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| RESEARCH ARTICLE

Utilization of Information and Communication Technology (ICT) in Online Teaching

Lemuel C. Candelasa[1]✉, Rex T. Argate[2], Renato C. Sagayno[3], Yolanda C. Sayson[4], Khalachuchi S. Flores-Caballes[5]

[1]Faculty, College of Nursing, University of Cebu – Banilad, Cebu City, Philippines
[2345]Faculty, Graduate School, University of Cebu-Main, Cebu City, Philippines
Corresponding Author: Lemuel C. Candelasa, **E-mail**: lemuelcandelasaUC@gmail.com

| ABSTRACT

The study aimed to determine the extent of the utilization of Information and Communication Technology (ICT) in virtual teaching among nursing faculty at the University of Cebu College of Nursing Campuses. The researcher used a mixed method that incorporates quantitative and qualitative philosophies. The quantitative component uses a descriptive design to analyze nurse educators' use of ICT in online teaching, employing frequencies, percentages, weighted means, and rankings. For the qualitative component, the study employed a single-case design to explore narratives from nurse educators about ICT implementation in online teaching. The study revealed that most nursing educators have a high level of ICT usage in online teaching. Communicating through social media to connect with other teachers and students, and then using social networking sites (e.g., Facebook, Viber, and WhatsApp) to communicate with students, reflects a high level of ICT usage in online teaching. On the other hand, fourteen emergent themes were identified in the informants' responses and classified under two overarching themes that addressed the sub-problems. The first overarching theme, which is on the Difficulties in Online Teaching Setting, has generated eleven emergent themes, namely: Lack of Digital Skills, Limited ICT Resources, Poor Internet Connection, Anxiety towards Technology Usage, Environmental Distraction, Financial Struggle, Lack of Time, Threat to Academic Integrity, Absence of Teacher Presence, Miscommunication of Information, and Technostress. The second overarching theme, which is on the Aspirations to Improve Online Teaching, has three (3) emergent themes. These emergent themes are Training, Procurement of ICT Equipment, and Financial Support. In conclusion, the nurse educators extensively utilized ICT in online education during the COVID-19 pandemic. However, the utilization of ICT is influenced by the difficulties that nurse educators experienced while striving to enhance the quality of online teaching.

| KEYWORDS

Information and Communication Technology, Online Teaching, Nursing Education

| ARTICLE INFORMATION

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1. Introduction

Information and Communication Technology (ICT) utilization in education can be seen as a vital element of the learning process that offers genuinely innovative advancement methods. It requires the use of computer-based software embedded in daily teaching. Utilization in ICT is not a one-stage learning process but a constant learning experience that provides dynamic education (Wiranda et al., 2020). Technology has become increasingly part of students' and educators' daily lives worldwide; its integration has become a priority and a significant component of teacher education programs. According to Spaulding (2016), technology has become an integral part of daily life and has steadily permeated the world of education.

The outbreak of the COVID-19 pandemic has had a significant impact on academic institutions. It has been estimated that about 376.9 million learners have been omitted from the learning process by closing schools in many countries worldwide to mitigate coronavirus transmission. Alternative solutions, such as online education, were then used to facilitate continuous learning.

However, according to the literature and international experts, many issues have been reported worldwide during the implementation of online learning (Huang et al., 2020).

The Philippines is facing a critical situation due to the rise in medical crises. Preventing and limiting contamination risks to the academic community has become a primary concern for educational institutions. As a result, flexible learning has been implemented in educational institutions. These students received instruction through digital, online, and printed modules, as well as the offline learning modality. This paradigm shift presents a significant challenge for nursing education, particularly for institutions that have adapted to remote learning and digital platforms.

The use of ICT tools for virtual teaching, such as Learning Management System (LMS) technology, is a driving force at the University of Cebu in delivering online classes and supplementing on-campus courses. The administrators are concerned about the emerging problems of distance learning. Based on the university's records, the nursing department has the least use of the Learning Management System among all colleges, despite the different faculty training. In my observation, the nursing department heads at three campuses received feedback that almost half of the nurse educators are struggling to use ICT and LMS for online teaching.

