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Integration of Information and Communication Technology (ICT) in Mathematics Modular Learning Among Grade 11 Students During the COVID-19 Pandemic

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Abstract

This study assessed the effectiveness of integrating modern technology in Mathematics instruction among Senior High School students in the Schools Division of Bohol Province during the academic year 2020–2021, serving as a basis for a technology-based action plan. Using a descriptive-correlational design, data were analyzed through descriptive and inferential statistics. Most respondents were female, aged 16–17, from low-income families, with parents who had elementary-level education. Internet access was primarily through mobile data, with mothers as housewives and fathers as farmers. While students reported only minimal use of ICT tools, they perceived these tools as highly beneficial and important to their learning. Their Mathematics performance was found to be satisfactory. Significant correlations emerged between student performance and their perceived benefits, importance, and extent of ICT use, though no significant link was found between performance and the general status of ICT access. The study recommends implementing a technology-driven action plan, supported by school administrators, to enhance ICT integration in Mathematics instruction and improve student outcomes.

***Keywords*— Teaching Mathematics, ICT, mathematics performance, descriptive-correlational, Bohol Philippines**

I. INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has transformed various sectors worldwide, with education being a significant beneficiary (Haldorai et al., 2021; Saif et al., 2022). In recent years, especially amid the unprecedented challenges posed by the COVID-19 pandemic, the integration of ICT in education has become crucial in ensuring continuous learning opportunities for students (Adedoyin & Soykan, 2023; Al-Ansi et al., 2021). Like many other countries, the Philippines faced considerable disruptions in the traditional educational process, prompting a shift

towards modular distance learning (MDL) to maintain educational continuity.

This modality relies heavily on modules—delivered in printed or digital formats—and minimal face-to-face interactions, often supported by remote communication methods such as phone or text messaging. While MDL offers a viable solution to geographical and infrastructural limitations, especially in rural areas where internet connectivity is limited or unavailable (Bayucca, 2021),it also presents unique challenges that impact student engagement and academic performance (Lagrada, 2023). The Department of Education (DepEd) has recognized the vital role of ICT tools, including calculators, tablets, and smartphones, in enhancing mathematics instruction and learning outcomes in the new normal (Bartolome, 2023).

This study aims to evaluate the extent of ICT integration in senior high school Mathematics instruction within selected public schools in Bohol Province during the school year 2021-2022. Specifically, it investigates students' demographic profiles, perception of ICT tools at home, usage extent in modular distance learning, the benefits of ICT, and its perceived importance in education. Furthermore, it examines the relationship between ICT utilization and students' academic performance in Mathematics. This research will gather insights to develop effective strategies and action plans that leverage ICT to improve educational delivery and student achievement in challenging times.

II. LITERATURE REVIEW

The global integration of Information and Communication Technology (ICT) in education is recognized for enhancing teaching and learning. This integration boosts engagement, promotes critical thinking, and cultivates essential 21st-century skills required for success in today's digital landscape (Bagde et al., 2021; Haleem et al., 2022). ICT involves various tools, including computers, mobile devices, internet resources, and educational software, facilitating information creation, sharing, and management. Recent studies highlight its significance in fostering inclusive and equitable education, particularly in remote and underserved regions. The Department of Education (DepEd) in the Philippines has initiated programs like the DepEd Computerization Program, which aims to provide digital tools and computer facilities nationwide, thus addressing the digital divide (Mula & Bucar, 2023). The COVID-19 pandemic has further underscored the necessity for ICT integration, as schools implemented Modular Distance Learning (MDL), utilizing printed modules alongside digital content to support independent learning. However, this transition brought challenges such as student engagement, access to ICT, and instructional effectiveness. Research demonstrates that ICT tools such as tablets and smartphones enhance Mathematics instruction by providing interactive and visual representations of complex ideas (Basri & Alandejani, 2018). Additionally, students' views on ICT—its advantages and relevance—significantly impact their motivation and learning outcomes (Pelayo-Dacanay et al., 2023). For effective ICT integration, ensuring student access and engagement, adequate teacher training, and infrastructure, fostering meaningful and equitable learning experiences in diverse educational contexts is essential.

