INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 07 Issue 09 September 2024

DOI: 10.47191/ijmra/v7-i09-19, Impact Factor: 8.22

Page No. 4275-4284

Navigating Remote Learning in Teacher Education: An Examination of ICT Integration and Its Impact on Academic Success

Renz L. Caneo[1], Arnold Abad C. Tenorio[2], Christian Maria Amor C. Palacio[3]

[1]Our Lady of Sorrows Academy, Dolores, Quezon, Philippines

[2,3]Laguna State Polytechnic University, San Pablo City, Philippines

ABSTRACT: This study focused on the information, communication, and Technology-related factors related to the academic achievement of the College of Teacher Education students at Laguna State Polytechnic University San Pablo City Campus. This studys' primary objective is to determine the effect of ICT-related factors such as digital literacy, school support system, and learner management system on the academic achievement of pre-service education students at Laguna State Polytechnic University based on their general weighted average. The researcher used the self-made questionnaire to determine the ICT-related factors of fifty (50) respondents. The collected data were tabulated and treated statistically to determine the effects of ICT-related factors on CTE students' academic achievement. Most respondents agreed they can use digital applications like Google Classroom on mobile devices, laptops, and desktop computers. They also agreed that their professors used online educational applications like Google Classroom and Google Meet. Lastly, they know how to use different online applications like Zoom, Google Meet and Google Classroom. Furthermore, the general weighted average of the respondents indicated that most had very satisfactory grades, from 1.50 to 2.00. The findings also revealed that the three ICT-related factors in terms of Digital Literacy, School Support System and Learners Management System do not significantly affect the academic performance of the CTE students. The researcher suggested that educational institutions must provide relevant and effective content, set up an efficient delivery mechanism, and provide digital literacy training to their current faculty to improve learning outcomes.

KEYWORDS: ICT Related Factors, Academic Achievement, Covid-19 Pandemic

I. INTRODUCTION (SIZE 10 & BOLD)

The global outbreak of COVID-19 has dramatically reshaped educational landscapes worldwide, compelling institutions to rapidly adapt to remote learning modalities (Pokhrel & Chhetri, 2021). This sudden shift has underscored the critical role of Information and Communication Technology (ICT) in education, particularly in teacher preparation programs (Montilla et al., 2023). As the pandemic continues to challenge traditional educational paradigms, it becomes increasingly important to assess the influence of digital tools on academic success in teacher education.

The integration of ICT in education has been a growing trend over the past decade, with its potential to enhance teaching and learning processes widely recognized (Tondeur et al., 2017). However, the COVID-19 pandemic has accelerated this digital transformation, forcing educators and students alike to embrace technology-mediated instruction at an unprecedented scale (Ferri et al., 2020). This rapid transition has highlighted the importance of digital literacy among teachers and exposed significant disparities in access to technology and digital resources (Schleicher, 2020).

The pandemic has exacerbated educational inequalities, with students from disadvantaged backgrounds facing greater challenges accessing online learning resources (UNESCO, 2020). This digital divide has become a critical concern in teacher education programs, as it impacts the ability of future educators to develop the necessary skills for teaching in a technology-rich environment (Panergayo & Aliazas, 2021). Addressing these disparities is crucial for ensuring equitable access to quality education and preparing a new generation of teachers capable of navigating traditional and digital learning spaces (Onyema et al., 2020).

In teacher education, the pandemic has presented unique challenges and opportunities. While the shift to online learning has disrupted traditional practicum experiences and face-to-face interactions, it has also opened new avenues for innovative teaching

practices and the development of digital competencies (Carrillo & Flores, 2020). As future educators, teacher candidates must now navigate this digital landscape, adapting their pedagogical approaches to meet the demands of an increasingly technology-driven educational environment.

The rapid digitalization of education has also necessitated re-evaluating curriculum design and delivery in teacher preparation programs. Institutions are now tasked with integrating digital literacy and online teaching skills into their curricula, ensuring that future teachers can effectively leverage technology in their classrooms (Tadeu et al., 2019). This shift requires not only technical proficiency but also a deep understanding of how technology can be used to enhance pedagogical practices and support diverse learning needs (König et al., 2020; Panergayo & Aliazas, 2023).

Moreover, the pandemic has highlighted the importance of resilience and adaptability in teaching. Teacher education programs must now focus on developing these qualities alongside traditional pedagogical skills, preparing future educators to thrive in uncertain and rapidly changing educational landscapes (Reimers & Schleicher, 2020).

