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A Comparative Study of Learning Modalities and Academic Performance in a Private Senior High School in Southern Philippines

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ABSTRACT

This quantitative study aimed to identify the level of academic performance among senior high school students in terms of synchronous, asynchronous, and modular learning modalities. Furthermore, the study aimed to determine if there is a significant difference in academic performance as analyzed according to types of learning modalities. Descriptive-comparative was utilized to answer the research questions with 362 respondents under the Science, Technology, Engineering, and Mathematics strand. The findings showed that students under synchronous got a higher mean with outstanding descriptive equivalent, and students under asynchronous and modular got a very satisfactory descriptive equivalent. The result implied that students who chose synchronous classes gained higher grades than those who chose the other two learning modalities. This further indicates that synchronous classes have effectively delivered lessons and led to students' higher academic performance. Modular to Asynchronous and Modular to Synchronous have .000 significant differences, and Asynchronous to Synchronous has 0.006. This result implied a significant difference among the types of learning modalities. Regarding participant's personal information, sex, and parental support, they had no significant moderating effects on their academic performance as analyzed according to types of learning modalities. In contrast, school support had significant moderating effects on academic performance as analyzed according to types of learning modalities. Hence, this study recommended that the school continue offering online classes and strategize plans for modular students for a better educational outcome.

INTRODUCTION

According to Alberto *et al.* (2020), the COVID-19 pandemic has disrupted education worldwide, and the Philippines was no exception. During the onset of the pandemic, most of the country's school facilities had to stop face-to-face learning activities, changing to various remote or online learning. They have considered the new normal education policy using multiple learning modalities like modular, asynchronous, and synchronous (Boudreau, 2020).

Online education has exploded recently, becoming part of the new standard setup. This setup gives the idea of coping with educational needs online. Furthermore, Ang (2020) emphasized that synchronous learning is more flexible and better enhances students' 21st-century skills. According to Kelly (2020), an asynchronous type of learning provides the students with materials like handouts, journals, articles, and other teacher presentations.

In the Philippines, Bernardo (2020) reported that based on the Department of Education survey, about 8.9 million parents prefer modular learning, and to ensure that students are continuing their education, DepEd provides the distribution of hard copies of instructional materials. These instructional materials contain study guides, activity sheets, and practice questions. Though it is an independent type of learning, Malaya (2020) highlighted that the role of teachers is a must, especially in monitoring the student's progress. Moreover, one of the public school teachers in Pangasinan prefers modular learning as their alternative type of learning due to the lack of gadgets, devices, and connections in their area (Manlangit *et al.*, 2020).

This paper purposely aimed to determine the level of academic performance among senior high school students in terms of synchronous, asynchronous, and modular learning modalities. Further, to determine if there is a significant difference in terms of sex, parental support, and school support in academic performance as analyzed according to types of learning modalities.

LITERATURE REVIEW

The education system is now turning to synchronous learning to improve the educational productivity and outcomes of the students (Bakia *et al.*, 2012). Synchronous learning refers to a program that uses the Internet wherein there is an interaction between the teacher and the students. The new normal setup gives the idea of coping with educational needs online. Online education has exploded in recent years, becoming part of our new normal setup. Moreover, online learning platforms have been introduced previously. Gibbs (2020) stated that CALCampus implemented the first online-based school in 1995, wherein classroom instruction and other related materials were provided.

Further, Thornton (2020) pointed out that education using the online platform has emerged as a new method

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of teaching and learning. With the power of technology, various learners can continue their education using technology or online platforms. Synchronous classes allow students to gain new knowledge and offer a high-quality education to all learners because it breaks barriers or borders. Over the past decades, education has had different purposes. Synchronous classes are one of the platforms that offer new opportunities for students. Other learners, from elementary to tertiary students, use this kind of method, as well as working adults who want to study (Singh, 2020).

Asynchronous learning is vital in humanizing online courses (Kelly, 2020). This type of learning happens on the student's schedule, and they can work at their own pace. Students are given instructional materials, different lectures that can add to the new knowledge of the learners, and assessments like activities, quizzes, assignments, and alike within the set deadline (Perveen, 2016). Asynchronous learning is commonly facilitated by a wide range of media that involves e-mails, discussions, and collaborative works for learners and teachers, even if the learners are not online.

Further, this is a student-centered method that is widely used, wherein the teachers will be the collaborators that set up a learning path, and the learning can occur at any time (Finol, 2020). With the idea of Lawless (2020), asynchronous learning offers a flexible schedule to non-traditional learners wherein the students do not need to travel or go to any venue since it only requires offline duties, which is cost-effective.