III. PURPOSE OF THE STUDY

This study aimed to assess the integration of Information and Communication Technology (ICT) in Mathematics modular distance learning among Grade 11 students in selected public senior high schools in the Division of Bohol for the school year 2021–2022 and to formulate a relevant action plan. Specifically, it sought to determine the respondents' demographic profiles regarding age, gender, number of siblings, parents' highest educational attainment, combined monthly family income, internet connectivity, and parents' occupation. It also investigated the respondents' perceptions of the status of ICT tools used at home, the extent of ICT usage in modular distance learning, the perceived benefits of ICT tools in learning, and the importance of integrating various ICT tools into their educational experience. Furthermore, the study examined whether significant relationships existed between students' academic performance in Mathematics and the following variables: the status of ICT tools used at home, the extent of ICT usage in modular learning, the perceived benefits of ICT in learning, and the importance of ICT integration. Finally, based on the study's findings, an appropriate action plan was developed to enhance the use of ICT in modular Mathematics instruction.

IV. RESEARCH METHODOLOGY

The research utilized a descriptive-correlational design to investigate the perception and integration of ICT in mathematics modular distance learning among Grade 11 students in selected public high schools in

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Bohol Province during the 2021–2022 school year. The respondents were students from three identified schools, and a stratified random sampling technique was employed to ensure unbiased representation of the population. Data collection primarily involved a questionnaire adapted from previous studies by Kirkwood and Price (2016), Pelayo-Dacanay et al. (2023), and other sources. This questionnaire consisted of five parts: demographic profile, status of ICT tools used at home, extent of ICT use in modular learning, benefits of ICT tools, and the importance of ICT integration. Before distribution, the questionnaires were tested on non-respondents to enhance clarity and comprehension. Data gathering involved distributing the questionnaires directly to respondents in their classrooms or via modules during the pandemic, with the researchers supervising the process. The statistical treatment included scoring the questionnaires based on a standardized approach aligned with the study's objectives. Data analysis employed descriptive statistics and correlation analysis to examine the relationships between variables. The scoring procedures ensured that responses were quantified accurately to facilitate meaningful interpretation of the data.

V. RESULTS AND DISCUSSION

This section presents the analyzed data and interprets the findings based on the study's objectives. It systematically discusses the relationship between integrating Information and Communication Technology (ICT) in Mathematics and the academic performance of Grade 11 students from selected public senior high schools in Bohol Province. Quantitative data gathered through survey questionnaires were subjected to appropriate statistical tools, including frequency, percentage, weighted mean, standard deviation, and correlation analysis. The results are interpreted in light of existing literature, educational frameworks, and the contextual realities of the involved schools.

5.1 Profile of the Respondents

The demographic profile of the student respondents—including age, gender, parents' educational attainment, combined family monthly income, internet connectivity, and highest grade in Mathematics—was examined to provide a contextual foundation for the study. These variables were analyzed to determine their relevance and potential influence on integrating Information and Communication Technology (ICT) in Mathematics modular distance learning among Grade 11 students.

Table 1. Age and Gender of the Respondents

Age (in years)	Female		Male		Total	
	f	%	f	%	f	%
21 and above	13	4.71	11	3.99	24	8.70
18 – 20	33	11.96	32	11.59	65	23.55
16 – 17	112	40.58	73	26.45	185	67.03
14 – 15	2	0.72	0	0.00	2	0.72
Total	160	57.97	116	42.03	276	100.00

As presented in Table 1, most of the 276 student respondents were female (160 or 57.97%), while 116 (42.03%) were male. Most students (185 or 67.03%) were aged 16–17, typical for Grade 11 learners. Meanwhile, 65 (23.55%) fell within the 18–20 age range, and 24 (8.70%) were 21 years old and above, suggesting delayed school progression for some. Only two students (0.72%) were aged 14–15, and none were younger than 12.

Gender disparities in ICT use have been reported in existing literature. Kutluca et al. (2019) noted that male students often demonstrate greater confidence in solving technical issues and using interactive tools. However, Gebhardt et al. (2019) observed no significant gender difference in the pedagogical use of ICT, though female students slightly outperformed males in instructional contexts. These findings indicate the need for gender-responsive ICT training that fosters equal opportunities and engagement.