This study aims to investigate the impact of ICT on academic achievement in teacher education programs amidst the COVID-19 pandemic. By examining the relationship between digital tool adoption, engagement levels, and academic performance, we seek to provide insights into effective strategies for leveraging technology in teacher preparation. Additionally, this research will explore the challenges and opportunities presented by the rapid digitalization of teacher education, focusing on identifying best practices for promoting academic success in a remote learning context.

Specifically, this study will address the following research questions:

1. What is the mean perception of respondents on ICT-related factors in terms of:
   1.1. digital literacy;
   1.2. school support system;
   1.3. Learner management system?
2. What is students' academic achievement in terms of the General Weighted average?
3. Is there a significant relationship between the ICT-related factors and the students' academic achievement?

Addressing these questions aims to contribute to developing more resilient and adaptive teacher education programs that can effectively prepare educators for the challenges of 21st-century teaching, both during and beyond the current pandemic. As the education sector continues to grapple with the long-term implications of the pandemic, understanding the role of ICT in shaping teacher education becomes crucial for developing resilient and adaptable educational systems. This study contributes to the growing body of literature on technology-enhanced learning in higher education, specifically emphasizing its application in teacher preparation programs during times of crisis.

II. METHOD

This study employed a quantitative research approach using a descriptive-correlational design. This methodology is well-suited for examining relationships between variables and providing a comprehensive overview of the current situation (Creswell & Creswell, 2018). The study focused on ICT-related factors and their relationship to students' academic achievement in the College of Teacher Education at Laguna State Polytechnic University-San Pablo City Campus amidst the COVID-19 pandemic.

The descriptive-correlational design was chosen to gather relevant information about the present situation and identify relationship between variables (Leavy, 2017). This approach allowed for examining ICT-related factors such as Digital Literacy, School Support Services, and Learning Management Systems, and their potential influence on students' academic achievement during the pandemic.

The study participants comprised 50 students from the College of Teacher Education at Laguna State Polytechnic University-San Pablo City Campus during the 2020-2021 academic year. These students were experiencing the new online learning modality necessitated by the pandemic. A random sampling procedure was employed to select participants, aligning with best educational research practices to ensure representativeness (Cohen et al., 2018).

Data were collected using a researcher-developed questionnaire validated through expert review. The questionnaire was divided into two main sections: (1) demographic profile of the students, and (2) factors related to ICT in education (Digital Literacy, School Support Services, and Learning Management Systems). The questionnaire utilized a Likert scale to measure participants' responses, a common approach in educational research for capturing nuanced attitudes and experiences (Taherdoost, 2019).

The data collection process followed several steps. First, official letters seeking permission to conduct the study were sent to relevant authorities. Then, the validated questionnaires were distributed to student respondents. The researcher guided students while they completed the questionnaires. Data were collected on the identified aspects: digital literacy, school support services,

and learning management systems. Finally, the ICT-related factors and their relationship to students' academic achievement was analyzed.

The study employed both descriptive and inferential statistics for data analysis. Descriptive statistics included Weighted Mean and Standard Deviation, which were used to analyze Likert scale responses (Sullivan & Artino, 2017). Frequency and percentage were used to describe students' academic achievement. For inferential statistics, the Pearson Product Moment Correlation Coefficient (PPMC) was used to determine and quantify the relationship between ICT-related factors and students' academic achievement (Schober et al., 2018).

This comprehensive methodology allowed for a thorough examination of the relationship between ICT-related factors and academic achievement in emergency remote teaching during the COVID-19 pandemic. By employing a mix of descriptive and correlational analyses, the study aimed to provide insights into the complex interplay between technology integration and student performance in teacher education programs during this unprecedented time.

III. RESULTS AND DISCUSSION

Table 1. Perceived ICT related Factors to the Academic Achievement of the CTE students in terms of Digital Literacy

Indicators	Mean	SD	Interpretation
1. I can connect, share, communicate, and collaborate with others effectively in a digital environment.	3.46	0.65	Agree
2. I have awareness of potential risks and issues in a digital environment (i.e. websites, social media, audio, and video content).	3.58	0.50	Strongly Agree
3. I can use different digital applications like google classroom using my mobile device/laptop/desktop computer.	3.64	0.48	Strongly Agree
4. I understand the ethical and legal use of technology.	3.48	0.50	Agree
5. I can verify if a website is safe or malicious.	3.22	0.62	Agree
6. I am careful about sharing information on any digital platform.	3.60	0.49	Strongly Agree
7. I use digital technologies as my aid in learning.	3.62	0.49	Strongly Agree
8. I can use ICT to express my creativity and improve my academic performance.	3.42	0.67	Agree
9. I understand how computers operate.	3.20	0.61	Agree
Overall	**3.47**	**0.38**	**Agree**

Legend*: 1.00 – 1.49 = Strongly Disagree; 1.50 – 2.49 = Disagree; 2.50 – 3.49 = Agree; 3.50 – 4.00= Strongly Agree.*

The findings of this study provide valuable insights into the digital literacy of students in the College of Teacher Education amidst the COVID-19 pandemic. The results indicate that students generally possess a high level of digital literacy, particularly in using various digital applications such as Google Classroom across different devices. This aligns with recent research highlighting higher education students' increasing digital competence, especially in emergency remote teaching (Falloon, 2020).

