

IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY-MEDIATED TEACHING AND LEARNING IN A STATE COLLEGE OF SQUIJOR ISLAND DURING PANDEMIC RECOVERY

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ABSTRACT: *The COVID-19 pandemic brought so much pressure to the educational system in the Philippines, especially in rural areas like Siquijor province. The higher institutions experienced many changes including the difficulties in transitioning to technology-based education. This study seeks to determine the impacts of technology among students of a state college in Siquijor island during post-pandemic / pandemic recovery. It determines the accessibility to and use of ICT in terms of (a) the learners' perception on the use of technology in their study and (b) extent of the impact of the learners' perception of the use of technology enabled learning. The results demonstrated that students' perceptions of using ICT in their studies were quite positive and had high levels of impact. The breadth of the learners' impressions of their age, year level and department were not statistically different at the 0.05 level of the significance. However, there are some gender differences in the ways that technology is applied in the classroom.*

Keywords: COVID-19 Pandemic, pandemic recovery, impact of technology, Information Communication Technology (ICT), ANOVA

1. INTRODUCTION

According to the World Health Organization [1], COVID-19 initially appeared in January 2019 and quickly spread globally, causing a terrible health disaster nationwide. The COVID-19 epidemic has killed approximately 1.07 million individuals and infected a total of more than 37 million worldwide. The COVID-19 pandemic has prompted educational reform and highlighted the essential importance of personalization, technology, and mobile devices in maintaining uninterrupted learning nationwide [2]. UNESCO estimates that the pandemic has caused learning gaps and loss, which involves limited access to technology and learning resources for some students in low-to-middle-income nations, leading to initiatives to close them [3]. Institutions must be ready to leverage digital tools to cultivate future citizens, given the COVID-19 pandemic, leading to the implementation of hybrid learning and blended learning models [4]. DepEd has implemented the Learning Continuity Plan (LCP) to provide fundamental education at the elementary school level for 2020-2021, with academic independence granted to HEIs using e-learning, distance learning, and other alternate delivery methods [5]. The Philippine government and educational institutions have prepared for pilot F2F classes by putting procedures in place, creating a budget, and creating a contingency plan [6]. Schools have also collaborated with the Department of Health to promote vaccination and proper cleanliness. In order for the province of Siquijor to be eligible for face-to-face classes, it was urged by the Commission of Higher Education (CHED) to make vaccinations a requirement for every single faculty member, student, and non-teaching staff. Siquijor has four higher education institutions: BIT International College - Siquijor, Quezon Memorial Institute

of Siquijor, Incorporated, Siquijor State College, and Carmelite College of Siquijor, Incorporated, with a total of 4,056 college students. As of November 25, 2021, the total vaccinated population was 1,749, representing 43.12% of the population [7]. ICT is a fundamental requirement in the digital age, providing better and faster ways to study, engage, and access information by utilizing dynamic information and teaching students problem-solving skills [8]. ICT-based learning environment increases students' analytical and assessment skills helping them become enthusiastic thinkers [9]. Technology in the classroom increases students' learning and fosters excellent teacher-student relationships, and technology enhances learning in the classroom [10]. The utilization and integration of ICT in teaching are crucial for fostering effective teacher-student interaction and facilitating learning, ultimately resulting in a transformative shift in teaching and learning methodologies in the 21st century [11]. A study conducted at Siquijor State College in Larena, Siquijor, Philippines, revealed that students exhibited a high level of comfort with digital communication and expressed strong acceptance towards blended learning, as supported by both students and experts [12]. However, a significant challenge identified was the insufficient proficiency in basic programming and keyboarding skills among the learners. The objective of this study is to evaluate the level of access to and utilization of information and communication technology (ICT), as well as the perceptions regarding technology-enabled learning, within Siquijor State College. The outcomes of this research can serve as a foundation for the development of novel teaching approaches and government guidelines concerning the integration of ICT in higher education.

2. METHODOLOGY

2.1. Research Design

The study employed an analytical descriptive research design to accomplish its goals which is assessing the impact of the information and communication technology (ICT) mediated teaching and learning during pandemic recovery since it thoroughly and accurately characterizes a group of people, situations, or occurrences. Descriptive research design involves getting data on events, organizing it, tabulating it, visualizing it, and summarizing it [13]. In addition, this research utilized quantitative measures that are quantified in number and qualitative because of the description of its degree. Although, this study includes inferential questions that need to be quantified and also descriptive questions that need qualitative answers, according to McCombes [14] descriptive data analysis, both descriptive statistics and inferential statistics can be used. McCombes also said that correlational research design measures a relationship between.