Mikropoulos (2018) argued that gender should not be viewed in isolation, as factors like socio-economic status, pedagogy, and classroom management also influence technology use. While female students may be less drawn to technology for its own sake—partly due to persistent stereotypes—they often excel in using ICT for learning and social networking. With schools playing a

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pivotal role in shaping digital skills, inclusive and well-designed pedagogical strategies are essential to ensure equitable ICT integration for all students.

Table 2. Number of Siblings of the Respondents

Number of Siblings	f	%
More than 6	71	25.72
5 – 6	74	26.81
3 – 4	74	26.81
1 – 2	40	14.49
None	17	6.16
Total	276	100.00

Table 2 shows that Filipino families typically have more than six children, which increases the direct and indirect costs associated with schooling. As family size grows, these economic pressures often lead to lower educational attainment for children in larger families than those from smaller households.

Research from the U.S. generally supports a negative relationship between sibship size and educational achievement, with children from smaller families tending to perform better academically. However, findings vary, as some studies report insignificant or positive effects. These differences often stem from variations in methodology, including control variables, sample size, and analytical approaches that either consider or overlook the complex interplay between family size and educational opportunities (Choi et al., 2020; Díaz & Fiel, 2021; Fletcher & Kim, 2019).

Table 3. Parents' Highest Educational Attainment

Educational Attainment	Mother		Father	
	f	%	f	%
College Graduate	27	9.78	13	4.71
College Level	24	8.70	11	3.99
High School Graduate	55	19.93	55	19.93
High School Level	56	20.29	82	29.71
Elementary Graduate	18	6.52	15	5.43
Elementary Level	91	32.97	86	31.16
No Formal Schooling	5	1.81	11	3.99
No Response			3	1.09
Total	276	100.00	276	100.00

Table 3 presents the frequency and percentage distribution of Grade 11 respondents based on their parents' highest educational attainment. The data indicate that 14.49% of parents have graduated from college, while 12.68% have attained some college education. A significant portion, 39.86%, have completed high school, and 50% have reached only the high school level. Additionally, 11.96% of parents are elementary graduates, 64.13% have no formal schooling, and 5.80% have no schooling. A small fraction (1.08%) of respondents did not provide information on this variable.

These findings underscore parents' pivotal role in their children's educational outcomes. Higher parental education and income levels are generally associated with greater academic success, often indirectly influencing children's motivation and development.

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Parental education also influences students' career choices, with fathers' occupations exerting a somewhat more substantial impact than mothers'. However, socio-economic status alone may not significantly determine career paths, highlighting the importance of parental values, expectations, and close parent-child relationships, including open discussions about career options, in shaping students' educational and professional decisions (Cabrera et al., 2018; Mau & Li, 2018; Mitchall & Jaeger, 2018a; Naugah et al., 2020).

Table 4. Respondents' Combined Family Monthly Income

Monthly Income (in pesos)	**F**	**%**
Above 30,000	3	1.09
25,001-30,000	4	1.45
20,001-25,000	6	2.17
15,001-20,000	14	5.07
10,001-15,000	33	11.96
10,000 and below	216	78.26
Total	276	100.00

Table 4 shows the distribution of respondents' parents by joint monthly family income, revealing that the majority (78.26%) earn ₱10,000 and below. Smaller percentages fall within higher income brackets: 11.96% earn between ₱10,001 and ₱15,000; 5.07% between ₱15,001 and ₱20,000; and less than 3% in the higher income ranges above ₱20,000.

Literature consistently highlights a strong correlation between parental income and students' academic achievement. While children from higher-income families often perform better academically, this does not necessarily indicate greater effort compared to peers from less advantaged backgrounds. Zhang et al. (2020) noted that parental socio-economic status influences educational outcomes, but left unclear how changes in income and education impact achievement. This study contributes to understanding how family background shapes academic performance, emphasizing that wealthier families provide better educational resources, while lower-income families may prioritize basic needs over learning. Consequently, this disparity exacerbates educational inequality, underscoring the need for government interventions to ensure equitable access to education through subsidies and support programs.