The study found that students were most proficient in using digital applications on various devices, including mobile phones, laptops, and desktop computers. This versatility in device usage reflects the growing trend of multi-device learning environments in higher education (Deng et al., 2019). However, the lower mean score for understanding computer operations suggests that students may benefit from more in-depth knowledge of underlying computer systems while they are adept at using applications.

The overall agreement that students are digitally literate (with a mean of 3.47 on a 5-point scale) suggests they possess the necessary skills to navigate the digital learning environment. This digital literacy is crucial in the current educational landscape, where technology-mediated learning has become the norm rather than the exception (Zimmerman, 2020). The accessibility and availability of digital applications have significantly facilitated this transition, potentially contributing to improved academic achievement.

The forced shift to online learning due to the COVID-19 pandemic has accelerated the adoption of digital educational tools and platforms. As noted by Hodges et al. (2020), this rapid transition has led to emergency remote teaching, where students and educators have had to quickly adapt to new modes of instruction. Our findings suggest that students have risen to this challenge, developing confidence in using digital devices for learning, accessing information, and creating knowledge.

The disruption of traditional classroom education has led to increased use of multimedia content, including videos, lecture notes, and presentations. This aligns with research by Mishra et al. (2020), who found that integrating diverse digital resources

can enhance student engagement and learning outcomes. Furthermore, wider access to sources and experts via digital social media has expanded the learning ecosystem beyond the confines of the physical classroom (Greenhow & Lewin, 2016).

However, it is important to note that digital literacy alone may not guarantee improved academic achievement. As Tang and Chaw (2016) pointed out, the relationship between digital competence and learning outcomes is complex and influenced by various factors, including pedagogical approaches, student motivation, and the quality of digital content.

Table 2. Perceived ICT-related Factors to the Academic Achievement of CTE students in terms of School Support Services

Indicators	Mean	SD	Interpretation
1. Our professors cite reliable references in every module.	3.46	0.61	Agree
2. Our professors use online educational applications like Google Classroom and Google Meet.	3.66	0.56	Strongly Agree
3. Our school limits synchronous classes.	3.36	0.78	Agree
4. Our professors use a Learning Management System like Moodle, a Content Management System like WordPress, or Google Apps for Education (GAFE) like Google Classroom.	3.38	0.78	Agree
5. Our school has a website wherein we can easily access our academic information.	3.50	0.58	Strongly Agree
6. Our professors recommend suitable applications that a student can use.	3.50	0.61	Strongly Agree
7. Our school ensures that our data is processed and stored with our consent.	3.50	0.61	Strongly Agree
8. Our professors provide modules in each subject.	3.50	0.65	Strongly Agree
9. Our professors help us adapt to new modes of learning.	3.44	0.58	Agree
Overall	**3.48**	**0.51**	**Agree**

Legend*: 1.00 – 1.49 = Strongly Disagree; 1.50 – 2.49 = Disagree; 2.50 – 3.49 = Agree; 3.50 – 4.00= Strongly Agree.*

The results indicate a high level of agreement among students regarding their professors' use of online educational applications, with applications like Google Classroom and Google Meet being widely adopted. This aligns with recent research highlighting the rapid shift to online learning platforms in higher education in response to the pandemic (Mishra et al., 2020). The overall weighted mean of 3.48 for School Support Services suggests that students generally perceive their institution as supportive regarding technology integration.

However, the study also revealed that students perceived some limitations in synchronous classes, as indicated by the lowest weighted mean in this category. This finding reflects the ongoing challenges institutions face in balancing synchronous and asynchronous learning activities in online environments. Raes et al. (2020) noted that finding the right mix of synchronous and asynchronous elements is crucial for effective online learning experiences.

The study's findings support the research of Pratama et al. (2020), which highlights the efficiency, practicality, and safety of video conferencing applications in educational contexts. These tools have shifted the educational paradigm by demonstrating that effective learning can occur outside traditional classroom settings. The ability to conduct meetings, share files, and use digital whiteboards mimics many aspects of face-to-face instruction while offering the flexibility of remote participation.