2.2 Data Collection

The researchers used a standardized research questionnaire for data collection- the questionnaire on Learners' Use of Technology. The researchers asked permission from the authors, namely Anup Kumar Das and Sanjaya Mishra [15] to utilize the questionnaire for the said research. The questionnaire has three categories: the profile of the respondents, Access to and use of information and communication technologies (ICTs) which include ownership and access to ICTs, Internet Access, use of ICTs, Social media, technology-enabled learning environment an use of online courses and perceptions of use of technology-enabled learning consists of statements such as technology use in your studies, the degree to which you presently use or would utilize each of the following technologies in your study. Though the researchers utilized a standardized questionnaire, it was still subjected to reliability testing. It was given to 3 Higher Education Institutions namely, Negros Oriental State University, Central Philippines State University, and Kabankalan Catholic College. The researchers advanced the establishment of its reliability via a test of internal consistency using Cronbach's alpha. The result was (0.942), indicating a high internal reliability level. For some categories of the instrument, Table 1 displays the internal consistency coefficient based on Cronbach's alpha equation. These numbers were deemed suitable for use in this investigation.

Table 1: The Internal Consistency Coefficient: Cronbach's Alpha

Category	Cronbach's Alpha
Learners' Perception of the use of technology in their study	0.98
The extent of the Impact of the Learners' Perception of the use of Technology – enable learning	0.91

After reliability testing a stratified random sampling with the fishbowl method was used to determine the actual number of

participants in the study. A population is divided into smaller subgroups, known as strata, based on shared features or characteristics, such as income or educational level, in a sampling approach known as stratified random sampling[16]. Each stratum is represented in the sample thanks to the stratification technique. By applying Slovin's Formula, the sample size was calculated.

2.3 Sample

Two hundred and sixty-six (266) Students from several departments at Siquijor State College participated in the study. While maintaining participant identity and data confidentiality, the researchers provided a brief summary of the research objectives and questions. Participants signed a permission form before beginning the survey, indicating their freely given consent to participate. Table 2 shows how the respondents' sample was dispersed based on their respondents' gender, age, year level, and department.

Table 2. Frequencies and Percentages According to the

Variables of the Study			
	Categories	Frequency	Percentage
Gender	Male	131	48.25
	Female	135	50.75
	17 and below	0	0
Age	18	14	5.26
	19	86	32.33
	20	81	30.45
	21	42	15.79
	22	21	7.89
	23 and above	22	8.27
Year of Study	Year 1	156	58.65
	Year 2	75	28.20
	Year 3	33	12.41
	Year 4	2	0.75
	COT	34	12.78
	CBM	86	32.33
	CAS	25	9.40
Department	CCJE	40	15.04
	COE	32	12.03
	MEP	49	18.42

2.4 Data analysis

SPSS 27 was used to analyze the descriptive and inferential statistics of this study. The means and standard deviations were obtained to determine the impact of technology on students. Furthermore, ANOVA was used to confirm statistically significant differences between the students' perceptions of using technology-enabled learning. For the use of ICTs, a five-point Likert scale was adapted with 1 as very low to 5 as very high with means interpreted as (1.00 – 1.8 = very low, 1.8 – 2.6 = low, 2.61 – 3.4 = medium, 3.41 – 4.2 = high, 4.21 – 5.0 = very high). Moreover, for the students' technology-enabled learning environment a six-point Likert scale was adapted with the following: [using the equation: $(n-1)/n = (6-1)/6 = 0.83$]

do not know	1.00 – 1.83
poor	1.84 – 2.67
fair	2.68 – 3.51
neutral	3.52 – 4.35
good	4.36 – 5.19
excellent	5.20 – 6.00

3. RESULTS AND DISCUSSIONS

Table 3. Means and Standard Deviation (SD) of Learners' Perception of the use of technology – enable learning

No	Statements	M	SD	level
1	helped understand the subject material	4.32	0.64	Very high
2	made the completion of work more	4.28	0.64	Very high
3	motivated to explore new topics	4.29	0.71	Very high
4	made inside and outside of the campus collaboration easy	4.26	0.73	Very high
5	generally improved IT and information management skills	4.26	0.7	Very high
6	improved long-term career or employment	3.97	0.82	High
Total		4.23	0.71	Very high

Table 3 illustrates the participants' responses to different statements regarding the use of technology in their studies. The results reveal that statement 1 received the highest mean score of 4.3195, indicating a significant level of agreement among the participants. This suggests that learners strongly believe in the potential of technology to enhance their understanding of the subject material. This result is aligned with the study of Klimova [17] which revealed that customized learning materials and tools, including a mobile app that catered to students' requirements and was consistently supported by a teacher, proved to be successful in improving students' performance and yielded favorable learning outcomes. In contrast, statement 6 obtained the lowest mean score of 3.9699, indicating a slightly lower level of agreement compared to other statements. However, it is noteworthy that participants still perceive technology as having a positive impact on their long-term career and employment prospects.