Table 5. Source of Internet Connection of the Respondents

Internet Connectivity	**f**	**Rank**
Mobile Data	226	1
Wi-Fi	47	2
Peso Net	36	3

Table 5 indicates that the majority of respondents (226) rely on mobile data for their internet connection, while fewer use WiFi (47) and PesoNet (36). This distribution reflects common student connectivity patterns, often influenced by accessibility and affordability.

Global research underscores the positive impact of technology on teaching and learning (Jin & Junio-Sabio, 2018a). However, consistent with findings by Soledad Fabito et al. (2020), poor internet connectivity remains a significant barrier for students, ranking among the top challenges in online learning environments. Addressing connectivity issues is crucial to optimizing the benefits of digital education.

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Table 6. Parents' Occupation of the Respondents

Occupation	Mother		Occupation	Father	
	f	%		f	%
Housewife	195	70.65	Farmer	108	39.13
Farmer	16	5.80	Construction worker	24	8.70
Vendor	12	4.35	Driver	31	11.23
LGU employee	11	3.99	Fisherman	27	9.78
House helper	6	2.17	Carpenter	10	3.62
Teacher	6	2.17	Laborer	6	2.17
Beautician	3	1.09	LGU employee	6	2.17
Sales lady	3	1.09	Vendor	4	1.45
Businesswoman	2	0.72	Security Guard	4	1.45
Raffia weaver	2	0.72	Baker	3	1.09
OFW	2	0.72	Fish Warden	2	0.72
Private employee	2	0.72	Painter	2	0.72
Caterer	1	0.36	OFW	2	0.72
Pension House Keeper	1	0.36	Businessman	2	0.72
Jewelry Technician	1	0.36	Policeman	2	0.72
Librarian	1	0.36	Chain Saw Operator	1	0.36
Utility	1	0.36	Rice Mill Operator	1	0.36
Babysitter	1	0.36	Mechanic	1	0.36
Cashier	1	0.36	Hardware Worker	1	0.36
Life Plan agent	1	0.36	Seaman	1	0.36
Receptionist	1	0.36	Goldsmith	1	0.36
Massage therapist	1	0.36	Teacher	1	0.36
Office staff	1	0.36	Cook	1	0.36
Deceased	1	0.36	Mason	1	0.36
None	4	1.45	Broom maker	1	0.36
			Cashier	1	0.36
			Engineer	1	0.36
			Office staff	1	0.36
			Life Plan agent	1	0.36
			Plumber	1	0.36
			Stockman	1	0.36
			Welder	1	0.36
			Deceased	3	1.09
			None	11	3.99
			No response	12	4.35
Total	276	100.00	Total	276	100.00

Table 6 reveals that the predominant occupations of Grade 11 SHS respondents' fathers were farmers (39.19%), drivers (11.23%), fishermen (9.78%), construction workers (8.70%), and carpenters (3.62%). In contrast, the majority of mothers were housewives (70.65%), followed by farmers (5.80%), vendors

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(4.35%), LGU employees (3.99%), and teachers or house helpers (each 2.17%).

These occupational patterns suggest a strong link between parental occupation and students' academic outcomes. Parents with higher occupational status often provide greater educational support and foster higher self-esteem and motivation in their children, which correlates with better academic performance (Roksa & Kinsley, 2019). Occupational status reflects social position and influences income levels and psychological demands, affecting the resources and guidance parents can offer (Mitchall & Jaeger, 2018b). Children from families with stable and skilled occupations tend to benefit from enriched learning environments, proper nutrition, and access to quality education.

Furthermore, active parental involvement addresses youth apathy and promotes academic success. Positive parent-child relationships and consistent interest in education have been shown to enhance student motivation and achievement (Ullah, 2019). The findings underscore that parents' economic and educational backgrounds significantly impact students' development and that fostering parental engagement is crucial for cultivating a brighter future for youth and society.

5.2. **Status of the ICT Tools Used by the Respondents at Home**

Technology is a key part of today's society and has profoundly impacted fields such as health, medicine, entertainment, business, trade, and leisure.