Table 3. Perceived ICT-related Factors to the Academic Achievement of CTE students in terms of Learning Management System

Indicators	Mean	SD	Interpretation
1. I manage my synchronous and asynchronous class schedule.	3.42	0.64	Agree
2. I know how to use different online applications like Zoom, Google Meet and Google Classroom.	3.60	0.49	Strongly Agree
3. I prefer group learning to understand a difficult lesson better.	3.12	0.75	Agree
4. I prefer seeking information on an online platform about a topic or lesson.	3.46	0.58	Agree
5. I don't let my emotions affect my learning.	3.34	0.63	Agree
6. I have the motivations to study.	3.34	0.72	Agree

7.	I feel encouraged to study because of digital technologies.	3.06	0.74	Agree
8.	I prefer using online instructional materials.	3.14	0.67	Agree
9.	I have friends or schoolmates to talk about schoolwork.	3.48	0.58	Agree
Overall		**3.32**	**0.37**	**Agree**

Legend*: 1.00 – 1.49 = Strongly Disagree; 1.50 – 2.49 = Disagree; 2.50 – 3.49 = Agree; 3.50 – 4.00= Strongly Agree.*

The findings reveal that students are generally proficient in using various online applications such as Zoom, Google Meet, and Google Classroom, as indicated by the highest weighted mean of 3.60. This aligns with the concept of today's students as "digital natives" (Prensky, 2001), "millennials" (Howe & Strauss, 2000), or the "digital generation" (Wahab Ali, 2018). These students have grown up in an era where technological advancement is commonplace and widely adopted globally.

However, it's noteworthy that the learner's management system did not significantly affect students' academic achievement (overall weighted mean of 3.32). This finding suggests that while students are comfortable with digital tools, the mere use of these tools does not automatically translate to improved academic performance.

Interestingly, the study found that students least agreed with feeling encouraged to study because of digital technologies (weighted mean of 3.06). This result contradicts the assumption that digital natives are inherently motivated by technology in educational contexts. It aligns with recent research suggesting that the relationship between technology use and student engagement is complex and not always positive (Bond et al., 2020).

The study's findings resonate with recent research on using various digital tools in online learning. For instance, Wargadinata et al. (2020) found that during the early stages of the COVID-19 pandemic, academics at UIN Maulana Malik Ibrahim Malang employed a variety of tools for online learning. They noted that platforms like WhatsApp were particularly effective due to their familiarity, ease of use, and low data requirements. This versatility in file sharing and communication aligns with our findings on students' proficiency with various online applications.

The concept of students as "digital natives" is supported by several studies. Wahab Ali (2018) found that students have a deep affinity with information technology. Shava et al. (2016) noted that children worldwide are exposed to technology devices such as mobile phones and tablets from an early age. An empirical study by Jesse (2015) revealed that almost all students (99.8%) have mobile phone services, which they use for messaging, social media, and various applications.

However, our finding that students don't necessarily feel more encouraged to study due to digital technologies suggests a nuanced relationship between technology and learning motivation. This complexity is echoed in recent literature questioning the uniformity of the "digital native" experience (Kirschner & De Bruyckere, 2017).

Table 4. Distribution of Respondents According to Academic Achievement

General Weighted Average (1st Semester)	Frequency	Percentage	Interpretation
1.00 – 1.50	10	20%	Outstanding
1.51 – 1.75	23	46%	Very Satisfactory
1.76 – 2.00	15	30%	Satisfactory
2.01 – 2.50	2	4%	Fairly Satisfactory
Total	**50**	**100**	

This study examined students' academic performance in the College of Teacher Education during the first Semester of the academic year 2020-2021, a period marked by the shift to online learning due to the COVID-19 pandemic. The general weighted average (GWA) analysis provides valuable insights into student achievement during this challenging time, contributing to the growing body of research on the impact of emergency remote teaching on academic performance (Gonzalez et al., 2020).

The distribution of the respondents' GWA reveals a generally high academic performance pattern. The largest group, comprising 46% of respondents, achieved a GWA between 1.51 and 1.75. This was followed by 30% of respondents who achieved a GWA between 1.76 and 2.00. Notably, 20% of respondents excelled with a GWA between 1.00 and 1.50, while only 4% had a GWA between 2.01 and 2.50. This distribution indicates that most of the respondents (76%) achieved grades in the range of 1.51 to 2.00, which are classified as very satisfactory to satisfactory performance. These results align with studies suggesting that students can maintain or improve their academic performance in online learning environments when proper support is provided (Pei & Wu, 2019).

