

# Comparative Analysis of the Student Learning Performance Behavior in An Online and Modular Class in Computer Art and Technological College, Inc. High School Department

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**Abstract**— The shift to distance teaching and learning during the COVID-19 pandemic brought about a challenge for both teachers and students. To face these difficulties in teaching in the High School department at the Computer Arts and Technological College, Inc., a blended learning strategy in the context of teaching and learning the students were employed. An online strategy that facilitated the transition from traditional face-to-face learning to an online setting. The present study identifies the online setting of teaching and learning and evaluates the behavior of the students based on the learning experience and performance. A comparative analysis was employed in conducting the study. The data were gathered using an online survey questionnaire from random respondents and a semi-structured interview was conducted to collect the general weighted average (GWA) of the students. A weighted mean is used to test the behavior of the students learning experience and a T-test using a two-tailed test was used to test and analyze the behavior performance of the high students taking online and modular classes. The results of the study indicated that the majority of the respondents preferred the limited F2F modality for the coming school year. The behavior of the students based on the learning experience taking the online and modular classes has been attained and there is no significant difference in the behavior performance of the high students taking online and modular classes.

**Keywords**- Online class; Modular class; Learning experience; Behavior performance; Face-to-face (F2F); Comparative analysis

## I. INTRODUCTION

The higher education institutions in the province of Albay have started to implement an online learning environment capable of delivering an online education in a blended learning academic setting. The sudden adoption of online teaching and learning is due to the pandemic challenge to the digital readiness of the teacher and students all over the world [1,2,3,4,5]. School closures in response to the pandemic have shed light on several issues affecting access to education. The pandemic is soaring due to which a considerable number of children, adults, and youths cannot attend schools and colleges [6]. UNESCO recommends distance learning programs and open educational applications during a faculty closure caused by COVID-19 so that schools and teachers use to show their pupils and bound the interruption of education. Therefore, many institutes attend online classes [7].

The E-learning framework has been increasingly used as a flexible platform for learning and teaching processes [8]. E-learning is defined as a replacement paradigm for online learning supported by information technology. In contrast to traditional learning academics, educators, and other practitioners want to

understand how E-learning can produce better outcomes and academic achievements. Only by analyzing student learning experience and performance behavior can the solution be sought.

In online learning, two basic settings are often compared, modular and online. The modular approach is an emerging trend in educational thinking that shifts traditional methods of instruction to an outcome-based learning paradigm. Modularization is predicated on the principle of dividing the curriculum into small discrete modules or units that are independent and typically short in duration. The new normal now could be a transformed concept of education with online learning at the core of this transformation. Today, digital learning has emerged as a necessary resource for college kids and schools everywhere on the planet. For several educational institutes, this can be an entirely new way of education that they need to adopt. Online learning is now applicable not just to learning academics but also extends to learning extracurricular activities for college kids further. A learning environment that is found in a web or virtual setting, rather than in an exceedingly face-to-face setting.

Schools and colleges are moving towards educational technologies for student learning to avoid strain during the

pandemic season [9]. Hence, the present study's objective is to identify the online setting of teaching and learning for the teachers and students and to evaluate the behavior of the students based on the learning experience and performance of Computer Art and Technological College, Inc. High School Department.

## II. RELATED LITERATURE

Theories of teaching have long emphasized the important role teachers play in supporting students' learning and development in their performance on an online platform. Moreover, a must designs a resiliency program to address the needs of the learners and some pedagogical skills to be adapted for the teachers. Thus, the use of CATC ELMS, zoom and google applications such as google meet, google drive, and google classroom has helped in the attainment of an online learning platform. Hence, online learning or distance learning should be the core of the resiliency program of the school for student learning even though the global pandemic is still present in this era.

In recent years, a study was conducted to find the link between the amount of online learning and the academic performance of bachelor of education students. It's to work out students' level of online learning, evaluate students' academic performance (in terms of satisfaction, students and instructor's interaction, and instructors' performance), and introduce a brand new framework to extend students' satisfaction in learning online [10]. Interaction with instructors and instructors' effectiveness in operating online classes affects the educational experiences and performance of scholars. This research can contribute to the event of the net learning process since it provides information about the status of scholars upon learning online.