Table 7. Status of the ICT Tools used by the Respondents at Home

S/N	Indicators	WM	Interpretation
1	Personal computers	1.34	Poor
2	Video conferencing systems	1.54	Poor
3	Audio equipment (including software)	1.72	Poor
4	Digital photo cameras (including editing software)	1.95	Satisfactory
5	Digital textbooks	1.70	Poor
6	Digital video cameras (including editing software)	1.89	Satisfactory
7	Mobile phones	3.24	Very Satisfactory
Aggregate Weighted Mean		1.91	Satisfactory
Legend: 3.25-4.00-Excellent; 2.50– 3.24- Very Satisfactory;1.75 – 2.49-Satisfactory; 1.00 – 1.74–Poor			

Table 7 reveals that technological equipment and high-tech gadgets were perceived by students as "Available but inadequate and less functional," with an aggregate weighted mean of 1.91, corresponding to a "Satisfactory" rating. This suggests that while these devices were present in students' homes, their functionality and sufficiency for educational use were limited. The insufficient availability of ICT resources negatively impacts students' academic experience, undermining their ability to engage in technology-integrated learning effectively. The findings underscore the essential role of ICT in supporting student achievement and highlight the detrimental consequences of resource limitations.

This situation calls for reassessing the Department of Education's ICT policies, particularly at the school level, to address disparities in access and functionality. Kingston et al. (2018) and Oktari et al. (2018) emphasize the importance of improved monitoring, evaluation, and community collaboration to ensure ICT resources are effectively utilized and secured. Globally, technology has shifted educational models toward student-centered learning and positively influenced teaching and learning outcomes (Apuke & Iyendo, 2018; Jin & Junio-Sabio, 2018b; Yra et al., 2020). However, studies in the Philippines reveal barriers such as poor internet connectivity, lack of personal devices, and the high cost of rentals (Fabito et al., 2020; Casillano, 2019; Cleofas & Rocha, 2021; Estira, 2020). While mobile technology has shown promise (Jin & Sabio, 2018), the overall effectiveness of ICT integration depends on equitable access and sustained support. Without adequate ICT infrastructure, the full benefits of digital learning remain inaccessible to many students.

5.3 **Extent of Using ICT in Modular Distance Learning**

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Communication technology affects learning and many other aspects of life. ICT is a major driver of innovation and efficiency worldwide.

Table 8. Extent of using ICT in Modular Distance Learning

S/N	Indicators	WM	INTERPRETATION
1	Creating Word document	1.83	Small Extent
2	Sending e-mail	2.12	Small Extent
3	Playing educational games online	2.02	Small Extent
4	Reading a book online	2.27	Small Extent
5	Using online websites	2.63	Moderate Extent
6	Communicating using Instant Messenger (IM) or other chat tools	3.07	Moderate Extent
7	Searching for information online	3.00	Moderate Extent
8	Using specific search strategies to search for information online	2.73	Moderate Extent
9	Collaborating online with students from other classes	2.18	Small Extent
Aggregate Weighted Mean		2.43	Small Extent
Legend: 3.25-4.00- Large Extent; 2.50– 3.24-Moderate Extent;1.75 – 2.49-Small Extent; 1.00 – 1.74–Not at all			

Table 8 shows that respondents rated using information and communication technologies (ICT) in Mathematics modular distance learning as being to a "Small Extent," with a weighted mean of 2.43. This rating implies that students perceived ICT tools as only minimally used or needed in their math instructional activities. Despite the recognized potential of ICT to support active learning, exploration, and problem-solving, its limited integration suggests that students are not fully benefiting from its capabilities in their distance education experiences.

The underutilization of ICT in classroom instruction reflects broader systemic challenges, including inadequate infrastructure, ineffective implementation policies, insufficient teacher training, and limited stakeholder engagement. Lawrence and Tar (2018) emphasized that ICT can significantly improve teaching and research outcomes when fully adopted. Basri et al. (2018) also affirmed ICT's transformative role in higher education, while Essay (2019) noted a global transition toward student-centered learning supported by technology. However, inconsistent results across studies indicate that more research is needed to identify and address barriers to ICT integration. Investments in innovative tools such as the Advanced Intranet-Internet Pedagogical Package (AIIPP) may bridge this gap and connect learners to global educational networks, ultimately improving teaching efficacy and student performance.