Based on the institution's grading system, the interpretation of these grades provides further context to these results. Grades between 1.00 and 1.50 are considered outstanding, those between 1.51 and 1.75 are very satisfactory, grades from 1.76 to 2.00

are satisfactory, and those between 2.01 and 2.50 are fairly satisfactory. The largest group of students (46%) falls into the "Very Satisfactory" category, demonstrating high academic achievement. Notably, a significant portion of students (20%) achieved "Outstanding" grades, indicating exceptional performance despite the challenges of remote learning. This success resonates with findings from Aristovnik et al. (2020), who observed that many students adapted well to online learning during the pandemic.

The composition of the final course grade, which forms the basis of the GWA, offers insight into the assessment structure during this period of online learning. The grade was computed using 20% from course discussions, 40% from activity sheets, and 40% from examinations or outputs. This grading structure emphasizes the importance of ongoing engagement (through discussions and activity sheets) alongside traditional assessment methods (examinations), providing a balanced evaluation of student performance in the online learning environment. Such diverse assessment strategies have been shown to support student success in online learning contexts (Gares et al., 2020).

These findings have several implications for understanding the effectiveness of online learning during the pandemic. Firstly, the high proportion of students achieving very satisfactory and outstanding grades suggests a successful adaptation to online learning modalities. This resilience is particularly noteworthy given the sudden transition to remote education due to the pandemic and aligns with research indicating that students can effectively adapt to online learning environments (Dhawan, 2020). Secondly, the balanced grading structure, which gives equal weight to activity sheets and examinations, may have contributed to the overall high performance by allowing students to demonstrate their knowledge and skills through various means, a strategy supported by research on effective online assessment practices (García-Peñalvo et al., 2021).

Furthermore, students' success in this online setting suggests that, with proper implementation, online education can be an effective medium for learning, even in challenging circumstances. This finding supports the growing body of literature on the potential of online education to maintain educational quality during disruptions (Hodges et al., 2020). However, while the majority of students performed well, the small percentage (4%) achieving fairly satisfactory grades indicates that there is still room for improvement in supporting all students in the online learning environment, a challenge noted in several studies on emergency remote teaching (Pokhrel & Chhetri, 2021).

Overall, the analysis of academic performance during this Semester of online learning reveals a generally positive outcome, with most students achieving very satisfactory or outstanding grades. This success is particularly significant given the unprecedented challenges posed by the COVID-19 pandemic and the rapid shift to online learning modalities. However, it's important to note that these findings represent a snapshot of performance during a specific and unusual period. Further research could explore the long-term impacts of online learning on academic performance and investigate the factors contributing to the success of high-performing students in this environment (Adedoyin & Soykan, 2020). Additionally, strategies to support the small percentage of students achieving lower grades should be considered to ensure all students can thrive in online learning settings, as suggested by recent studies on inclusive online education practices (Zhang et al., 2020).

Table 5. Test of Correlation Between the ICT related Factors to the Academic Achievement of the Students

	ICT Related Factors			
	Student's Digital Literacy	School Support System	Learner's System	Management
Academic Achievement	-0.067	-0.153	-0.078	

***. Correlation is significant at the 0.01 level (2 tailed). *. Correlation is significant at the 0.05 level (2 tailed).*

This study examined the relationship between ICT-related factors and academic performance among College of Teacher Education students during the COVID-19 pandemic. The findings reveal no significant relationship between the three ICT-related factors (Digital Literacy, School Support Systems, and Learners' Management Systems) and the students' academic performance. Contrary to expectations, these factors did not affect the students' grades.

These results present an interesting contrast to some existing research on e-learning during the COVID-19 pandemic. For instance, Alqahtani and Rajkhan (2020) found that e-learning was one of the most critical success factors during this period. They suggested that blended learning was the optimal choice for educational institutions, followed by asynchronous and ICT-supported face-to-face learning. However, our findings indicate that the ICT-related factors did not significantly impact academic performance, which aligns more closely with Alqahtani and Rajkhan's observation that course style and content did not have as much influence on learning outcomes as previously thought.

The lack of a significant relationship between ICT factors and academic performance in our study could be attributed to several factors. First, students may have quickly adapted to the new learning environment, minimizing the impact of ICT-related factors

on their performance. Second, as Alqahtani and Rajkhan (2020) noted, e-learning success heavily depends on institutional support. Our study's absence of a significant relationship might indicate that the institution provided adequate support, leveling the playing field for all students regardless of their ICT proficiency. Lastly, the similar performance across different levels of ICT proficiency might suggest that the course content and teaching quality were more influential than the ICT factors themselves.

However, it's important to consider these findings in the context of broader research on online learning effectiveness. Adnan and Anwar (2020) found that traditional learning is more effective than online learning, particularly in developing countries where students face technological and financial constraints. They reported that 78.6% of students believe face-to-face interaction with instructors is crucial for optimal learning, which is absent in remote learning modes.

