

Impacts of Blended Learning Modality on the Learning Drive of Grade 12- STEM Students of Hilongos National Vocational School

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Abstract—The purpose of this study is to examine the impacts of blended learning modality on the learning drive of Grade 12-Science, Technology, Engineering, and Mathematics (STEM) students of Hilongos National Vocational School (HNVS) during the first half of School Year 2022-2023 when limited face-to-face instruction was provided in the school. This research is important in examining the effects of implementation and entails a solution to the students' psychological needs. This is an *ex post facto* research study. The random sampling method was used to select respondents from all HNVS Grade 12 STEM students. The methods used to determine the impacts of the modality on the students and its relationship between the variable groups are percentage, cross-tabulation, Pearson's R correlational analysis, and Analysis of Variance. According to the findings, the student's learning motivation and development were negatively affected. Although not all students were affected, the majority of them found the modality difficult to adjust, lowering student satisfaction. As a result, the study recommends that the school implement special programs or activities for the students to gradually restore the students' motivation and provide choices in the modality that the students prefer without forcing them.

Keywords— Blended Learning Modality, Grade-12 STEM students, Learning Motivation, Student Satisfaction.

I. INTRODUCTION

The Coronavirus pandemic affected the learning modality of schools in the Philippines. Due to the mandatory lockdown, schools were forced to shut down for months. But the country found that shutting down schools can affect the economic development of the country. In the year 2020 alone, the National Economic and Development Authority found that the country lost an estimated Php 230 billion due to school closures. In addition, they estimated that the long-run overall cost of human capital investment and returns, in regards to education alone, will exceed P 11 trillion over 40 years due to a loss of future production and income. Other countries also suffered from school shutdowns, and school cancellations affected more than 1.5 billion learners and adolescents worldwide, with considerable education and income losses occurring in all economies (United Nations Educational, Scientific and Cultural Organization [UNESCO] 2021). The impact on the country's economy of the phenomenon urged the government to develop and examine different strategies to continue the learning of the student despite the pandemic. Online and offline classes were imposed as an alternative learning modality in the year-end months of 2020. Online

classes involve using social media sites to perform classes. These are Google classrooms, Zoom, Messenger, YouTube, and other sites that can help teachers connect with their students virtually. While offline involves printed modules, textbooks, and other physical materials that students can read their lessons and answer activities. Though, these kinds of classes were already offered to countries like America, Australia, and other countries in Europe for flexible choice of class time slots. But if applied to all the students, researchers found an alarming problem with this. Learning about poverty still matters in developing countries even with the resources they had. During the pandemic, over 200 million students in middle- and low-income economies had no access to virtual and mobile learning opportunities (United Nations Children's Fund 2021). This is the reason behind the proposal of blended learning modality in school.

Blended Learning is a learning scheme in which learning is scheduled when to go to school. In other terms, it is called limited face-to-face classes. In this condition, students have classes at home and school. They will attend a few classes arranged by the school's administration and finish some activities and learning load at home. Teachers will provide self-learning modules or any printed materials for the students to study and answer the activities. Some schools also offered online classes as soon as they finish their face-to-face class schedules. This innovation using technology has helped the world to face the crisis caused by the pandemic.

Blended learning is a method that has gained acceptance in teaching institutions in the latest years and has shown potential in effectively doing what it sought to do: educating students in a manner that fits their learning style. Individual practitioners define blended learning in the way that works best for them in their classes, therefore definitions vary. In an evaluation of the book *Teaching in Blended Learning Environments*, French (2015) explains the efficiency of these empirical research ideas. "Teaching in Blended Learning Environments is a well-organized and instructive book that will enable many readers to adapt and rethink the pedagogical tools and techniques they use when teaching college and university students" (French, 2015, p. 519). Another investigation of Gyamfi and Gyaase (2015) discovered that when evaluating the "quality of the content, learning, communication and the amount of engagement experienced" (Gyamfi & Gyaase, 2015, p. 97)

student's perceptions of the blended-learning environment was a good one.

Although there are significant advantages, shifting from traditional face-to-face classes to blended learning programs can be tough for both students and instructors. Certain factors brought by this modality affect the students in their learning development. Students have different independence in their pace of acquiring knowledge, thus, we can't assure that blended learning works for all students. Being away from students, teachers cannot ensure the commitment of their participants during online classes given the characteristics and issues towards the use of technology (Hofmann, 2014). He added that failure of technological applications may abandon the learning development of the students. Oxford Group (2013) reported 16% of learners have negative opinions about blended learning and 26% of them found a possibility for them of failing to finish their studies. This is due to different issues that students faced during the process. The utilization of technology tools must fully satisfy the needs of the learners while guaranteeing the appropriateness of the program's right blended learning nature (e.g., Brali and Divjak, 2018; Chaeruman, Wibawa, and Syahrial, 2018; Greller, Santally, Boojhawon, Rajabalee, and Kevin, 2017; Lee, Lim, and Kim, 2017). However, certain instructors' lack of technical abilities (e.g., Bowyer & Chambers, 2017; Krasnova & Shurygin, 2019; Ma'arop & Embi, 2016) affect students' learning experience. As a result, some experts have a poor opinion of the blended-based approach. Studies also found that the burden of the students on cognitive load, learning styles, and working setup are examples of the contributing factors to the problem of limited face-to-face interaction between teachers and learners. The following problems teachers and learning institutions faced will likely affect the learning drive of the students.