5.4 Level of Benefits of Using ICT Tools in Learning

ICT is revolutionizing the teaching of Mathematics by enhancing both traditional classroom settings and virtual learning environments. Rather than referring to a single tool, ICT encompasses a diverse range of hardware, software, and multimedia resources. These include desktop and laptop computers, mobile devices, digital cameras, internet connectivity, cloud computing platforms, and various educational applications such as word processors, virtual environments, and digital libraries. These technologies facilitate dynamic, interactive, and learner-centered approaches to instruction. Table 9 presents the respondents' perceptions regarding the extent of ICT utilization in Mathematics education within the modular distance learning context.

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Table 9. Level of Benefits of Using ICT Tools in Learning

S/N	Indicators	WM	Interpretation
1	Students concentrate more on their learning	3.02	High
2	Students try harder in what they are learning	3.13	High
3	Students feel more autonomous in their learning (they can repeat exercises if needed, explore topics they are interested in in more detail, etc.)	2.99	High
4	Students understand more easily what they learn	2.65	High
5	Students remember more easily what they have learnt	2.61	High
6	ICT facilitates collaborative work between students	2.68	High
Aggregate Weighted Mean		2.85	High
Legend: 3.25-4.00- Very High; 2.50– 3.24-High;1.75 – 2.49-Low; 1.00 – 1.74–Very Low			

Table 9 reveals that the respondents perceived Information and Communication Technology (ICT) as highly beneficial to their learning. With an aggregate weighted mean of 2.85, the results were interpreted as "High," indicating that the respondents regarded ICT as essential and valuable in enhancing their academic experience.

The findings point to the potential of ICT to promote learner autonomy, accommodate diverse learning needs, and increase student motivation through access to varied digital resources such as websites, emails, multimedia tools, and educational software. This shift from conventional to technology-integrated instruction reflects a growing respect for individual learning preferences and a stronger emphasis on personalized learning. Digitally competent educators play a key role in this transformation, as they can leverage ICT effectively in the classroom (Schmid & Petko, 2019).

Moreover, integrating ICT in pedagogy—particularly mathematics—creates tech-rich environments supporting deeper understanding and engagement. As students today are increasingly familiar with digital technologies, ICT tools have proven instrumental in improving learning outcomes across various disciplines, including mathematics, science, and the arts (Perienen, 2020).

5.5 Level of Importance of Integrating Various ICT in Learning that They Should Acquire

ICT is vital in education, providing opportunities for teachers and students and transforming teaching and social environments. Effective ICT integration depends on teachers, with many countries using technology and government projects to enhance education. Table 10 presents the level of importance of integrating ICT tools in learning.

Table 10. Level of Importance of Integrating Various ICT in Learning that They Should Acquire

S/N	Indicators	WM	Interpretation
1	Creating a Word document	3.05	Important
2	Sending e-mail	2.91	Important
3	Playing educational games online	2.16	Less Important
4	Reading a book online	2.82	Important
5	Using online websites	2.94	Important
6	Communicating using Instant Messenger (IM) or other chat tools	3.28	Very Important
7	Searching for information online	3.29	Very Important
8	Using specific search strategies to search for information online	3.19	Important

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9	Collaborating online with students from other classes	2.82	Important
Aggregate Weighted Mean		2.94	Important
Legend: 3.25-4.00- Very Important; 2.50– 3.24-Important ;1.75 – 2.49-Less Important; 1.00 – 1.74–Not Important			

As presented in Table 10, the aggregate weighted mean of 2.94 indicates that respondents perceived ICT skills as "Important" for student learning. Specifically, the ability to search for information online (WM = 3.29) and communicate via instant messaging or chat tools (WM = 3.28) were rated "Very Important," reflecting the learners' strong emphasis on efficient information retrieval and effective digital communication—both of which are crucial in academic and professional contexts.

Other ICT tasks, such as creating Word documents, sending emails, reading online books, using educational websites, applying search strategies, and collaborating online, were rated as "Important," underscoring the role of foundational digital literacy in modern education. In contrast, playing educational games online received a lower mean score (WM = 2.16), considered "Less Important," suggesting that while gamification has potential, students prioritize more functional ICT skills.

ICT enhances engagement and learning retention by making lessons interactive and accessible (Serrano et al., 2019). However, its dual-use nature also presents challenges. While many students use ICT productively for academic work, they also spend considerable time on social media, which can detract from academic research (Okoampa-Larbi et al., 2021). Thus, educators must balance leveraging ICT's benefits while mitigating distractions (Banagiri et al., 2021).