The implementation of an online setting approach to improving academic performance and students' satisfaction. T-test was used to evaluate the online learning on academic performance and students' satisfaction. The study found that the variance of online learning is different, revealing that different levels of online learning influence academic performance [11].

A study aimed to research the impact of the COVID-19 pandemic on students' learning in education in Afghanistan. In the research, a mixed method research design was employed in conducting the study. The quantitative data were gathered using an internet survey questionnaire from randomly selected students and semi-structured interviews were conducted to gather qualitative data. Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data. The qualitative data were coded and analyzed thematically. The study will help educational managers and better education leaders review and adopt policies for teaching and learning in emergency cases and it also helps lecturers to style a correct plan and improve their instruction [12].

Another study, investigate how school closures in 2020 influenced the performance of German students in a curriculum-based online learning software for mathematics. The data was analyzed from the different students who computed mathematical problem sets before and during the shutdown and found that students' performance increased during the shutdown of schools in 2020 relative to the year before [13]. The analyses revealed that low-achieving students showed greater improvements in performance than high-achieving students, suggesting a narrowing gap in performance between low- and high-achieving students. It was concluded that online learning

environments might be effective in preventing educational losses associated with current and future shutdowns of schools.

There is a study that the high use of web systems in learning implies that E-learning is becoming a standard successful learning method in wider academic contexts. To boost and support schooling and literacy, E-learning includes leveraging information and communication technology (ICT). Within the study, the aim is to work out the correlation between E-learning and also the academic achievement of scholars in higher learning. The findings reveal that ICT encompasses a major statistically favorable effect on the educational success of scholars in E-learning and suggest that ICT features a substantial positive effect on the full success of scholars in universities [14].

The Minister of Education and Culture of Indonesia make a policy in which all education sectors are shifted from face-to-face learning to online learning. The study identifies the impact of online learning on students' performance in business correspondence courses [15]. Data were collected through a questionnaire that consists of statements and open-ended interviews. The result of the study showed that online learning has a positive impact on student's performance in terms of learning motivation, learning achievement, and learning engagement and showed that conducting online learning is relevant. Furthermore, flexibility, accessibility, learning autonomy, and boosting students' achievement become the strengths of conducting online learning.

The factors affecting students' satisfaction and performance regarding online classes during the pandemic period of COVID-19 and to determine the link between these variables [16]. The study is quantitative in nature, and therefore the data were collected from respondents through an internet survey who were studying business management (B.B.A or M.B.A) or hotel management courses in Indian universities. This study is being conducted during the epidemic period of COVID-19 to test the effect of online teaching on students' performance.

The efficacy of online delivery relative to face-to-face delivery using an enrolment protocol that largely eliminates self-selection bias. It utilizes random assignment of the registrants of a Principles of Macroeconomics class into two alternative venues: online and face-to-face. Students within the face-to-face section have statistically significantly higher exam scores and statistically significantly greater improvement on the post-test instructor questions and there's no statistical difference between the improvement on the post-test overall nor the improvement within the post-test standardized questions [17]. These mixed results suggest that both course objectives and the mechanism went to assess the relative effectiveness of the two modes of education may play a very important part in determining the relative effectiveness of other delivery methods.

A growing number of students are now choosing online classes. They find the standard classroom modality restrictive, inflexible, and impractical. During this era of technological advancement, schools can now provide effective classroom teaching via the net. This shift within the pedagogical medium is forcing academic institutions to rethink how they require delivering their course content. The overarching purpose of this research was to work out which method proved simpler over the 8 years [18]. The immeasurable scholars in a biological science class were accustomed determine which instructional modality generated better student performance. There is no significant difference in student performance between online and face-to-face (F2F) learners with relevant class rank found. The info

demonstrates the flexibility to similarly translate bionomics concepts for non-STEM majors in both traditional and online platforms regardless of class rank. A possibility exists for increasing the quantity of non-STEM majors engaged in citizen science using the flexibility of online learning to show biology core concepts.

### III. METHODOLOGY

This section discussed who are the respondents for the study. And it also discusses the process and tools of how the data was gathered and analyzed.

#### A. Respondents

The study consisted of 269 students who completed the school year 2021 to 2022. The General Weighted Average (GWA) of the student served as the primary comparative factor in assessing performance differences between online and modular. Of the 269 total students, 80 were taking online while 189 were taking modular. This disparity was considered a limitation of the study. The study also used students from all four-class ranks. The ranks are Grade 7, 8, 9, and 11 which are shown in Table I.