Most of the faculty also modified conventional teaching and learning methods used in on-campus classroom settings, which are daunting, as they involve redesigning course elements using modern pedagogical techniques, learning experiences, and technology resources. At present, no empirical studies have been conducted in the nursing department on ICT utilization in virtual teaching.

The college department's performance depends on how effectively the faculty teaches and how well students comprehend and become competent nursing professionals. These nurse educators must be equipped with ICT knowledge and skills in different areas to foster quality learning. The researcher sees the need to determine ICT utilization in academic settings with the scenario and trend presented. Hence, this study is undertaken to determine the extent of utilization of ICT in virtual teaching among nurse educators in three campuses of the College of Nursing at the University of Cebu-Banilad Campus, University of Cebu-Lapu-Lapu and Mandaue Campus, and University of Pardo-Talisay Campus, to formulate a proposed action plan for health sciences.

2. Theoretical Background

This study was anchored in the Diffusion of Innovation Theory of Everett Rogers (2003) and supported by the Theory of Reasoned Action of Ajzen & Fishbein (1975) and the Technology Acceptance Model of Davis (1985).

The Diffusion of Innovation Theory of Everett Rogers (2003) indicates that diffusion is how innovation spreads across specific channels over time among members of a social system. It focuses on factors that increase or decrease the likelihood that members of a given community will embrace a new concept, product, or practice. The diffusion of innovation theory predicts that both media and interpersonal interactions provide information and influence opinion and decision. The theory consists of four components: invention, diffusion (or communication) through the social system, time, and consequences. The networks' essence and opinion leaders' positions within them determine the likelihood that innovation will be embraced. Innovation diffusion sought to explain the forces that influence how and why individuals use new information media, such as the internet. Opinion leaders exercise control over the audience's actions through their intimate touch, but additional intermediaries, named change agents and gatekeepers, are also included in the diffusion process. Five adopt groups are (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. Also, the theory explains the phase that members of society go through as they choose to adopt new ideas and technologies. The innovator is usually ahead of his time and will not influence others to engage in a new "far-out" invention or innovation (Rogers, 2003; Thomas et al., 2017).

Adopter groups are groups of members of the social system based on their level of innovation. It includes innovators, early adopters, early majority, late majority, and laggards. The innovators can observe innovations and address the challenges and repercussions of innovation. Innovators are facilitators who introduce ideas from outside the framework. They may not be valued or trusted by other social system members because of their danger and relations outside the social structure. On the other hand, early adopters tend to hold leadership positions in the system, while others look to them for direction or information. They play a central role at every point of the process, particularly in deploying the implementation resources. The early majority tend to have more substantial interactions with other social systems and do not hold the management roles that early adopters do. They are more deliberate in implementing innovations and are neither the first nor the last to adopt it. The late majority includes most participants in a social system, waiting until almost all their peers adopt an innovation. While they are cynical about innovation and its consequences, they may be motivated by economic needs and peer pressure. Lastly, laggards have a more traditional view regarding innovation and are more critical of innovation. They are conservative and want to ensure creativity works before implementing it (Afseth, 2020).

The Theory of Reason Action holds that a decision to participate in a particular action is the product of a logical process. Various behavioral choices are considered, the consequences of each are analyzed, and decisions are made to act or not. This decision is then expressed in behavioral intentions, which are also a significant predictor of whether we will execute attitudes in each situation (Branscombe & Baron, 2017)

The Theory of Reasoned Action by Ajzen & Fishbein (1975) explains that behavior is driven by behavior intention. This intention results from consideration of (1) attitude towards performance of particular action through a positive or negative appraisal of the behavior of a person, whether it produces positive or negative results, and (2) subjective norms (an individual's interpretation of the belief of others as to whether a behavior is acceptable, as well as a motivation to comply with those expectations). The third aspect, perceived behavioral control, evaluates people's capacity to perform a behavior (Myers et al., 2018).

The Technology Acceptance Model of Davis (1985) is an information systems theory that outlines steps for information seekers or learners to follow in the adoption, assimilation, and application of new technology to develop information literacy skills. It describes individuals' acceptance behavior in terms of their intentions. In this context, two factors influence the intention: first, individual attitudes toward the activity; and second, societal norms that assume specific individuals or groups would approve or disapprove of the behavior.