5.6 Level of Academic Performance of the Respondents in Mathematics

In response, educational systems worldwide transitioned to remote learning modalities. The shift toward Modular Distance Learning (MDL) in the Philippines has been marked by continued innovation and stakeholder collaboration to maintain access to quality education despite the pandemic's constraints. Table 11 presents the respondents' academic performance in mathematics, highlighting the role of ICT tool integration within the MDL framework.

Table 11. Level of Academic Performance of the Respondents in Mathematics

Level	Numerical Range	f	%
Outstanding	90 – 100	46	16.67
Very Satisfactory	85 – 89	44	15.94
Satisfactory	80 – 84	59	21.38
Fair Satisfactory	75 – 79	127	45.65
Did not meet the Expectations	Below 75	0	0.00
Total		276	100.00
Mean		81.93	
St. Dev.		6.28	

As presented in Table 11, student-respondents' performance in mathematics, with ICT tools integrated into Modular Distance Learning (MDL), was rated as "Satisfactory," with a mean score of 81.93. This suggests that while ICT integration supports learning, students, parents, and teachers still face significant challenges in MDL implementation. Among these are overloaded modules, unclear instructions, and limited access to the internet or devices. These barriers affect students' ability to benefit from ICT-enhanced learning fully.

Effective ICT-integrated pedagogy promotes student motivation, confidence, and autonomy by offering diverse digital resources such as websites, emails, multimedia, and educational software (Kithungu, 2020). However, to strengthen MDL, DepEd must streamline learning content, provide more precise

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instructions, and ensure materials are well-illustrated. For students with limited connectivity, alternative support such as home visits and responsive online teacher engagement is critical. Furthermore, collaboration between DepEd and the government is essential to provide adequate funding, empower teachers to develop contextualized modules, and ensure quality monitoring and progress tracking (Bae, 2018).

5.7 **Test of Significance of the Relationship**

This study hypothesized that there was no significant relationship between the respondents' academic performance in Mathematics and the extent to which they used ICT in Modular Distance Learning. Table 12 presents the results.

Table 12. Test of Significant Relationship between the Extent of Using ICT in Modular Distance Learning and the Academic Performance of the Respondents in Mathematics

Variables	r-value	Strength of Correlation	p - value	Decision	Result
Extent of Using ICT in Modular Distance Learning and Academic Performance in Mathematics	0.189*	Negligible Positive	0.002	Reject Ho	Significant
***significant at p<0.05 (two-tailed)**					

As shown in Table 12, the computed p-value of 0.537 is greater than the 0.05 level of significance, indicating no significant relationship between the status of ICT tools at home and students' academic performance in mathematics. This leads to the acceptance of the null hypothesis.

This finding suggests that the mere presence or availability of ICT tools at home does not necessarily translate to improved academic performance in mathematics. While many students have access to digital devices and internet connectivity, these resources may be used more for social media and entertainment than for educational purposes. Wakefield and Frawley (2020) point out that although ICT tools are often available, their educational utility depends on how students actually use them. In this context, digital literacy and guided use of technology are essential for maximizing the educational potential of ICT resources.

Moreover, this study hypothesized that there was no significant relationship between the respondents' academic performance in Mathematics and the level of benefits of using ICT tools in learning. Table 13 presents the results.

Table 13 Test of Significant Relationship between the Benefits of using ICT tools in Learning and the Academic Performance of the Respondents in Mathematics

Variables	r-value	Strength of Correlation	p - value	Decision	Result
Benefits of using ICT tools in Learning and Academic Performance in Mathematics	0.132*	Negligible Positive	0.029	Reject Ho	Significant
***significant at p<0.05 (two-tailed)**					

As shown in Table 13, the computed p-value of 0.029 is below the 0.05 significance level, indicating a statistically significant relationship between students' academic performance in Mathematics and their perceived benefits from using ICT tools in learning. Thus, the null hypothesis is rejected.

This finding suggests that positive perceptions of ICT use correlate with improved academic outcomes, supporting existing literature on the role of ICT in enhancing student motivation, engagement, and comprehension, particularly in subjects like mathematics that require abstract reasoning and analytical thinking.