Students' drive of going to school is influenced by the circumstances they faced as learners. According to Hendrix (2019), learning environments play a critical part in student achievement as well as their relationship with the people around them. Several elements can affect learning ability, including seating, light, noise, and even color. Students that study in a favorable learning environment are more motivated, and engaged, and have greater overall learning ability. On the other side, kids learning in poor circumstances - ones that are uncomfortable, loud, or full of distractions and lack intensive teaching support - will find it far more difficult to retain knowledge and stay engaged.

Objective of Study

This study aimed to determine the impact of blended learning modality on the learning drive of Grade 12 – Science, Technology, Engineering, and Mathematics (STEM) students of Hilongos National Vocational School.

Specifically, this study sought to answer the following questions.

1. How many profiles of the respondents be described:
 - 1.1 Students;
 - 1.1.1 Gender ;
 - 1.1.2 Academic Standing ;

2. Did limited face to face helped the students feel motivated to learn their school lessons?
3. How did blended learning affect the learning drive of the student? Did it also affect the learning development of the students?
4. Did the limited social interaction of the students affect their motivation of going to school?
5. Did the students find the modality hard to adjust?

II. METHODOLOGY

Design

This quantitative research study will use an ex-post facto research design to identify the impact of the phenomenon that occurred before the conduct of the study. The Latin word, ex-post facto means "from a thing done afterward". This will show how the independent variable creates and affect the dependent variable under the circumstances that already occurred (Kerlinger, 1964). According to Ary, Jacobs, and Razavieh (1972), the ex-post facto's purpose is to discover the functional relationship among the variables in the study. The effects of the study are controlled by the independent variable but it doesn't act like the experimental design which is manipulated by the researcher. It is an experiment examining the effects of naturally occurring treatment and relating this after-the-fact treatment to an output or dependent variable (Tuckman, 1972). It doesn't have random assignments of variables but you are only looking at a prior variable present in the participant.

Environment

The research environment for this ex post facto study was situated at Hilongos National Vocational School (HNVS), a public school located in Hilongos, Leyte, Philippines.

Hilongos National Vocational School is an established school that offers educational tracks such as Science, Technology, Engineering, and Mathematics (STEM), and Technical Vocational Livelihood (TVL) tracks.

The participants in this study will include graduating Senior High School students taking the STEM track at Hilongos National Vocational School and be surveyed using questionnaires. The study was conducted in the first semester of the academic year 2022-2023.

Respondent

The participants of this study were the graduating Senior High School in the STEM track in Hilongos National Vocational School.

Inclusion Criteria

- Participants must be enrolled in the STEM track of Senior High School at HNVS.
- Participants must be graduating students. (Grade 12)

Exclusion Criteria

- Students in other tracks apart from STEM will not be included in this study.

The researchers will collaborate with the school administration and teachers to identify the eligible participants for the study. The random sampling method was used to select respondents from all HNVS Grade 12 STEM students. The study will

collect data from the Grade 12- STEM Students of Hilongos National Vocational School. The respondents of the questionnaires are eighty (88) students from all the sections of Grade 12- STEM in HNVS.

Instrument

The researcher used survey questionnaires to collect the information needed in assessing the relationship between the variables in the study. It was of composed of 9 close-ended questions related to the problems stated in the statement of the problem and also about the significant profile declared in the same part of the paper. All questions will be given three answer choices: “Yes” if respondents agree with the question, “No” if they disagree, and one out-option.

Data-Gathering Procedure

The researcher collaborated with the class mayors of the target Grade-12 STEM sections wherein data will be collected. Afterward, the permission of the respondents will be asked before the distribution of the questionnaires.

The confidentiality and privacy of the respondents in the present study will be kept by not requiring the need for filling out personal information aside from the variables stated in the statement of the problem.

All the respondents will receive the same questionnaires. The data will be collected and soon tabulated. The researcher will cross-check the responses for the validity and reliability of the data collection processes. After, it will be finalized to be able to perform the data analysis.

Data Analysis

The study used the ex-post facto research processes formulated by Isaac and Michael (1971) modified by Sukhia and Metrotra (1996) with three (3) important casual-comparative methods in its data processing. Since we are using quantitative data, there may be open-ended choices that cannot be chosen in the survey. We will discard first the elements that are not present in the data gathered to avoid wasting time and confusion. We will also collect data that are always present when a particular effect does not occur. Though the absence of the effect might cause a questionable reason for including its data, it can be a contributing factor to the presence of the impact of the phenomenon that we are studying. Lastly, data will be compared, or one will be subtracted from the other to conclude the study.