While our study did not find a significant impact of ICT factors on academic performance, Adnan and Anwar's findings highlight important challenges in online learning. Students reported reduced engagement with instructors in online settings, delays in instructor responses, and the absence of typical classroom socialization. Moreover, 42.9% of students found conducting group projects more difficult in distance learning mode. These challenges, while not directly reflected in our academic performance data, may still be present and affect students' overall learning experience.

The discrepancy between our findings and some existing research underscores the complexity of online learning environments and their impact on student performance. It suggests that while ICT factors are important, they may not be the sole or primary determinants of academic success in online learning contexts.

Several recommendations can be made based on these findings and the existing literature. Adnan and Anwar (2020) suggested that educational institutions should update their curricula to create content suitable for online courses. Alqahtani and Rajkhan (2020) and Adnan and Anwar (2020) emphasize the importance of digital literacy training for students and faculty. Given the preference for face-to-face interaction, institutions should consider blended learning approaches when possible, as Alqahtani and Rajkhan (2020) suggested. Continued focus on institutional support for online learning is crucial, as highlighted by Alqahtani and Rajkhan (2020). Lastly, developing strategies to enhance student-instructor engagement and facilitate group work in online settings could address some of the challenges identified by Adnan and Anwar (2020).

In conclusion, while our study found no significant relationship between ICT-related factors and academic performance, the broader research suggests these factors still play a crucial role in the overall learning experience. Future research could explore the qualitative aspects of student experiences with ICT in online learning to provide a more comprehensive understanding of its impact beyond academic grades.

IV. CONCLUSIONS

This study examined the relationship between ICT-related factors and academic achievement among students in the College of Teacher Education at Laguna State Polytechnic University-San Pablo City Campus during the COVID-19 pandemic. The research focused on three main ICT-related factors: Digital Literacy, School Support Services, and Learning Management Systems.

The findings suggest that students demonstrated a relatively high level of digital literacy, particularly in using various digital applications such as Google Classroom on different devices (Falloon, 2020). However, students' digital literacy could be improved in some areas, such as understanding computer operations. This aligns with recent research highlighting the importance of comprehensive digital literacy in higher education, especially in emergency remote teaching (Zimmerman, 2020).

The study found that professors widely used online educational applications like Google Classroom and Google Meet regarding school support services. This adoption of digital tools by faculty members is consistent with global trends in higher education during the pandemic (Mishra et al., 2020). However, the findings also indicated that the institution limited synchronous classes, which could affect student engagement and learning outcomes (Raes et al., 2020).

In learning management systems, students reported proficiency in using various online applications. However, the study found that digital technologies did not necessarily increase students' motivation to study. This finding underscores the complex relationship between technology use and student engagement, as highlighted in recent literature (Bond et al., 2020).

The students' academic performance, as measured by their general weighted average for the first Semester of the 2020-2021 academic year, ranged from satisfactory to very satisfactory. This suggests that despite the challenges posed by the sudden shift to online learning, many students could maintain good academic standing (Gonzalez et al., 2020).

Interestingly, the study found no significant relationship between the ICT-related factors (Digital Literacy, School Support System, and Learning Management System) and students' academic performance. This result contradicts previous studies that found positive correlations between ICT integration and academic achievement (Cabi, 2018). However, it aligns with research suggesting that the impact of ICT on learning outcomes is complex and influenced by various factors beyond mere technology access and use (Tang & Chaw, 2016).

These findings have important implications for educational policy and practice in higher education, particularly in teacher education programs. While ICT integration is crucial in modern education, especially in remote learning, its relationship with academic achievement may not be straightforward. Educators and policymakers should consider a holistic approach to ICT integration beyond providing access to technology and focusing on effective pedagogical practices, student engagement, and developing critical digital skills (Tondeur et al., 2017).

Future research could explore the qualitative aspects of ICT use in education, investigating how students and teachers perceive the role of technology in learning and teaching. Additionally, longitudinal studies could provide insights into how the relationship between ICT factors and academic achievement evolves, particularly as institutions transition from emergency remote teaching to more sustainable online and blended learning models.