In general, the total mean score across all statements is 4.2299, which reflects a very high level of agreement among the participants regarding the beneficial effects of technology on their studies. They recognize technology as a valuable tool that facilitates deep understanding, offers convenience, boosts motivation, enables collaboration, and fosters skill development. Previous research suggests that when it comes to academic performance, students tend to demonstrate improved results in digital platforms compared to traditional ones. The effective incorporation of ICT plays a critical role in organizing an effective online educational program. By successfully utilizing ICT, not only do learners experience

satisfaction, but it also facilitates individuals in achieving their desired educational objectives [18]. Students utilize digital tools such as phones, tablets, laptops, and computers to attend online classes and communicate with their peers, professors, and college administrators. They make use of platforms like Google Classroom, Google Meet, Zoom, Moodle, Edmodo, Gmail, Facebook, and Messenger to engage in meetings, conferences, webinars, and overall online interaction. These tools and social media platforms facilitate the formation of online groups based on shared interests and personal connections among students, allowing them to share resources, discuss classroom activities, collaborate on assignments, and talk about various school-related topics, including mental health issues and current events within the school or community[19].

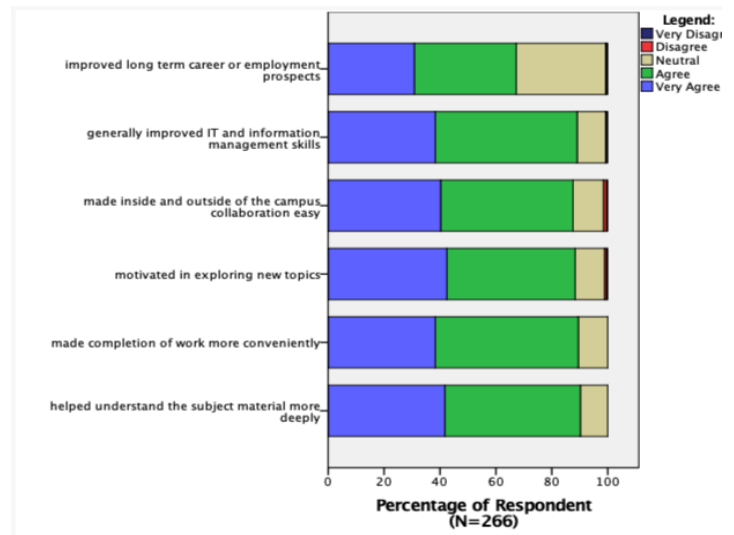


Figure 1. Frequency of Occurrence of Perceived Use of Technology among Students of Siquijor State College-Main Campus

Table 4. Means and Standard Deviations of Students' Impact of Using ICT According to their Gender, Age, Year of Study, and Department

		N	Mean	±SD
Gender	Male	131	4.13	0.58
	Female	135	4.32	0.49
	17 and below	0	0	0
Age	18	14	4.05	0.65
	19	86	4.26	0.6
	20	81	4.14	0.55
	21	42	4.23	0.67
	22	21	4.35	0.44
	23 and above	22	4.45	0.57
Year of Study	Year 1	156	4.26	0.59
	Year 2	75	4.12	0.61
	Year 3	33	4.31	0.49
	Year 4	2	4.33	0.94
Department	COT	34	4.86	0.60
	CBM	86	4.91	0.48
	CAS	25	4.80	0.81
	CCJE	40	4.63	0.52
	COE	32	4.78	0.47
	MEP	49	4.64	0.70

Female students, on average, have a slightly higher skill level in using ICT compared to male students. However, the difference is relatively small. The finding that female students have slightly higher skill levels in using ICT can be used to guide efforts in promoting gender equality in ICT education and ensuring equal opportunities for all students. In addition, ICT adoption had a greater positive impact on the academic performance of female students compared to male students [20]. Taken together, these findings highlight the importance of providing equal access and support in ICT education to bridge the gender gap and empower female students in their academic pursuits. Older students generally exhibit higher mean skill levels in using ICT. Older students tend to have higher skill levels in using ICT, suggesting the importance of continued ICT training and education throughout a student's academic journey.