Then it will be presented through cross-tabulation (crosstab) of the information gathered. This is a data analysis method to identify patterns, trends, and relationships between the parameters of your study. This easily helps you analyze doubtful data because of its nature. Researchers either use statistical tools or software to easily tabulate and compare your data or write it down manually. Microsoft Excel or Spreadsheet is the basic program that can be used to present and compute the numerical data that the researcher collected. This involves categorical data that are mutually exclusive from each other.

There are methods to be done in this type of data analysis method. The researcher will create a table according to the

data that should be tabulated and compared (Figure 1.0). Then, they will count the data under a specific category. The researcher will enter the numerical data counted under that category and will be compared to the contrasting data that corresponds to it. The total number of the answer for each category must be tabulated. As shown below (Figure 1.0), the letters a, b, c, and d represent the total number of answers per group and option. A is the number of answers corresponding to the row and column 2 and row 3, B is for column 3 and row 3, C is for column 2 and row 4, and lastly is C for row 4 and column 3.

EVENT			
	1 st Option	2 nd Option	TOTAL
Group 1	A	B	A+B
Group 2	C	D	C+D
	A+C	D	C+D

Figure 1.0 Cross-Tabulation Data Analysis Procedures

Though this method (Figure 1.0) has its formula, the researcher will not strictly adhere to it. Only data from students who agree with the questions will be chosen by the researcher. Then tabulate it to represent each question's responses. Using the different groups of academic standing and gender, the researcher will compute the percentage of each group from the separate population of the subgroup during the cross-tabulation. For example, there are 22 consistent female honor students and 16 of them agree with the question, then she will be computing it as shown below (Figure 2.0)

$$\text{Percentage} = 16/22 * 100 = 72.72\%$$

Figure 2.0 Getting the Percentage

Each academic standing will be determined independently for each group and gender. The percentage method will aid in representing the sample's unequal population. The final section of the table will show the total number of respondents from each academic standing group and gender.

Since the study also includes groups and subgroups that are not easily calculated through cross-tabulation then the researcher will use single-factor Analysis of Variance (ANOVA). This analysis method is used to see if there are any statistically significant differences in the means of three or more groups. Academic standing involves more than two groups of consistent honor, inconsistent (during and before limited face-to-face), and non-honor students. This method will be performed using Microsoft excel for fast data analysis.

Meanwhile, the relationship between the gender will be computed through Pearson's R correlation analysis. It measures the linear correlation between two sets of data in statistics.

To analyze the data, there are guidelines needed to be followed. The higher number will be considered as the choice that the majority have chosen. Therefore, it will be the option that will likely answer the question representing the population or the sample.

III. RESULTS

Through surveys, the researchers gathered quantitative data during the data collection phase of this study. The investigation happened in Hilongos National Vocational School Senior High School grounds in which 88 Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students participated. The data collected was under the statement of the problem and research hypothesis related to the theory and literature presented. Tabulation and analysis will be done after surveying. The data yield will be presented through charts for visual presentation.

Each question involved in the inquiry will be presented at the upper part of the charts. This will be followed by the related theories and literature that will signify its relation to the hypothesis and statement of the problem.

There are two research variables that the researcher included in the study. These are the sex and academic standing of the students. Among the 88 respondents these are the data yield from the inquiry:

Table 1. Respondent's Population per Section and Gender

Section	Male	Female	Total
Jenner	6	9	15
Newton	4	11	15
Franklin	2	6	8
Curie	8	6	14
Mendel	5	10	15
Dalton	8	13	21
Total	33	55	88

Table 2.0 Respondent Population Per Section, Gender, and Academic Standing.

Section	Academic Standing									
	Consistent		Only During Limited Time		Before Limited		None		Total	
	F	M	F	M	F	M	F	M		
Jenner	7	4	1	0	1	0	0	2	15	
Newton	6	2	1	2	1	0	3	0	15	
Franklin	5	2	0	0	1	0	0	0	8	
Curie	4	2	1	2	0	1	1	3	14	
Mendel	8	2	0	0	0	0	2	3	15	
Dalton	11	2	1	0	1	2	0	4	21	
Total	41	14	4	4	4	3	6	12	88	

Table 2.1 Summary of Table 2.0

Consistent Honor Only During		Only During		Before Limited		None	
F	M	F	M	F	M	F	M
41	44	4	4	4	3	6	12
55		8		7		18	

With the two variables, respondents' responses were tabulated using the cross-data tabulation analysis template. Then we will compare the data using correlational data analysis to be able to determine the relationship between each academic standing of the following.