TABLE I. TOTAL STUDENTS FOR SY 2021-2022

Grade	Online	Modular
7	15	19
8	16	43
9	20	44
11	29	83
Total	80	189

The sample in the study consisted of 130 respondents, 120 students, and 10 teachers. The students are divided equally to the number of respondents. The 60 students are taking online which is 75.00% of the total population taking an online class, 60 students taking modular which is 31.75% of the total population taking a modular class, and 10 teachers which are 38.46% of the total population of teachers in the high school department.

#### B. Interview

The researcher conducted an interview with the High School Department in Computer Arts and Technological College, Inc. to ask questions regarding the issues and concerns in an online setting. The interview was done virtually with the questions focusing on the issues and concerns in the online setting. The results of the interview will be used as the basis for finding the question to be used in the survey question to answer the objective of the study.

#### C. Survey

The researcher conducted an interview with the High School Department in Computer Arts and Technological College, Inc. to ask questions regarding the learning experience in the online setting. The survey was done virtually with the question focusing on the subject matter knowledge, presentation and management in the online setting, assessment of the performance behavior in the online setting, and development in the online setting. The survey question is shown in Annex figure 1.

For the behavior performance of the students in an online setting, the researcher asked the adviser for the consolidated grade report of the students. From the consolidated grade report, the GWA will be used to analyze the performance behavior of the students. Annex figure 2a shows a sample computation of the GWA of the students taking an online class and Annex figure 2b shows a sample computation of the GWA of the students taking the modular class. The data for the GWA will be based on the selected students that are taking the online and modular classes who answered the survey question.

#### D. Descriptive Analysis

The researchers used a descriptive analysis in identifying the preferred modality and evaluating the behavior of the students based on the learning experience and performance in the online setting. In identifying the preferred modality, the researcher used the data collected in the survey question about the preferred modality in the online setting. The result was in a percentile form. For evaluating the behavior of the students based on the learning experience, the researcher used the data collected in the survey question about the subject matter knowledge, presentation and management in the online setting, assessment of the performance behavior in the online setting, and development in the online setting. The researcher computed the weighted mean of each question in the category using the formula in Figure 1 and get the average mean of each category. A Likert scale range is used to the interpretation of the result which is shown in Table II.

$$\bar{x} = \frac{\sum X}{n}$$

Figure 1. The formula for computing the mean.

TABLE II. LIKERT SCALE RANGE

Weight	Range	Interpretation value
5	4.3 - 5	Strongly agree
4	3.5 - 4.2	Agree
3	2.7 - 3.4	Neutral
2	1.9 - 2.6	Disagree
1	1 - 1.8	Strongly disagree

To evaluate the behavior of the students based on their performance, the researcher used the GWA of the students that are taking an online and modular class. The sample data are GWA of the students taking the online and modular classes. The researcher used T-tests to test for the hypothesis and determine if there is a statistically significant difference between the means of two variables, which are taking online and modular classes. The researcher computes the variance using the formula in Figure 2 and used the two-tailed critical values of the t distribution shown in Annex figure 3. After identifying the critical values, the researcher computes the common standard deviation (sp) using the formula shown in Figure 3 and the test statistic (t) using the formula shown in Figure 4.

$$V = \frac{\sum(\bar{x}-x)^2}{n-1}$$

Figure 2. The formula for computing the variance.

$$sp = \sqrt{\frac{(n_o - 1)s_o^2 + (n_M - 1)s_M^2}{n_o + n_M - 2}}$$

Figure 3. The formula for computing the estimate of the common standard deviation.

$$t = \frac{\bar{X}_O - \bar{X}_M}{sp \sqrt{\frac{1}{n_o} + \frac{1}{n_M}}}$$

Figure 4. The formula for computing the test statistic.

#### IV. FINDINGS AND DISCUSSIONS

##### A. Identify the online setting of teaching and learning for the teachers and students

In the school year, 2021-2022, the high school department in Computer Arts and Technological College, Inc. used the basic online settings which the online and modular. The total number of students in the high school department is shown in Table I. Based on the total number of students, 29.74% are taking an online class while 70.26% are taking a modular class. The researcher used a random sampling method for the teachers and students. For the students, the researcher used an equal number of respondents taking the online and modular classes to identify the preferred online setting for teaching and learning for the teachers and students. Table III, shows the number of respondents who answered the survey, and Table IV, shows the preferred modality of the teachers and students. Out of the total respondents, 52.31% preferred the limited F2F modality based on the survey result. Most of the respondents would like to have a limited face-to-face (F2F) class this coming school year.