Students in their fourth year of study demonstrate the highest mean skill level in using ICT, followed by students in their third, first, and second years. In addition, the standard deviation for the fourth year is relatively high, suggesting a higher level of variability in skill levels among these students. The CBM department has the highest mean skill level, followed by COT, COE, CAS, MEP, and CCJE. The standard deviations indicate the degree of variation in skill levels within each department, with CAS having the highest deviation and COE having the lowest. The findings underscore the importance of department-specific approaches to ICT education and the need for ongoing evaluation and support to ensure consistent skill development across all departments. By addressing the specific needs of each department, educational institutions can foster a more equitable and inclusive learning environment that prepares students for the digital challenges of the future.

Table 5. One-way Analysis of Variance of the Impact of Gender, Age, Year Level, and Department on their Perception of using technology in their Study

Variable		Sum of squares	df	Mean square	F	Sig
Gender	Between groups	2.33	1	2.33	6.86	*0.01
	Within groups	89.80	264	0.34		
Age	Between groups	2.53	5	0.51	1.47	0.20
	Within groups	89.60	260	0.35		
Year Level	Between groups	1.39	3	0.46	1.33	0.26
	Within groups	90.75	262			
Department	Between groups	3.51	5	.70	2.08	0.07
	Within groups	87.82	260	0.34		

*Significant if ≤ 0.05

Despite the learners' differences in age, year level, department, or college, these factors had no bearing on how much technology was used in the sample research. The perspective of the students regarding using technology in their academics has been impacted by gender. This may be

because utilizing technology in the classroom setting is a novel teaching tool and unquestionably a novel experience for the students. It depends on how a student shows eagerness in dealing with and using technology which typically depends on how he or she is exposed to technology. This result is consistent with the study that both men and women can utilize roles to control their behavior. Men's and women's emotions can act as feedback and support more stereotypically gendered changes in behavior. In this research, results showed a significant difference in the ANOVA according to gender at a 0.05 significance level [21]. Women are more likely than males to describe an experience as stressful by Bing Sun et al [22]. Moreover, women may exhibit heightened sensitivity to environmental cues and emotions based on their typical gender characteristics, resulting in a higher likelihood of modifying their behavior in a manner that aligns with environmental norms, as compared to men [23].

A one-way ANOVA in Table 4 reveals a statistically significant difference between students' perception of using technology in their studies across several departments at Siquijor State College, $F(1, 264), p = 0.009$. Moreover, shows that there are no appreciable changes in how students perceive the use of technology in their studies depending on the learners' department, year level, or age.

Table 6. Means and Standard Deviation of the Impact on the Extent of the Learners' Perception of the Use of ICT

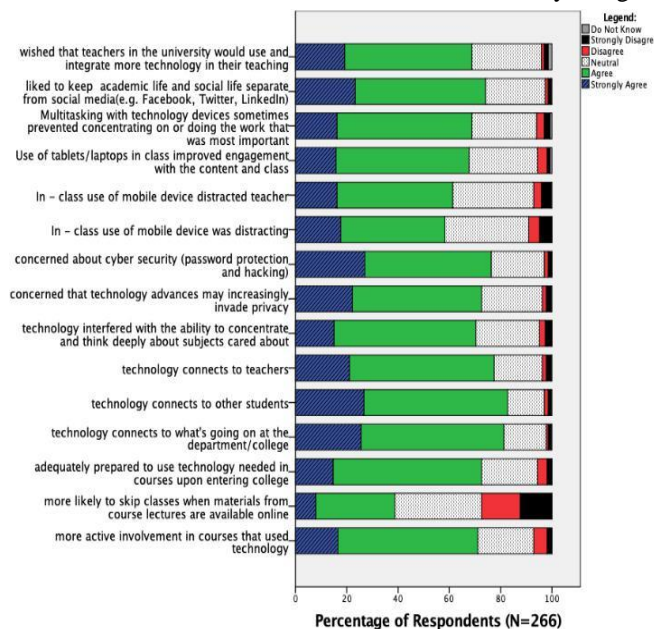
No	Statements	M	±SD	level
1	more active involvement in courses that used technology	4.79	0.85	Very High
2	more likely to skip classes when materials from course lectures are available online	4.07	1.13	High
3	adequately prepared to use technology needed I courses upon entering college	4.80	0.80	Very High
4	technology connects to what's going on at the department/college	5.03	0.78	Very High
5	technology connects to other students	5.05	0.8	Very High
6	technology connects to teachers	4.92	0.83	Very High
7	technology interfered with the ability to concentrate and think deeply about subjects cared about	4.78	0.82	Very High
8	concerned that technology advances may increasingly invade privacy	4.88	0.86	Very High
9	concerned about cyber security (password protection and hacking)	4.99	0.82	Very High
10	In-class use of the mobile device was distracting	4.62	0.98	Very High
11	In-class use of mobile devices distracted teacher	4.66	0.94	Very High
12	The use of tablets/laptops in class improved engagement with the content and class	4.75	0.86	Very High
13	Multitasking with technology devices sometimes prevented concentrating on or doing the work that was most important	4.75	0.89	Very High
14	liked to keep academic life and social life separate from social media(e.g. Facebook, Twitter, LinkedIn)	4.93	0.82	Very High
15	wished that teachers in the university would use and integrate	4.79	0.92	Very High