Table 3. Beforehand, are you in favor of the plan of implementing limited face-to-face than having full fac-to-face classes?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor	21	8	8	2	12	4	55

Student							
Honor Student Only During Face-to-face	2	1	2	2	0	1	8
Honor Student Only Before Limited Face-to-face	2	1	2	0	0	2	7
None Honor Student	2	6	1	3	3	3	18
Total	27	16	13	7	15	10	88

Table 4. While you were in class, do you like the set-up of limited face-to-face?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	18	10	13	14	10	0	55
Honor Student Only During Face-to-face	2	1	2	3	0	0	8
Honor Student Only Before Limited Face-to-face	2	0	2	1	0	2	7
None Honor Student	2	5	0	4	4	3	18
Total	24	16	17	12	14	5	88

Table 5. Do you find limited face-to-face modality motivating in learning your lessons?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	17	8	12	4	12	2	55
Honor Student Only During Face-to-face	3	1	1	2	0	1	8
Honor Student Only Before Limited Face-to-face	4	0	0	1	0	2	7
None Honor Student	0	5	3	3	3	4	18
Total	24	14	16	10	15	9	88

Table 6. Do you find limited face-to-face learning harder than the full face-to-face?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	25	11	5	1	11	2	55
Honor Student Only During Face-to-face	1	2	2	1	1	1	8
Honor Student Only Before Limited Face-to-face	1	2	2	1	1	0	7
None Honor	2	7	2	1	2	4	18

Student							
Total	19	20	16	6	20	7	88

Table 7. Do you think that limited face-to-face interaction helped you comprehend more in lessons?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	16	6	14	3	11	5	55
Honor Student Only During Face-to-face	2	1	2	2	0	1	8
Honor Student Only Before Limited Face-to-face	2	0	1	1	1	2	7
None Honor Student	0	8	3	3	3	1	18
Total	20	18	20	9	15	6	88

Table 8. Does limited interaction with your teachers affect your drive to go to school?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	25	6	4	6	10	2	55
Honor Student Only During Face-to-face	1	2	1	0	2	2	8
Honor Student Only Before Limited Face-to-face	3	1	1	1	0	1	7
None Honor Student	3	5	3	4	3	0	18
Total	21	14	17	11	17	8	88

Table 9. Does limited interaction with your classmates affect your drive to go to school?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	27	5	4	3	10	6	55
Honor Student Only During Face-to-face	1	1	0	3	3	0	8
Honor Student Only Before Limited Face-to-face	2	2	1	0	1	1	7
None Honor Student	1	6	1	4	3	3	18
Total	19	14	18	10	17	10	88

Table 10. Have you ever felt unmotivated on going to school because of limited face to face?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	29	7	1	2	11	5	55
Honor Student	2	0	2	4	0	0	8

Student Only During Face-to-face							
Honor Student Only Before Limited Face-to-face	1	1	1	1	2	1	7
None Honor Student	1	3	3	3	1	6	18
Total	19	11	22	10	14	12	88

Table 11. Do you find it hard to adjust to limited face-face?

Academic Standing	Yes		Maybe		No		Total
	F	M	F	M	F	M	
Consistent Honor Student	25	7	6	3	10	4	55
Honor Student Only During Face-to-face	3	2	1	1	0	1	8
Honor Student Only Before Limited Face-to-face	2	1	1	1	1	1	7
None Honor Student	4	4	2	5	0	3	18
Total	28	14	16	10	11	9	88

IV. DISCUSSION

4.1 In relation to the Theory of Model of Commitment Process

Concerning this theory, The Investment Model of Commitment Process, a student's prior selection of limited face-to-face classes can have a significant impact on their persistence to engage in the modality. According to the survey results depicted in the table (Table 12) below, only 49.09% of females and 48.48% of males support implementing limited face-to-face. The majority of these females are honor students. However, only the majority of male honor and non-honor students are in favor.

Table 12. Number of students favor of face-to-face

	Number 1. Beforehand, are you favor of the plan of implementing limited face-to-face than having full face-to-face classes?				Total
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	
Female	21	2	2	2	27
	51.296222	50	0	33.333333	48.090909
Male	8	1	1	0	10
	57.14285714	33.333333	2	50	48.484848

Table 12.1 Analysis of Variance of Computation in Table 12.

Groups	SUMMARY			
	Count	Sum	Average	Variance
Consistent Honor	2	106.36237	54.18118	17.54301
Before Implementation	2	81.333333	41.66667	136.8889
During Implementation	2	75	37.5	312.5
Non-Honor Student	2	81.333333	41.66667	136.8889

ANOVA					
Source of Variation	df	MS	F	P-value	F crit
Between Groups	3	104.36641	0.960837	0.505493	6.595182
Within Groups	4	151.9552			
Total	7				

We will calculate the correlation between groups based on their academic standing using the data shown above (Table 12). The F-statistic value is 0.68687, and the P-value is 0.605493, according to the ANOVA calculation (Table 12.1). The values are significant because F and P-values are greater than $\alpha=0.05$. Though significant, the F value is far from one,

indicating a weak correlation from each group. This suggests that students' academic standing influences their choices independently, particularly non-honor and inconsistent honor students.