According to Manlangit *et al.* (2020), "Supercharging Filipino Parents is key for successful Modular Distance Learning," online learning is not the only option and type of distance learning. It is a distance learning program that uses modules. There are guides and vital sections for teachers and students to meet the desired competencies. The Department of Education aims to ensure that all students in the school year 2020-2021 will experience quality education by integrating the so-called SLMs or Self-Learning Modules. This will include alternative delivery modalities like modular, radio, and television-based instruction. Undersecretary Diosdado San Antonio stated that they are printing self-learning modules for students who cannot attend online classes (Bernardo, 2020). Secretary Leonor Briones said in one of her press briefings, "Education is the new normal, not only online." This means that buying gadgets and other materials is not compulsory. They can choose modular if their situation does not permit or allow them to attend an online class (Arcilla, 2020).

MATERIALS AND METHODS

The descriptive-comparative method was used in this study to determine the academic grades of senior high school students in higher education institutions in terms of asynchronous, synchronous, and modular learning modalities. The study's respondents were senior high school STEM students, with 236 respondents for Synchronous Learning, 91 respondents for Asynchronous Learning, and 35 for Modular Learning. The sample size was then divided by the number of STEM sections proportionally. The respondents were randomly selected from the master list given. These respondents were given researcher-made online survey forms to determine their personal information (i.e., sex, parental support, and school support). In this study, a researcher-made survey questionnaire was used, and the questionnaire was validated by three experts in research where it passed the validation process. After, the questionnaire was subjected to pilot testing for 15 non-respondents of the study. This study utilized Cronbach's alpha, which was discussed by Frost (2023), which measures the reliability of a set of items, and all the items have the same characteristics. If the value is higher, the items have a higher agreement. This statistical tool checks the quality of the instrument or tool before it is deployed to all respondents. Using Cronbach's Alpha, the reliability score of the validated questionnaire is .845, which means it generates consistent responses.

The researchers followed the procedures to gather the data for this study. First, a letter was sent to the principal to request permission to conduct the study in the school. After the researchers received approval from the school principal, the researchers then sent a letter to the class advisers. This was part of the study to request the master list and the student's preferred learning modalities. The Ethics Committee approved that most respondents were below 18 years old.

Additionally, the assent form was sent to the students below 18 years old, and the consent form was sent to their parents and students who were 18 years old and above, indicating the purpose of the research, risk and benefits, voluntary participation, and confidentiality. The researchers sent a letter to the Registrar requesting a copy of the respondents' semestral general weighted average to determine their academic performance. While personal information processed for research purposes intended for public benefit is exempted from the Data Privacy Act of 2012 and its Implementing Rules and Regulations, the researchers still adhered to the relevant laws, regulations, and ethical standards of the researchers' institution. Subsequently, a survey was conducted to gather the respondents' demographic profiles (i.e., sex, internet connection, gadgets, parental support, and school support). This was done to acquire the moderating variables for this study. The respondents were asked to evaluate statements by checking a numeric response on the indicators. In this study, a 5-point Likert scale anchored by (5) strongly agree, (4) agree, (3) somewhat agree or disagree, (2) disagree, and (1) strongly disagree. Lastly, the data was retrieved, collected, tallied, tabulated, and interpreted confidentially and accordingly.

In the analysis of data, the following statistical tool was employed: Mean was used to determine the level of academic performance of the respondents in terms of synchronous, asynchronous, and modular learning

modalities. Kruskal- Wallis One-Way Analysis of Variance was used to determine if there is a significant difference in academic performance as analyzed according to types of learning modalities. A post hoc test was also used to see which pairs of groups differ significantly. Moderated Regression Analysis was used to test the hypothesis that the demographic profile moderates the relationship between the Students' Learning Modalities and Academic Performance.

RESULTS AND DISCUSSIONS

Table 1: Participant's Personal Information (Sex)

Learning Modalities	Male	Female	Total
1. Synchronous	85	151	236
2. Asynchronous	30	61	91
3. Modular	13	22	35
Overall	**128**	**234**	**362**

In the participant's personal information in terms of sex, as reflected in Table 1, there are 362 respondents from different learning modalities. In general, there are 128 male and 234 female respondents.

Table 2: Level of Participant's Personal Information (Parental Support)

Learning Modalities	Mean	N	Descriptive Equivalent
1. Synchronous	3.526	236	High
2. Asynchronous	3.468	91	Moderate
3. Modular	3.469	35	Moderate
Overall	**3.506**	**362**	**High**

Table 2 shows synchronous got the highest mean of 3.526 with a high descriptive equivalent. This indicates that the perceived parental support of the respondents using an ordinal scale is often experienced among the G11 STEM synchronous respondents. At the same time, Asynchronous got the lowest mean of 3.468 with a moderate descriptive equivalent. This indicates that parental support is seldom experienced among the G11 STEM asynchronous respondents.

Further, the overall mean is 3.506, a high descriptive equivalent that indicates that parental support is often experienced among the respondents. The results in Table 2 imply that parental support to students is evident, which means parents assist their children.