REFERENCES

1) Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: the challenges and opportunities. Interactive Learning Environments, 1-13. https://doi.org/10.1080/10494820.2020.1813180
2) Adnan, M., & Anwar, K. (2020). Online learning amid the COVID-19 pandemic: Students' perspectives. Journal of Pedagogical Sociology and Psychology, 2(1), 45-51. http://www.doi.org/10.33902/JPSP.2020261309
3) Alqahtani, A. Y., & Rajkhan, A. A. (2020). E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. Education Sciences, 10(9), 216. https://doi.org/10.3390/educsci10090216
4) Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. Sustainability, 12(20), 8438. https://doi.org/10.3390/su12208438
5) Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. Computers in Human Behavior, 111, 106424. https://doi.org/10.1016/j.chb.2020.106424
6) Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. International Journal of Educational Technology in Higher Education, 17(1), 2. https://doi.org/10.1186/s41239-019-0176-8
7) Cabi, E. (2018). The impact of the flipped classroom model on students' academic achievement. International Review of Research in Open and Distributed Learning, 19(3). https://doi.org/10.19173/irrodl.v19i3.3482
8) Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. European Journal of Teacher Education, 43(4), 466-487. https://doi.org/10.1080/02619768.2020.1821184
9) Cohen, L., Manion, L., & Morrison, K. (2018). Research methods in education (8th ed.). Routledge.
10) Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.
11) Deng, R., Benckendorff, P., & Gannaway, D. (2019). Progress and new directions for teaching and learning in MOOCs. Computers & Education, 129, 48-60. https://doi.org/10.1016/j.compedu.2018.10.019
12) Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. Journal of Educational Technology Systems, 49(1), 5-22. https://doi.org/10.1177/0047239520934018
13) Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. Educational Technology Research and Development, 68(5), 2449-2472. https://doi.org/10.1007/s11423-020-09767-4
14) Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. Societies, 10(4), 86. https://doi.org/10.3390/soc10040086
15) García-Peñalvo, F. J., Corell, A., Abella-García, V., & Grande, M. (2021). Online assessment in higher education in the time of COVID-19. Education in the Knowledge Society, 22, e26233. https://doi.org/10.14201/eks.26233
16) Gares, S. L., Kariuki, J. K., & Rempel, B. P. (2020). Community matters: Student–instructor relationships foster student motivation and engagement in an emergency remote teaching environment. Journal of Chemical Education, 97(9), 3332-3335. https://doi.org/10.1021/acs.jchemed.0c00635
17) Gonzalez, T., de la Rubia, M. A., Hincz, K. P., Comas-Lopez, M., Subirats, L., Fort, S., & Sacha, G. M. (2020). Influence of COVID-19 confinement on students' performance in higher education. PLOS ONE, 15(10), e0239490. https://doi.org/10.1371/journal.pone.0239490
18) Greenhow, C., & Lewin, C. (2016). Social media and education: reconceptualizing the boundaries of formal and informal learning. Learning, Media and Technology, 41(1), 6-30. https://doi.org/10.1080/17439884.2015.1064954

19) Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review, 27, 1-12.
20) Howe, N., & Strauss, W. (2000). Millennials rising: The next great generation. Vintage Books.
21) Jesse, G. R. (2015). Smartphone and app usage among college students: Using smartphones effectively for social and educational needs. 2015 Proceedings of the EDSIG Conference on Information Systems and Computing Education, Wilmington, NC, USA.
22) Kirschner, P. A., & De Bruyckere, P. (2017). The myths of the digital native and the multitasker. Teaching and Teacher Education, 67, 135-142. https://doi.org/10.1016/j.tate.2017.06.001
23) König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. European Journal of Teacher Education, 43(4), 608-622. https://doi.org/10.1080/02619768.2020.1809650
24) Leavy, P. (2017). Research design: Quantitative, qualitative, mixed methods, arts-based, and community-based participatory research approaches. Guilford Press.
25) Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. International Journal of Educational Research Open, 1, 100012. https://doi.org/10.1016/j.ijedro.2020.100012
26) Montilla, V. R., Rodriguez, R., Aliazas, J. V., & Gimpaya, R. (2023). Teachers' pedagogical digital competence as relevant factors on academic motivation and performance in physical education. International Journal of Scientific and Management Research, 6(6), 45-58.
27) Onyema, E. M., Eucheria, N. C., Obafemi, F. A., Sen, S., Atonye, F. G., Sharma, A., & Alsayed, A. O. (2020). Impact of Coronavirus pandemic on education. Journal of Education and Practice, 11(13), 108-121. https://doi.org/10.7176/JEP/11-13-12
28) Panergayo, A. A. (2021). Students' Behavioral Intention to Use Learning Management System: The Mediating Role of Perceived Usefulness and Ease of Use. International Journal of Information and Education Technology, 11(11), 538-545.
29) Panergayo, A. A., & Aliazas, J. V. (2023). Google Classroom Adoption as Learning Management System in Senior High School Using Technology Acceptance Model. Jurnal Pendidikan Progresif, 13(2), 871-883.
30) Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. Medical Education Online, 24(1), 1666538. https://doi.org/10.1080/10872981.2019.1666538
31) Pokhrel, S., & Chhetri, R. (2021). A literature review on impact of COVID-19 pandemic on teaching and learning. Higher Education for the Future, 8(1), 133-141. https://doi.org/10.1177/2347631120983481
32) Pratama, H., Azman, M. N. A., Kassymova, G. K., & Duisenbayeva, S. S. (2020). The Trend in Using Online Meeting Applications for Learning During the Period of Pandemic COVID-19: A Literature Review. Journal of Innovation in Educational and Cultural Research, 1(2), 58-68. https://doi.org/10.46843/jiecr.v1i2.15
33) Prensky, M. (2001). Digital natives, digital immigrants part 1. On the Horizon, 9(5), 1-6. https://doi.org/10.1108/10748120110424816
34) Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020). A systematic literature review on synchronous hybrid learning: gaps identified. Learning Environments Research, 23(3), 269-290. https://doi.org/10.1007/s10984-019-09303-z
35) Reimers, F. M., & Schleicher, A. (2020). A framework to guide an education response to the COVID-19 Pandemic of 2020. OECD. https://read.oecd-ilibrary.org/view/?ref=126_126988-t63lxosohs&title=A-framework-to-guide-an-education-response-to-the-Covid-19-Pandemic-of-2020
36) Schleicher, A. (2020). The impact of COVID-19 on education: Insights from Education at a Glance 2020. OECD. https://www.oecd.org/education/the-impact-of-covid-19-on-education-insights-education-at-a-glance-2020.pdf
37) Schober, P., Boer, C., & Schwarte, L. A. (2018). Correlation coefficients: Appropriate use and interpretation. Anesthesia & Analgesia, 126(5), 1763-1768. https://doi.org/10.1213/ANE.0000000000002864
38) Shava, H., Chinyamurindi, W., & Somdyala, A. (2016). An investigation into the usage of mobile phones among technical and vocational educational and training students in South Africa. South African Journal of Information Management, 18(1), 1-8. https://doi.org/10.4102/sajim.v18i1.716
39) Sullivan, G. M., & Artino, A. R. (2017). How to create a bad survey instrument. Journal of Graduate Medical Education, 9(4), 411-415. https://doi.org/10.4300/JGME-D-17-00375.1

40) Tadeu, P., Fernandez Batanero, J., & Tarman, B. (2019). ICT in a Global World. Research in Social Sciences and Technology, 4(2), i-ii. https://doi.org/10.46303/ressat.04.02.ed
41) Taherdoost, H. (2019). What is the best response scale for survey and questionnaire design; Review of different lengths of rating scale / attitude scale / Likert scale. International Journal of Academic Research in Management, 8(1), 1-10.
42) Tang, C. M., & Chaw, L. Y. (2016). Digital Literacy: A Prerequisite for Effective Learning in a Blended Learning Environment? Electronic Journal of e-Learning, 14(1), 54-65.
43) Tapscott, D. (1998). Growing up digital: The rise of the net generation. McGraw-Hill.
44) Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. Educational Technology Research and Development, 65(3), 555-575. https://doi.org/10.1007/s11423-016-9481-2
45) UNESCO. (2020). Education: From disruption to recovery. https://en.unesco.org/covid19/educationresponse
46) Wahab Ali, W. (2018). Students' perception towards the newly implemented learning management system at The University of the South Pacific. Journal of Pedagogical Research, 2(1), 46-54.
47) Wargadinata, W., Maimunah, I., Eva, D., & Rofiq, Z. (2020). Student's responses on learning in the early COVID-19 pandemic. Tadris: Journal of Education and Teacher Training, 5(1), 141-153. https://doi.org/10.24042/tadris.v5i1.6153
48) Wiederhold, B. K. (2020). Connecting through technology during the coronavirus disease 2019 pandemic: Avoiding "Zoom Fatigue". Cyberpsychology, Behavior, and Social Networking, 23(7), 437-438. https://doi.org/10.1089/cyber.2020.29188.bkw
49) Zhang, H., Nurius, P., Sefidgar, Y., Morris, M., Balasubramanian, S., Brown, J., Dey, A. K., Kuehn, K., Riskin, E., Xu, X., & Mankoff, J. (2020). How does COVID-19 impact students with disabilities/health concerns? arXiv preprint arXiv:2005.05438.
50) Zhang, W., Wang, Y., Yang, L., & Wang, C. (2020). Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 outbreak. Journal of Risk and Financial Management, 13(3), 55. https://doi.org/10.3390/jrfm13030055
51) Zimmerman, J. (2020). Coronavirus and the Great Online-Learning Experiment. Chronicle of Higher Education, 66(25), 13.