The figure below (Table 13) depicts the number of students who were satisfied with the limited face-to-face set up, which we can relate to theory number 3. A student's satisfaction with the setup of limited face-to-face classes has a significant impact on their willingness to engage in the modality.

Those who agree with the modality's setup are listed below, but they are few. As a result, the majority of students, 43.67% for females and 48.48% for males disapproved of the limited face-to-face setup.

Table 13. Number of students satisfied with the setup of limited face-to-face.

Number 2. While you were in class, do you like the setup of limited face-to-face?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	18	2	2	2	24
	43.90246902	50	50	33.33333333	43.63636364
Male	10	1	0	5	16
	71.42857143	33.33333333	0	41.66666667	48.48484848

When the above values (Table 13) are calculated using ANOVA (Table 13.1), the F and P-values are greater than 0.05, indicating that the data is significant. The P-value is 0.55227, and the F-value is 0.80669. They are related because their F-values are moderately close to one. In which the values are directly related and affect each other in the same way that one value affects the other.

Table 13.1 Analysis of Variance of the Value in Table 13.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	115.331	57.66551	378.844		
Before Implementation	2	83.33333	41.66667	138.8889		
During Implementation	2	50	25	1250		
Non-Honor Student	2	75	37.5	34.72222		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1090.517278	3	363.5058	0.80669	0.55227	6.591382
Within Groups	1802.455094	4	450.6138			
Total	2892.972372	7				

Satisfaction will also be applied to the figure below (Table 14), where the data gathered is the number of students who discovered that limited face-to-face is significantly more difficult than full face-to-face. According to the third theory, the more difficult the modality is for students, the less likely they are to commit to it. Students' data will show how they find limited and full face-to-face classes. The findings show students have a negative view of the modality because they found it more difficult to learn than full face-to-face learning. It is made up of 52.73% females and 60.61% males

Table 14. Number of students find limited face-to-face harder than full face-to-face learning modality.

Number 4. Do you find limited face-to-face learning harder than full face-to-face?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	25	1	1	2	29
	60.97560976	25	25	33.33333333	52.72727273
Male	9	2	2	7	20
	64.28571429	66.66666667	50	58.33333333	60.60606061

The above data (Table 14) is significant because the F-value is 0.593798 and the P-value is 0.651458, shown below (Table 14.1), both of which are greater than the alpha level. Though they are significant, the F-value of 0.593798 is far from one, indicating a weak relationship between and within groups of the population.

Table 14.1. Analysis of Variance of the data in Table 14.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	125.2613	62.63066	5.478396		
Before Implementation	2	91.66667	45.83333	868.0556		
During Implementation	2	75	37.5	312.5		
Non-Honor Student	2	91.66667	45.83333	312.5		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	667.3697823	3	222.4566	0.593798	0.651458	6.591382
Within Groups	1498.538952	4	374.6335			
Total	2165.908734	7				

The data presented above (Figure 12, Figure 13, Figure 14) revealed moderately direct gender relationships based on their responses to the given questions about the effects of limited face-to-face contact on students' persistence. Computed below (Table 15) is their correlation with a value of 0.802955069 indicating a moderately direct correlation. It means that the variance of the values is not significantly far from each other.

Table 15. Correlation between genders from numbers 1, 2 and 4 questions

Female	Male
49.09090909	48.48484848
43.63636364	48.48484848
52.72727273	60.60606061
Correlation	0.802955069

However, the data correlation was inconsistent based on their academic standing. Numbers 1 and 4 show a weak correlation, while number 2 shows a moderate correlation. As a result, we can conclude that in this section of the study, academic standing does not have a strong relationship with each other and stands independently.

4.2 Discussion related to the Investment Model of Commitment Process

The preceding findings are associated with Rusbult's Investment Model of the Commitment Process. The first and

second questions ask students if they support the implementation of face-to-face learning, both during and before class. According to the model, three factors influence their persistence: satisfaction, investment size, and alternative quality. During the post-lockdown pandemic, students' only option for education is limited face-to-face communication, in which students are forced to use a limited learning mode or drop out of school. It is the quality of the alternatives that the students were presented with. And their satisfaction is what is tested throughout the process, which may affect their motivation to attend school. Finally, their rating of the modality's difficulty is related to the size of their investment. The more difficult the modality is for students, the greater their investment, and vice versa.

Initially, the majority of participants did not approve of the modality's implementation. 49.09% of females and 48.48% of males agree while the majority of the rest are opposed to the implementation. Both have a direct relationship, whereas the learners' academic standing has a weak correlation. This means that learners' academic standing influences their choices independently as their values differ and are neither directly nor indirectly related.

