and videos that are connected to the topics taught to enable the students to continue the lessons at home when they get home hence learning in the school and outside the school is one of the distinctive features of technological learning environments.

Recommendation

1. Irrespective of the gender influence, Google Classroom Communicative Strategy and Edmodo Communicative Strategy should be used to teach English Grammar in senior secondary in Enugu North Local Government of Enugu State.
2. There is a need for an internet connection for easy access and communication for the interested users.
3. Maintenance personnel and supervisors are needed to keep the gadgets provided in various in good working conditions.

References

Andrew, J.M. (2013). Brunner's learning theory. From https://www.academia.edu/brunner-learning-theory.

Bayne, G. A. (no date). Foundations of distance education from https://www.researchgate.net/publication/foundation/of/distant/education

Brittany, C. (2013). Students' retention knowledge. http://www.amazon.com/edu/education-information-for-new-and-future-teachers/hml

Donald, Y. (2017). Google Classroom: Easiest teachers' guide to master google classroom from https://www.google-classroom/-easiest-to-teachers-guide-pdf.

Edmodo. (2018). About Edmodo. Retrieved May 18, 2021, from https://www.edmodo.com/about

Fafunwa, A.B. (2010, November 6). Fafunwa's last interview: Remember me as somebody who promoted mother tongue in schools. The Punch Newspaper, p3. Retrieved May 8, 2020, from https://www.punchnewsonline.com.

Indian Society for Technical Education (ISTE) (2016). Retrieved July 3, 2020, www.iste.online.com.

Kaur, A. & Erturk, E. (2017). Google Classroom from https://www.academia.edu>googleclassroom.

Kiatkheeree, P. (2017). An effective learning environment for language acquisition: Student's perspective. *International Journal of English Language Literature,* 5, (4), 100-106.

Kuama, S. & Usa, I. (2016). Is online learning suitable for all English language students? *PASAA*, 52, (3) 52-82.

Lori, K., Michelle, B., Glenda, H., & Brian, U. (2015). The relationship between gender and academic success. *Journal of Educators Online*, 11, (1), 1-14.

Mankumari, P. & Ajay, T. (2017). Gender differences in the academic performance of students. From https://www.researchgate.net/publication/339922091.

Matthew, L. (2018). 10 benefits of google classroom integration. Retrieved September 20, 2021, from http://www.researchgate.net/publication/pdf.

Mokhtar, F.A. (2018). Breaking barriers through Edmodo: A qualitative approach on the

perception of University of Malaya undergraduates. *Online Learning*, 22 (1), 61-80.

Applied and Advanced Research, 3(s1),33-38

Rudite, A. (2017). *The learning environment in today's school in the context reform of the curriculum.* Latvia: University of Latvia.

Sukumawati, S. & Nensia, N. (2019). The role of google classroom in ELT. *Journal of Educational and Vocational Studies*, 1, (2), 142-145.

The American Heritage Dictionary of Medicine (2018). America: Houghton Mifflin Harcourt publishing company. Retrieved May 15, 2020, from https://ahdictionary.com

University of Tasmania, (2017). Retention and success strategy. From www.universityoftasmania.com.

Vizeshfar F., & Torabizadeh, C. (2018). The effect of teaching based on dominant learning style on nursing students' academic achievement. *Nurse Education in Practice*, 28(2)103 -108.