The Technology Acceptance Model (TAM) by Davis (1985) describes computer usage behavior. TAM employs TRA as the theoretical foundation for defining the causal relationship between two essential beliefs: perceived usefulness and the perceived ease of use, and user attitudes, intentions, and actual computer adoption. Perceived usefulness (U) is defined as a prospective user's subjective likelihood that adopting a given application system will enhance their job performance within the organization. The degree to which a prospective user anticipates the target system being free or easy to use is perceived ease of use (EOU) (Monje & Bárcena, 2015).

The Technology Acceptance Model (TAM) is defined by Farzana et al. (2021) as an analysis of consumers' behavior and intentions regarding technology use in daily life. TAM is one of the most reliable models for explaining end-user technology adoption for various objectives. Likewise, Marikyan & Papagiannidis (2022) define the Technology Acceptance Model (TAM) as individual acceptance of information systems. The technology acceptance model (TAM) predicts technology adoption based on users' behavioral intention, which is defined by perceptions of technological usefulness in accomplishing the task and perceived ease of use.

Most teachers still do not use ICT effectively, or, if they do, it is not integrated into their pedagogy. Multiple factors hinder the introduction of ICT in education in most developing countries, including Bangladesh, and ICT integration requires overcoming these interconnected barriers (Mou, 2016). Meanwhile, the frequency with which teachers use ICT is influenced by and linked to ICT resources, access to knowledge and technology within the curriculum, and teachers' professional development in ICT implementation (Gibson et al., 2018).

Coşkunçay et al. (2018) researched the factors influencing college students' behavioral intentions towards Learning Management Systems. It found that, using the validated structural model, perceived usefulness, perceived ease of use, enjoyment, subjective norm, satisfaction, and interactivity and control were established as predictors of behavioral intention. The associations between the influencing factors revealed information about students' behavioral intentions towards the use of Learning Management Systems.

According to Omotunde and Abigail (2017), most academic staff have minimal computer skills, are unable to use advanced computer programs to supplement their work and were not formally educated in the use of ICT; instead, they learned their skills on their own. Similarly, Dhakal (2018) suggested that using Information and Communication Technology (ICT) in classroom instruction enhances the efficacy of the teaching and learning process and learners' capacity to comprehend basic concepts and logic. Nevertheless, many teachers lack the expertise to incorporate ICT tools, and the availability of resources, affordability for learners, and inadequate teacher training were identified as challenges to tool use.

Abouelenein (2016) stated that there is a need for faculty development focused on the use of technological advancements to increase educators' capacity to meet labor-market requirements and apply quality educational standards, and in their field of specialization. Also, Alt (2018) found that educators' ICT training programs can maximize the use of ICT in schools. Teachers are encouraged to engage in online learning environments, with an increasing emphasis on lifelong learning skills. Continuous interactions can supplement their knowledge and skills gained through regular training programs.

Ehsan's (2019) study revealed that high-achieving students use ICT for learning rather than for entertainment. Low achievers tend to spend their time engaged in ICT-based entertainment. Most students agree that information and communication technology (ICT) supports their learning. The main impediment found was a lack of browsing skills. Besides, Chinweuba et al. (2019) suggested

that teacher training and proficiency in information and communication technologies (ICT) should be required for work as an instructor. Furthermore, training in the use of digital technologies must be an essential component of staff development initiatives, since most quality academic tasks can be performed more effectively with ICT.

Basri et al. (2018) revealed a relationship between ICT adoption and academic performance in a conservative setting. Another finding was that the use of ICT improved female students' performance more than it did male students. Nevertheless, students' IT majors did not affect their academic achievement.

In preparing learning materials, PowerPoint is by far the most utilized ICT-based instructional technology. The lowest used ICT-based instructional technologies were animations and hands-on practical exercises. Other ICT-based instructional technologies used by a few teachers included virtual classrooms, computer-aided simulations, and smartboards. As non-ICT-based instructional technology, teachers used textbooks and whiteboards (Maharaj-Sharma et al., 2017).

Bond (2020) found that educational technology facilitates student engagement, with behavioral engagement being the most prevalent dimension. The lowest observed dimension was affective engagement, with affective disengagement being the most prevalent negative dimension. Also, the most effective methods for increasing engagement were blogs, mobile learning, and evaluation tools. Collaborative technologies such as Google Docs, Google Classroom, and Edmodo were found to be significantly associated with engagement, with non-teacher-created videos more likely to result in disengagement.