During the implementation, only 43,67% of females and 48.48% of males supported their learning environment, which is less than the majority of students. Both genders are directly related, and so is their academic standing.

The final question concerns their assessment of the modality's difficulty. 52.73% of females and 60.61% of males agreed that limited face-to-face learning is more difficult than full face-to-face learning. Both genders had a high percentage of students.

Therefore, both male and female students were dissatisfied with the new learning mode.

4.3 In relation to the Theory of Interpersonal Communication

Students are more reliant on their external relationships to achieve certain goals, according to the first Interpersonal Communication theory. This is because each participant contributed to their personal and intellectual growth, as represented by question 5 on the survey questionnaire. Only a small percentage of females (36.36%) believe that limited learning modality helped them comprehend the lessons as well as males (45.45%), according to the findings (Table 16).

Table 16. Number of students agree that limited interaction helped students comprehend more in their lessons

Number 5. Do you think that limited face-to-face interaction helped you comprehend more in lessons?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	16	2	2	0	20
	39.02439024	50	50	0	36.36363636
Male	6	1	0	8	15
	40.85714286	33.33333333	0	66.66666667	45.45454545

Because the F-value is 0.134344 and the P-value is 0.934568, both of which are greater than the alpha level, the above data (Table 16) is significant. The F-value of 0.134344, on the

other hand, indicates a weak relationship between and within population groups (refer to Table 16.1)

Table 16.1 Analysis of Variance of Data in Table 16.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	81.88153	40.94077	7.344995		
Before Implementation	2	88.33333	44.16667	138.8889		
During Implementation	2	50	25	1250		
Non-Honor Student	2	66.66667	33.33333	2222.222		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	Fcrit
Between Groups	364.587338	3	121.5291	0.134344	0.934568	6.591382
Within Groups	3618.456107	4	904.614			
Total	3983.043445	7				

The theory also stated that interpersonal interactions can influence student motivation. The data below (Table 17) depicts students' interactions with their teachers and classmates, as well as how this affects their motivation to learn. The majority of female students (58.18%) agreed that their interaction with their teachers affected their learning, whereas only 42.42% of male students agreed. There is a gender difference in how prevalent it is in females versus males.

Table 17. Number of students agree that limited interaction of them with their teachers affects their drive to go to school

Number 6. Does limited interaction with your teachers affect your drive to go to school?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	25	1	3	3	32
	60.97560976	25	75	50	58.18181818
Male	6	2	1	5	14
	42.85714286	66.66666667	25	41.66666667	42.42424242

The P-value for the above data (Table 17) is 0.991018, but the F-value is 0.032342, which is below the alpha level (refer to Table 17.1). As a result, the student's academic standing has no direct effect on the number of responses.

Table 17.1 Analysis of Variance of the data in Table 17.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	103.8328	51.91638	164.1394		
Before Implementation	2	91.66667	45.83333	868.0556		
During Implementation	2	100	50	1250		
Non-Honor Student	2	91.66667	45.83333	34.72222		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	Fcrit
Between Groups	56.200772	3	18.73359	0.032342	0.991018	6.591382
Within Groups	2316.917199	4	579.2293			
Total	2373.117971	7				

Their interactions with their classmates may also have an impact on their learning motivation. The majority of female students (56.36%) agreed that their interaction had an impact on their learning, whereas only 42.42% of male students

agreed (Table 18). As is in Table 17, there is a significant difference in number, with females outnumbering males.

Table 18. Number of students agree that their interactions of them with their classmates affect their drive.

Number 7. Does limited interaction with your classmates affect your drive to going to school?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	27	1	2	1	31
	65.85365854	25	50	16.66666667	56.36363636
Male	5	1	2	6	14
	35.71428571	33.33333333	50	50	42.42424242

Computing the relationship between the academic standing of the students and the numbers of those who agree shown in Table 18, the F-value is 0.958455 indicating a strong relationship between each group (Table 18.1)

Table 18.1 Analysis of Variance of the Data in Table 18.

SUMMARY						
	Groups	Count	Sum	Average	Variance	
	Consistent Honor	2	101.5679	50.78397	454.1909	
	Before Implementation	2	58.33333	29.16667	34.72222	
	During Implementation	2	100	50	0	
	Non-Honor Student	2	66.66667	33.33333	555.5556	
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	750.8069843	3	250.269	0.958455	0.493523	6.591382
Within Groups	1044.468675	4	261.1172			
Total	1795.275659	7				

All the data under section 4.3, indicates a strong positive (directly proportional) correlation between males and females. Gender has a strong relationship between their limited interaction and their drive on going to school.

Table 19. Correlation of females and males under data section 4.3

Female	Male
63.63636364	54.54545455
58.18181818	42.42424242
56.36363636	42.42424242
Correlation	0.970725343

Summing up the correlational data of the findings, there is no significant relationship with the students' choices if referring to their academic standing.