Table 3: Level of Participant's Personal Information (School Support)

Learning Modalities	Mean	N	Descriptive Equivalent
1. Synchronous	4.341	236	High
2. Asynchronous	4.200	91	High
3. Modular	4.411	35	High
Overall	**4.312**	**362**	**High**

As shown in Table 3, modular got the highest mean of 4.411 with a high descriptive equivalent. This indicates that school support is often experienced among the G11 STEM modular respondents. While Asynchronous got the lowest mean of 4.200 with a moderate descriptive equivalent. This suggests that school support is seldom experienced among the G11 STEM asynchronous respondents.

Further, the overall mean is 4.312, with a high descriptive equivalent indicating that school support is oftentimes experienced among the respondents. The results in Table 3 imply that school support for students is highly evident, which means the school is doing its best to assist the students in their classes regardless of their chosen learning modality.

Table 4: Level of Academic Performance in terms of Learning Modalities

Learning Modalities	Mean	Standard Deviation	Descriptive Equivalent
1. Synchronous	90.721	3.278	Outstanding
2. Asynchronous	89.395	3.381	Very Satisfactory
3. Modular	87.228	3.680	Very Satisfactory
Overall	**90.050**	**3.507**	**Outstanding**

Table 4 presents the level of academic performance among Grade 11 Science, Technology, Engineering, and Mathematics students in terms of their preferred learning modalities for the first semester of the school year 2020-2021. The descriptive equivalent is based on the DepEd Order No. 8 s. 2015 (Grading Scale, Descriptive Equivalent, and Remarks), as well as in a local study entitled Determining Factors to Students' Science Achievement in the Implementation of K to 12 Spiral Progression Approach: A Mixed Method (Decano *et al.*, 2021).

The synchronous class got the highest mean of 90.721, with an outstanding descriptive equivalent. Modular got the lowest mean of 87.228, with a very satisfactory descriptive equivalent. The result implies that students who chose a fully online class have obtained grades outstandingly compared to students who chose the other two learning modalities. This is further supported by a study conducted by Smith and Brame (2014), which highlighted that online students performed slightly better than those teaching the same material through traditional instruction.

In addition, Al-Maroof *et al.* (2021) revealed in their study that students prefer online classes, especially if content richness, information, and the educational system have a higher level of quality. The researchers also added that the higher the level of satisfaction among the students, the more positive their attitude is towards online learning. This can be further interpreted as an indication that educational institutions must have a well-developed learning management system that aligns with the existing competencies required from the students by the Department of Education. In addition, Cristobal *et al.* (2022) suggested that since the educational system uses a variety of learning modalities, teachers should be trained on ICT integration in the classroom to enhance the instructional materials and increase student engagement.

Table 5: Significant Differences in Academic Performance as Analyzed According to Type of Learning Modalities (Pairwise Comparisons of Groups)

Sample 1 – Sample 2	Test Statistics	Std. Error	Std. Test Statistics	Sig.	Adj. Sig.
Modular – Asynchronous	58.659	20.814	2.818	.005	.014
Modular – Synchronous	100.093	18.954	5.281	.000	.000
Asynchronous – Synchronous	41.434	12.913	3.209	.001	.004

The significant difference in academic performance as analyzed according to the type of learning modalities is shown in Table 5, which is the pairwise comparison of groups. Each row tests the null hypothesis that the Sample 1 and 2 distributions are identical. Asymptotic significance (2-sided tests) is displayed. The significance level is .05. The significance values have been adjusted by the Bonferroni correction for multiple tests. With this, the result shows that Modular and asynchronous are significantly different, Modular and synchronous are significantly different, and Synchronous and synchronous are significantly different. These results imply a significant difference in academic performance as analyzed according to types of learning modalities, thus rejecting the null hypothesis.

Table 6: Independent-Samples Kruskal Wallis Test

Total N	362
Test Statistics	32.942
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.000

Table 6 of the Independent-Sample Kruskal-Wallis Test shows that the test statistics are adjusted for ties with 32.942 with 362 total no. of respondents in all learning modalities. Asymptotic significance (2-sided tests) is displayed with .000. The significance level is .05. The result is .000, $p > .05$, thus rejecting the null hypothesis.

Table 7: Hypothesis Test Summary

Null Hypothesis	Test	Sig.	Decision
The distribution of GWA is the same across categories of MODALITIES.	Independent Samples Kruskal-Wallis Test	.000	Reject the Null Hypothesis

As shown in Table 7, the Hypothesis Test Summary, the study rejected the null hypothesis because the significant difference among the learning modalities is .000.