TABLE III. THE NUMBER OF RESPONDENTS ANSWERED WHO THE SURVEY

Respondent	Number of Respondents	Percentage
Teachers	10	7.70%
Students	120	92.30%
Total	130	100.00%

TABLE IV. PREFERRED MODALITY OF THE TEACHERS AND STUDENTS

Modality	Number of Respondents	Percentage
Modular	34	26.15%
Online	13	10.00%
Blended	15	11.54%

Modality	Number of Respondents	Percentage
Limited F2F	68	52.31%
Total	130	100.00%

##### B. Evaluate the behavior of the students based on the learning experience and performance

- Behavior of the students based on the learning experience

The behavior of the students learning experience is based on the result in Annex figure 1. The researcher gets the average of the weighted mean of every question in each category in the survey. The weighted mean is interpreted based on the Likert scale range in Table II. With the result in Table V, it is most likely that the students agree with the three categories of the survey question, which are subject matter knowledge, presentation and management, assessment of the performance behavior, and development in an online setting. The students have attained a learning experience during their online and modular classes. Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.

TABLE V. WEIGHTED MEAN OF THE SURVEY QUESTION

Category of survey question	Weighted mean	Interpretation
Subject matter knowledge, presentation, and management in the online setting	3.98	Agree
Assessment of the performance behavior in the online setting	3.99	Agree
Development in the online setting	3.96	Agree

- Behavior of the students based on the performance

The researcher conducted a study on the behavior of the students based on their performance in an online and modular class. The behavior of the students in their performance is based on their GWA which is shown in Annex figures 2a and 2b as an example. The researcher developed a hypothesis to determine if there is a significant difference in the GWA of the students that are taking online and modular classes which is shown in Annex table I. After creating the hypothesis, the researcher then now, computes the mean and the variance of the GWA of the student taking online and modular using the formula in Figures 3 and 4. The result of the mean and variance of the GWA of the students is shown in Table VI.

TABLE VI. MEAN AND VARIANCE OF THE GWA

Treatment	Sample Size	Mean	Variance
Online	60	87.55	27.10
Modular	60	84.57	32.86

After computing the mean and the variance, the researcher used the two-tailed test and a 5% level of significance together with the computed mean and variance

of the students taking online and modular classes. The degree of freedom (df) is 118, the level of significance is 0.05 and the critical value is 1.9803 which is based on the critical values of t distribution shown in Annex figure 3. Now, the research needs to compute the pooled estimate of the common standard deviation (sp) and the test statistic (t) using the formula in Figures 3 and 4.

The estimate of the common standard deviation (sp) is 40.19 and the test statistic (t) is 0.41. Since the computed t value is 0.41, it is less than the critical value of 1.98 therefore; it failed to reject the hypothesis. Based on the result of the sample gathered by the researcher, there is no significant difference in the behavior performance of the high students taking online and modular classes. Since the result is that there is no significant difference in the behavior performance, the school can both adopt the online and modular classes as a teaching modality for the students who will enroll.

## V. CONCLUSIONS

The study indicated that the majority of the students in the High School department of Computer Arts and Technological College, Inc. are taking a modular class in the school year, 2021-2022. The researcher gets an equal number of respondents to take online and modular to answer the survey question. As a result of the survey, 52.31% of the respondents preferred the limited F2F modality this coming opening of the academic year.

The behavior of the students based on the learning experience in the online and modular classes has a positive impact because both online and modular classes provided flexibility and convenience for the students. Students can access the lessons both online and in modular classes. The behavior of the students based on the performance was based on the GWA of the student in a different online setting, which is the online and modular class. It is most likely the students taking online classes got higher GWA than the students taking modular. However, the overall result is that students taking online and modular has no significant difference when it comes to their performance in the online setting.

This study was relevant because it can enhance the plan of organizational behavior. The researcher can suggest that the school may offer a F2F class aside from the online and modular classes and teachers should encourage students taking the modular class to have more time for their studies and submit activities on time.

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