Ozerbas & Erdogan (2017) investigate the effects of digital classrooms on academic success and on self-efficacy regarding online technologies. According to the study's findings, students in the digital classroom achieve significantly higher academic achievement than students in traditional classrooms. However, no significant variations in the two groups' levels of self-efficacy in online technologies were found.

When dealing with technology, high achievers find it easier to engage and concentrate than low achievers. There is a significant association between poor grades and time spent on social networking sites and streaming media for reasons other than studying. Furthermore, there were substantial correlations between a decrease in student performance and the incidence of unauthorized multi-tasking through learning technologies while in class: the lower the grades, the more often students reported using digital technologies to withdraw when classes were not interesting (Bergdahl et al., 2020).

Krystalli's (2020) study on students' perceptions of virtual teaching following their experiences during the Covid-19 pandemic. It revealed that most students were opposed to virtual classrooms. Factors that significantly affect students' perceptions of the virtual classroom: the use of integrated communication and collaboration tools, the subject matter of the course, the pedagogical approaches used by the teachers, the ICT skills of the users, both lecturers and students, technical problems, a lack of equipment, and, of course, the distance.

Correspondingly, Mohebi et al. (2018) found that virtual education had a detrimental impact on medical sciences students for several reasons, including a lack of infrastructure and standards for delivering quality educational content. In contrast, Virtual Teaching (VT) positively affects students' attitudes. Students are dedicated and motivated academically and embrace Virtual Teaching (VT) during the Covid-19 situation. Several students prefer online teaching as it is a unique but enjoyable experience. Students express their accessibility to learning and attending courses utilizing virtual teaching (Shahzad et al., 2020).

Miller et al. (2018) investigated the efficacy of a virtual instructional method in general studies and physical science laboratory courses. According to the findings, both formats (face-to-face and virtual) helped students develop content understanding in both laboratory tasks. It implies that virtual laboratories were just as effective as traditional face-to-face laboratories regarding student knowledge gains.

The virtual learning platform enables learners to acquire digital media skills; however, if educators are not supported, motivated, and rewarded to use emerging technologies in the classroom, students miss out on these essential learning experiences (Ko & Pacansky-Brock, 2017). Nunneley et al. (2021) concluded that online education has great potential to transform professional medical education. The shift of education from the physical classroom to a virtual space can be addressed with careful pre-session planning, strategic delivery during the session, and constructive post-session assessment.

Meum et al. (2021) examined how digital educational technologies can be integrated into learning activities to enhance quality and relevance in nursing education. The findings identified various educational gaps and emphasized the importance of digital competence, including professional knowledge and expertise that support the instructional use of digital technology.

The study by McLaughlin & Ricevuto (2021) investigates the challenges, successes, and desired support in integrating virtual learning. The findings revealed that emergency remote teaching enables faculty to develop innovative teaching methods and learning approaches while fostering a perspective that embraces a wide range of talents, such as flexibility, creativity, and

innovation. Online learning has evolved into a venue for students and teachers to collaborate on teaching and learning. Student engagement in the online class was minimally associated with student success on a knowledge survey, and the correlation strengthened as the learning and teaching continued. Hence, at the beginning of a learning process, student participation in an online course will not be a reliable indicator of student performance on online knowledge surveys (Bahati et al., 2017). To be specific, student engagement is a complex issue influenced by factors such as teaching practice, course design, teaching style, and curriculum concepts. These variables must be studied further regarding student engagement (Hussain et al., 2018).

Dumford & Miller (2018) found a significant relationship between taking online courses and engaging first-year and senior students. Students taking more online courses were more likely to engage in quantitative reasoning. Unlike their more conventional classroom peers, students were less engaged in group learning, student-faculty interactions, and discussions with diverse others. On the other hand, most students tend to use ICT in the classroom because it motivates them and improves their learning. However, one major impediment to ICT implementation is that teachers are less competent in using ICT for learning (Nikolić et al., 2019).

Recognizing the value of pedagogical use and contextualization of ICT and computers is essential to the reciprocal relationship between teachers' digital expertise and classroom management. It implies that teachers' technical digital competence and classroom management skills are closely linked (Moltudal et al., 2019).