more technology in their teaching

Total 4.77 0.87 Very High

According to Table 6, the means were between 4.07 and 5.05. The total mean score (M = 4.77) shows how much students believe they have used ICT in their education.

The study findings indicate that learners strongly believe their active involvement in courses increases when technology is used. The high mean and low standard deviation show a strong consensus among respondents regarding this perception. Specifically, the statement "feels that technology connects to other students" received a "Very High"



interpretation. On the other hand, the statement "more likely to skip classes when materials from course lectures are available online" received a "High" interpretation, indicating a tendency among learners to skip classes when the course

Figure 2. Frequency of Occurrence of Impact of Technology in the Learning among Students of Siquijor State College-Main Campus

materials are accessible online. The wide range of responses, as reflected by the high standard deviation, suggests a significant variation in agreement or disagreement with this statement.

Furthermore, the statement "When I entered College, I was adequately prepared to use the technology needed in my courses" also received a "Very High" interpretation. This suggests that learners generally feel well-prepared to use the technology required for their courses upon entering college. The high mean and low standard deviation indicate a strong perception of adequate preparation among respondents.

Similar patterns of means, standard deviations, and high levels of agreement were observed for statements 4 to 15. Overall, the study reveals learners' positive perceptions of the impact of technology on their learning experience. They feel connected to their educational institutions, peers, and teachers through technology. However, they have concerns about privacy invasion and cyber security. The use of mobile

devices in class is seen as distracting for both learners and teachers, while tablets and laptops are perceived to enhance engagement with course content. Learners recognize that engaging in multitasking with technology can impede concentration, and they express a preference for maintaining a clear distinction between their academic and social lives on social media platforms. Finally, learners express a desire for educators to incorporate more technology into their teaching practices.

The implications of this study highlight the positive effects of technology on learner involvement, connectivity, and engagement in courses. Institutions should prioritize data protection and address learners' concerns about privacy and cyber security. By implementing explicit guidelines or policies regarding the utilization of mobile devices in the classroom, distractions can be reduced. This presents educators with an opportunity to successfully incorporate technology into their teaching methodologies and enhance the learning experience, aligning with the expectations of contemporary learners.

The main campus of Siquijor State College's students' use of technology as a learning tool is depicted in Figure 2. In connection to Table 6, it can be seen further that the graphic is mostly dominated by green color bars that reflect the assertions that happened "agree". This is followed by the blue bars that stand for "strongly agree". The longest green bars are seen in the "technology connects to other students" section. This supports Table 7's findings about the effects of technology learning among students at Siquijor State College's main campus.

Table 7 provides data on the impact of technology on learning, categorized by gender, age, year of study, and department.

		Table 7			LEVEL
		N	Mean	SD	
Gender	Male	131	4.77	0.68	Very high
	Female	135	4.81	0.48	Very high
	17 and below	0	0	0	
Age	18	14	4.78	0.68	Very high
	19	86	4.84	0.59	Very high
	20	81	4.74	0.59	Very high
	21	42	4.63	0.61	Very high
	22	21	4.84	0.46	Very high
	23 and above	22	5.03	0.49	Very high
Year of Study	Year 1	156	4.82	0.55	Very high
	Year 2	75	4.76	0.68	Very high
	Year 3	33	4.72	0.49	Very high
	Year 4	2	4.37	0.52	Very high
	COT	34	4.86	0.60	High
Department	CBM	86	4.91	0.48	Very high
	CAS	25	4.8	0.81	Very high
	CCJE	40	4.63	0.52	High
	COE	32	4.78	0.47	Very high
	MEP	49	4.65	0.70	High

Both males and females perceive technology to have a positive impact on learning, with females slightly higher on average. However, the standard deviations indicate that there is more variability in responses among males compared to females.