Table 8: Sex Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t.	Sig.
	B	Std. Error	Beta		
(Constant)	89.984	1.492		60.313	.000
Sex	1.463	.874	.200	1.674	.095
Modalities	.041	.940	.008	.043	.966
Modalities x Sex	-1.009	.550	-.383	-1.832	.068

**Dependent Variable: GWA*

Participant's Personal Information, as Analyzed according to the Types of Learning Modalities, Significantly Moderate the Academic Performance

In terms of sex, as presented in Table 8, there is a .095 significant moderating effect. As to modalities, there is a .966 significant moderating effect. Both sex and modalities have a .068 significant moderating effect. The study revealed .068 > 0.05, which is interpreted that sex has no significant moderating effect on academic performance as analyzed according to types of learning modalities. Thus, the null hypothesis is accepted.

This is similar to the study of Attah and Ita (2017), which revealed that gender has no significant influence on the academic performance among senior secondary school students in Calabar Metropolis. It was analyzed using an independent t-test with a 0.05 level, and Cronbach's alpha yielded a reliability index of 0.75. In line with this, the results of the study by Adigun *et al.* (2015) showed that there was no significance even if there was slightly better performance of the male students than the female students. According to the findings, there was no significant difference in the retention and academic achievement of the students and no skill achievements of the students (cognitive, affective, and psychomotor) regarding gender.

Table 9: Parental Support Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t.	Sig.
	B	Std. Error	Beta		
(Constant)	94.191	1.900		49.576	.000
Parental Support	-.516	.528	-.119	-.978	.329
Modalities	-2.602	1.120	-.493	-2.323	.021
Modalities x Parental Support	.283	.312	.214	.907	.365

**Dependent Variable: GWA*

As presented in Table 9, there is .329 no significant effect regarding parental support. As to the modalities, there is a .021 significant effect. The study revealed .365 > 0.05, which means that parental support has no significant effect on academic performance as analyzed according to the types of learning modalities. Thus, the null hypothesis is accepted. This result is supported by Nigussie (2022), who revealed in his study that due to lack of time, knowledge, and conflict of schedules, there have been inconsistencies in terms of the impact of parental support on students' success in school. Nigussie further argued that though the results of his study show irregularities in the existing results of other research, he still pointed out that parental support is necessary for a student's achievement. He also revealed that collaboration between parents and teachers should be noticed, and it can only be achieved if there is effective communication in family-school partnerships. Furthermore, Gan and Bilige (2019) discovered in their study that parental support, both in quantity and quality, positively affects students' academic success. Parental support has been a significant component of students' academic achievement (Mapp & Kuttner, 2013).

Table 10: School Support Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t.	Sig.
	B	Std. Error	Beta		
(Constant)	85.410	3.174		26.912	.000
School Support	1.600	.722	.271	2.216	.027
Modalities	2.388	2.009	.453	1.189	.235
Modalities x School Support	-.918	.458	-.791	-2.006	.046

**Dependent Variable: GWA*

As presented in Table 10, there is a .027 significant effect

in terms of school support. As to the modalities, there is a .235 no significant effect. The study revealed .046 > 0.05, which means that school support has a significant moderating effect on academic performance as analyzed according to the types of learning modalities. Thus, the null hypothesis is rejected.

This result is supported by a study conducted by Mitchell (2018), who revealed that students were satisfied with the school support provided to them. Most respondents rated the following school supports highly: opportunities to be part of service projects, opportunities to learn through clubs and meetings, teacher's help, etc. Furthermore, the same study found that students strongly desire to connect with their classmates and receive additional school support.

In addition, Vallaster (2019) pointed out in his study that schools must have customized resources that can support the diverse community of their students. The level of support the school can provide its students will significantly impact the student's success. Palmerola (2024) supported the idea that teachers' and students' work is positively impacted by well-planned program implementation in schools, such as e-learning and other modalities. This further implies that there should be enough school support to ensure the highest level of academic performance among students.

CONCLUSION

Students under synchronous got a higher mean with outstanding descriptive equivalent, and students under asynchronous and modular got a very satisfactory descriptive equivalent. The result implied that students who chose synchronous classes had gained higher grades than those who chose the other two learning modalities, leading to academic achievement. Regarding the respondents' demographic profile, the study revealed that sex and parental support had no significant moderating effect on academic performance. School support had a significant moderating effect on academic performance as analyzed according to types of learning modalities. The result implied that the level of support the school can provide its students has contributed significantly to their academic performance.

Recommendations

This study suggests the following: the school administration may continue offering online classes to its students. Moreover, the administration may devise a plan or assist students enrolled in modular classes to enable them to participate in online classes for a better learning outcome. Sufficient training and workshops can also be done to orient and reorient teachers on how to effectively deliver lessons online, develop and enhance their existing teaching pedagogies, and adequately assist students regardless of their preferred learning modality; third, the parents and guardians must have open and effective communication and create a family-school collaboration. Aside from the variables mentioned in the study, future researchers can explore other variables and choose a different strand to see if there are differences in the preferred learning modalities and other moderating variables that may affect the student's academic performance.

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