4.4 Discussion related to the Theory of Interpersonal Communication

A student's learning begins with their interaction with their surroundings. This can be done verbally or nonverbally during a face-to-face interaction with their source of expertise. Interpersonal communication entails direct contact between

conversation participants for immediate feedback and effective communication.

The findings in Table 16,17,18 above are about students interacting in a school setting to learn. Table 16 shows that 36.36% of female students and 45.45% of male students found that limited face-to-face interaction helped them understand their lesson. Because of the small number, this indicates that the majority of them do not agree. Both sexes have a similar number of responses. Their academic performance, on the other hand, did not show as strong a correlation having a value far from 1.

Table 17 investigates whether students' limited interaction with their teachers affects their motivation to attend school. More than half of the female population (58.18%) agrees, while only 42.41% of males agree. This means that females are more affected by interacting less than they were before the new modality was implemented. The correlation status of these students' academic standing is also found to be less than the alpha level at which we failed to reject the null hypothesis, resulting in insignificant data.

Finally, Table 18 shows the students' responses to the question of whether their limited interaction with their classmates affects their learning motivation to go to school. 56.36% of females and 42.42% of males agree, indicating a close value but a significant difference in how they represent the population. Their academic standing, however, is strongly related representing a low number of differences in their variances.

Therefore, males are far affected by the learning modality on maintaining their drive just as females. Despite this, the findings revealed that both genders struggled to understand their lessons using the modality.

4.5 In relation to Self-Determination Theory

In relation to the second theory, Deci and Ryan's (1985) Self-Determination Theory, which also discusses intrinsic and extrinsic motivation, the motivation that students obtain from their environment may have an impact on their three psychological needs, thereby influencing their learning drive. This theory is supported by Table 20, which shows the number of students who found that a limited face-to-face modality motivates them to learn their lesson.

Out of the responses (Table 20), 43.64% of female students found that limited face-to-face interaction motivates them to learn their lessons, while 42.42% of male students did. This indicates that the majority of them did not find the modality motivating in their learning.

When computing the relationship of each group based on their academic standing, the P and F-values are greater than the alpha level (Table 20.1). It denotes that the data is important. 0.273492, on the other hand, is a long way from 1. This indicates that the values have large variances or that their mean values are widely dispersed.

The following data (Table 21) is also related to the second theory. Students' motivation is an important factor in their determination. The eighth question asked if the modality affected the students' motivation. 60% of females and 33.33%

of males agree. As a result, the two genders did not reach an agreement.

Table 20. Number of students found that limited face-to-face modality motivates the students in learning their lessons

Number 3. Do you find limited face-to-face modality motivating in learning your lessons?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	17	3	4	0	24
	41.46340463	75	100	0	0.436666667
Male	8	1	0	5	14
	57.14285714	33.33333333	0	41.66666667	0.424242424

Table 20.1 Analysis of Variance of Data in Table 20.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	98.60627	49.30314	122.9225		
Before Implementation	2	108.3333	54.16667	868.0556		
During Implementation	2	100	50	5000		
Non-Honor Student	2	41.66667	20.83333	868.0556		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1406.917938	3	468.9726	0.273492	0.842377	6.591382
Within Groups	6859.03357	4	1714.758			
Total	8265.951508	7				

Table 21 Number of students felt unmotivated on going to school because of limited face-to-face

Number 8. Have you ever felt unmotivated on going to school because of limited face-to-face?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	29	2	1	1	33
	70.73170732	50	25	16.66666667	60
Male	7	0	1	3	11
	50	0	25	25	33.33333333

With an F-value of 1.822248, the correlation of academic standing in the table above is very strong. When comparing the MS between and within groups, 683.1716 is greater than 374.906, indicating that the null hypothesis is false (referring to Table 21.1)

Table 21.1 Analysis of Variance of the Data in Table 21.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	120.7317	60.36585	214.9018		
Before Implementation	2	50	25	1250		
During Implementation	2	50	25	0		
Non-Honor Student	2	41.66667	20.83333	34.72222		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2049.514798	3	683.1716	1.822248	0.283047	6.591382
Within Groups	1499.624066	4	374.906			
Total	3549.138864	7				

The final question in the survey questionnaire sought to determine how many students agree that limited face-to-face time is difficult to adjust to, and only 60% of females and 42.42% of males agreed. According to the findings, females are more affected than males.

Table 22. Number of students found that limited face-to-face found hard to adjust.

Number 9. Do you find it hard adjusting to limited face-to-face?					
	Consistent Honor	Before Implementation	During Implementation	Non-Honor Student	Total
Female	25	3	1	4	33
	60.97560976	75	25	66.66666667	60
Male	7	2	1	4	14
	50	66.66666667	25	33.33333333	42.42424242

Using Analysis of Variance, we can demonstrate that there is a strong correlation between the numbers in Table 22 from each academic standing group (Table 22.1). The data can be considered significant if the P value is greater than the alpha level of 0.05. The F-value of 4.462992 is greater than one, indicating that the groups are strongly related to one another.