The data suggests that older respondents (23 and above) perceive technology to have a higher impact on learning

compared to younger respondents. However, it is important to note that the sample size for the age group "17 and below" is zero, which may limit the generalizability of the findings.

The data suggests that first-year students perceive technology to have a slightly higher impact on learning compared to second and third-year students. However, the sample size for fourth-year students is very small, making it difficult to draw strong conclusions for that group.

Among the different departments, the data suggests that the COT department has the lowest mean impact of technology towards learning, while the CBM department has the highest mean impact. However, it's important to consider that the standard deviations vary across departments, indicating different levels of agreement within each department.

The findings suggest that both males and females perceive technology to have a positive impact on learning, although there may be some gender differences.

Older respondents and those in higher year levels tend to perceive technology as having a greater impact on learning, indicating the potential benefits of technology for advanced education.

The results by department highlight the variability in perceptions across different academic disciplines, indicating the need for tailored approaches to technology integration based on specific departmental needs and preferences.

Further research could explore the reasons behind the observed differences, such as the specific technologies used, teaching methods employed, or the influence of digital literacy levels.

incorporating technology to improve their learning and to adapt to the changes in the modern educational environment.

Table 8. One-way Analysis of Variance of the Impact of Gender, Age, Year Level, Department on their Extent of Perception on using technology in their studies

Variable		Sum of squares	df	Mean square	F	Sig
Gender	Between groups	0.12	1	0.12	0.33	0.57
	Within groups	91.21	264	0.35		
Age	Between groups	2.84	5	0.57	1.67	0.14
	Within groups	88.48	260	0.34		
Year Level	Between groups	0.72	3	0.24	0.69	0.56
	Within groups	90.6	262	0.35		
Department	Between groups	3.51	5	.70	2.08	0.07
	Within groups	87.82	260	0.34		

*Significant if ≤ 0.05

Table 8 demonstrates that the respondents' perceptions of the amount to which they use technology in their studies are unaffected by their age, year level, or department. The amount to which respondents see using technology in their studies is unaffected by their gender, either. These results show that both genders had positive perceptions of

4. CONCLUSION AND RECOMMENDATIONS

The current study adds to the body of knowledge about Siquijor State College's usage of educational technology from the perspective of the students. The COVID – 19 pandemic has also sparked educational reform and highlighted the crucial roles that mobile devices, technology, and personalization play in maintaining learning continuity across the nation [2]. Students think that technology has the ability to improve their academic performance. According to [17], personalized learning resources and tools, such as mobile apps that are tailored to students' needs and receive constant teacher support, were effective in raising student performance and producing positive learning outcomes. However, there are some points where it is clear that students perceive technology as a major reason for skipping class, with a mean of 4.0677. However, there is some variation between the genders in terms of how technology is used for academic purposes. It demonstrates that they have a marginally greater degree of ICT proficiency than male students. ICT usage improved female students' academic performance more than male students, according to Basri *et al* [19].

This study has some consequences for practical futures. The impact of COVID – 19 on students' perceptions of using technology for learning has been felt quickly. Despite the obstacles and hurdles the students had when using technology for their studies, they were able to gather a variety of experiences related to doing so in the classroom.

To this purpose, the researchers advise organizing efficient training on the use of specific programs that are helpful for students in their studies, such as the usage of social media like Google+, SlideShare, research sharing sites, goodreads.com, and others. In order to avoid depending solely on testing, they also advise setting up the Internet and communication network infrastructure inside Siquijor State College and in other residential locations. They also suggest that the educational platform includes features that facilitate team learning. On the other hand, the study suggests expanding the research project's sample size. To conduct a comparison between Siquijor public and private institutions, it is also advised to acquire information from other HEIs on the island.

5. ACKNOWLEDGMENT

The Office of Research, Innovation, Development, and Extension of Negros Oriental State University, represented by Dr. Edwin Romano Jr., is gratefully acknowledged by the authors for providing the SPSS 27. The researchers also appreciate the support of Dr. Iris Calibo of Siquijor State College and Dr. Liza Caballero of Negros Oriental State University - Bayawan Campus for their insightful comments and recommendations, which contributed to elevating the manuscript's caliber.

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