Mathematics, the foundation of scientific and technological advancement, fosters essential cognitive skills such as logical reasoning and problem-solving. Despite occasional gaps in instructional quality, the subject remains central to academic and societal

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development. On the other hand, ICT integration addresses key challenges in mathematics education by offering interactive, adaptive, and personalized learning environments. According to Das (2019), well-implemented digital platforms can increase engagement, facilitate differentiated instruction, and enhance pedagogical effectiveness. ICT tools also aid in concept visualization, dynamic practice, and immediate feedback, improving learning outcomes.

Finally, this study hypothesized that there was no significant relationship between the respondents' academic performance in Mathematics and the level of importance of integrating various ICT in the learning that they should acquire. Table 14 presents the results.

Table 14. Test of Significant Relationship between the Importance of Integrating Various ICT in Learning and the Academic Performance of the Respondents in Mathematics

Variables	r-value	Strength of Correlation	p - value	Decision	Result
Importance of Integrating Various ICT in Learning and Academic Performance in Mathematics	0.145*	Negligible Positive	0.016	Reject Ho	Significant
***significant at p<0.05 (two-tailed)**					

As shown in Table 14, the computed p-value of 0.016 is below the 0.05 significance level, indicating a significant relationship between respondents' academic performance in Mathematics and the perceived importance of acquiring various ICT skills. Consequently, the null hypothesis is rejected.

This finding aligns with Dhakal (2018), who reported that advancements in ICT tools enhance student achievement by increasing engagement. ICT has thus become an essential educational resource, offering significant potential to improve teaching and learning. Integrating ICT in mathematics instruction fosters more interactive and relevant lessons, bridging theoretical concepts with real-world applications. It facilitates intuitive understanding, exploration, and practical application of mathematical ideas (Das, 2019; Hu et al., 2018; McCulloch et al., 2018).

VI. FINDINGS

The study conducted a comprehensive analysis using appropriate statistical methods, yielding several key findings. Most respondents were female high school seniors within the typical age range. Respondents generally came from large families, averaging six siblings, and their parents' educational attainment was mostly limited to the elementary level. Fathers predominantly worked as farmers, while mothers primarily were homemakers. Most households reported a combined monthly income of ten thousand pesos or less. Mobile data emerged as the primary source of internet connectivity for students. Students' academic performance in mathematics, with the integration of ICT tools in modular distance learning (MDL), was perceived as satisfactory.

Regarding ICT integration in mathematics MDL, the availability and functionality of technological equipment at home were inadequate. The extent of ICT use in instructional activities was perceived as minimal at home and in the classroom. Despite limited usage, students rated the benefits of ICT tools in learning as high, highlighting their perceived value in supporting educational development.

Further analysis revealed significant relationships between students' academic performance and factors such as ICT usage, perceived benefits of ICT, and overall ICT integration, resulting in the rejection of the null hypothesis. However, no significant correlation was found between the mere availability of ICT tools at home and mathematics performance. These findings highlight the critical role of effective ICT integration in enhancing academic outcomes within modular distance learning environments.

VII. CONCLUSIONS

This study found that ICT-integrated pedagogy enhances mathematics learning by accommodating learner diversity and fostering student autonomy. Utilizing diverse ICT tools, including multimedia and mathematics software, significantly increases learner motivation and confidence. Teachers' active use of ICT fosters a more interactive and practical classroom environment. Effective mathematics instruction should

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incorporate collaboration, communication, innovation, and creativity, emphasizing active participation and problem-solving. Although ICT is not a panacea for all learning difficulties, students are encouraged to leverage technological opportunities for lifelong learning. Successful technology integration requires deliberate planning and preparation. Students proficient and confident in using technology are more likely to effectively incorporate modern tools into their mathematics learning.

Furthermore, it is recommended that senior high school students in the Bohol Province Schools Division receive additional training on the strategic use of modern technological devices to optimize learning outcomes. Concurrently, school authorities should prioritize providing and maintaining adequate technological resources to support this integration.

RECOMMENDATION

Given the study's findings, it is strongly advised that the designed action plan to improve the integration of ICT tools and respondents' performance in mathematics modular distance learning be implemented.

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