Table 22.1 Analysis of Variance of Table 22.

SUMMARY						
Groups	Count	Sum	Average	Variance		
Consistent Honor	2	110.9756	55.4878	60.232		
Before Implementation	2	141.6667	70.83333	34.72222		
During Implementation	2	50	25	0		
Non-Honor Student	2	100	50	555.5556		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2177.414857	3	725.805	4.462992	0.091244	6.591382
Within Groups	650.5097825	4	162.6274			
Total	2827.92464	7				

Table 23. Gender Correlation of Questions 3,8,9

Female	Male
43.63636364	42.42424242
60	33.33333333
60	42.42424242
Correlation	-0.5

The researchers discovered a correlational value of -0.5 when we measured the relationship between two genders using Pearson's R correlational analysis, in which the data are unrelated to one another.

Adding up the correlational data of the findings, there is somehow significant relationship with the students' choices if referring to their academic standing since majority of the data above under 4.5.

4.6 Discussion related to Self Determination Theory

Questions 3, 8, and 9 examine how limited face-to-face interaction affects students' learning motivation. The third question asks students if the modality motivates them to learn their lessons. Only 43.64% of female students and 42.42% of male respondents agreed. This figure represents less than half of the population, indicating that more students feel the opposite way. When asked about their motivation to go to school while participating in the new learning setup, 60% of females and 33.33% of males agreed. This shows that females are affected at a higher rate than males. The last number, like the numbers in question 8, determines how many students agree that limited face-to-face time is difficult to adjust to, and only 60% of females and 42.42% of males agreed. Females outnumber males, with male students accounting for less than half of the population. Only the first question has a weak relationship in terms of academic standing. Meanwhile, gender is found to be unrelated in all three of the questions given.

According to the findings, the nature of humans is dependent on their relatedness to the people in their environment. They also require competence or effectiveness in dealing with their surroundings. Aside from that, they are also highly functional if they have a sense of control throughout their lives. This has an impact on their motivation.

According to the findings, both genders had difficulty learning their lessons with the modality. This could be due to their relatedness and competence in dealing with their affected environment. Though, there are male students who also found that they felt unmotivated on going to school it is prominent in females just as how they found it hard to adjust. These factors relate to the motivation of the students affecting their learning drive.

Summary of Findings

The focus of this study is to evaluate the impacts of blended learning modality on the learning drive of Grade 12 – Science, Technology, Engineering, and Mathematics (STEM) students of Hilongos National Vocational School. This will answer the following research problems of the study.

Objective 1: Determine if the limited face to face helped the students feel motivated to learn their lessons in school

Both students, males, and females found limited face-to-face un motivating in learning their lessons

Objective 2: Determine if blended learning affects the learning drive and development of the student

Most females found that the modality affected their drive while only a few male respondents responded the same.

The majority of both genders didn't agree that limited face-to-face helped them comprehend their lessons.

Objective 3: Determine if the social interaction of the students affects their motivation of going to school

Most female and male students agree that their limited interaction with their teachers and classmates affects their drive of going to school. Though, only a few of the male students found themselves unmotivated on going to school to engage in the modality.

Objective 4: Determine if the learners found the modality hard to adjust

Before and during the implementation, there is only a small number of respondents agreed with the implementation of limited face-to-face. And most of them found the modality hard to adjust which is more prominent in females than males.

The researcher also investigates the correlation of the student's academic standing as factors influencing the following findings based on gender. However, because an inconsistency was found in the data from the number of responses from questions 1-9, we can conclude that it has a weak relationship with each other. Though there may be instances where it influences their choices, it's likely more on the psychological needs of the student which is their interaction and relatedness with the people around them, that affects their motivation.

V. CONCLUSION

As students in limited or blended learning study both at school and at home, they may encounter uncomfortable situations. If noise pollution and distraction in the environment have an impact on the learners' cognitive development and motivation, the psychological factor will be exacerbated. Teachers in a close contact environment are much more likely to initiate learners' requests for assistance with their studies. If the students require immediate assistance from their instructors, the faster they will get if they can freely move and communicate with one another. However, because a limited modality was implemented, these specific ideas were impacted. Most students encountered difficulties while adjusting to the modality. The majority of them also struggled to understand their lessons. Finally, the majority of the students agree that their limited interaction with other students and teachers occurred in a controlled environment, which impacted their psychological and social needs. This has influenced the student's motivation to attend school and engage in the mode of learning.

Recommendations

To aid the effects of the modality's implementation on the students' learning drive, the school will implement special programs or activities for the students to gradually restore the learners' motivation.

Some students prefer limited face-to-face interaction; the school can also provide an option for students to learn at home and at school rather than requiring them to attend the full learning modality.

If the same situation occurs, the requirement to learn the modality should be waived. Allow the student to choose what works best for them.

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