Lorenzo (2016) reveals in his research that almost all public schools in the Philippines do not have full ICT facilities, lack internet access, and that most educators are not ICT literate – the first form of the digital divide. Also, Labucay (2014) stated that Filipinos use the internet for entertainment and social networking sites – a second-class digital divide. Interestingly, numerous studies show that people with higher education use advanced digital media applications substantially for capital-enhancing jobs, careers, and research. In contrast, people with lower education use basic entertainment, commerce, and messaging applications.

According to Etcuban et al. (2016), Cebu's ICT readiness for portable learning management systems (PLMS) and mobile apps (M-APP) for teachers is at a moderate degree. The teachers' ICT Readiness (PLMS) and their civil status have a significant relationship. Furthermore, there is also a correlation between participants' ICT Readiness (M-APP) and their gender and civil status.

The study of Dela Rosa (2016) revealed that the skilled language teacher was more exposed to ICT use than the beginner teacher. However, the inexperienced teacher uses more ICT-related resources and exercises in a language class. Both teachers have optimistic views on the effect of ICT on students' overall learning and achievement. Also, the inexperienced instructor considers ICT use time-consuming and demanding. experience manipulation of technical devices. On the one hand, experienced teachers recognize the advantages ICT offers for language teaching but consider the inadequacy of infrastructure and facilities, such as Internet connectivity, as unfavorable to successful ICT integration.

Nwozichi et al. (2019) revealed that integration of Information Communication Technology (ICT) in nursing education had received limited attention in Southeast Asian Countries. ICT is a beneficial method for improving nursing education. Faculty and nursing students both showed a positive attitude. The lack of administration and government funding is the most significant barrier to integrating ICT in nursing education. In the same manner, the study of Tomaro & Mutiarin (2018) on ICT integration in the educational system of the Philippines found that several policy actions to fully integrate ICT in education in the Philippines, such as additional professional development, acquisition of computer infrastructure, strategic implementation of ICT in the curriculum, and, finally, effective leadership.

Another study conducted by Torii et al. (2019) revealed that teachers using ICT in a school had only a short time to prepare for a lesson and insufficient ICT equipment. Given the lack of ICT utilization training, there was a gap between the division office's teacher training and the teachers' needs. Finally, when the IT officer develops teacher training, it is proposed that the IT officer work with a researcher in the faculty of education at the university to design learning materials and teacher-training content for each subject.

According to Merillo and Domingo (2019), educators agree that using ICT in the classroom will improve students' learning. Most teachers concurred that using ICT helps their students learn more efficiently because teaching is more engaging and informative as profile variables; both the teachers' age and teaching experience were observed to have a significant relationship with their perception of the usefulness of ICT integration in language classrooms.

3. Objectives of the Study

The study aimed to determine the extent of utilization of Information and Communication Technology (ICT) in virtual teaching among the College of Nursing Faculty at the University of Cebu-Banilad Campus, University of Cebu-Lapu-Lapu and Mandaue Campus, and University of Pardo-Talisay Campus during the 2020-2021 academic year. Specifically, the study examined the

demographic profile and the online teaching profile of the participants, the extent of the participants' utilization of ICT in online teaching, and the difficulties encountered by the participants in an online teaching setting.

4. Methodology

4.1 Research Design

The researcher used a mixed method that incorporates quantitative and qualitative philosophies due to how deductive and inductive (interpretive approach) complement one another. The mixed-method design was implemented as each method alone will not provide a detailed answer to the study's phenomena. The quantitative component focuses on descriptive design to determine the extent of the participants' utilization of ICT in online teaching. This research type could draw out essential data to bring out actual situations or reality (Calmorin, 2007). For the qualitative component, interviews were conducted to explore the difficulties encountered by online teaching participants, which were not part of the standard questionnaire. Analysis of the transcript of interviews was used to support and validate the study's quantitative findings.

4.2 Research Participants

The study participants were the nursing faculty from the three campuses of the University of Cebu. All nurse educators who were handling 1st- to 4th-year BS Nursing students were included as participants in the study. The total nursing faculty population across the three campuses is forty (40). From forty (40) participants, the researcher selected and interviewed eight (8) nursing faculty. The informants were chosen based on the following criteria: they had to be nursing faculty who had been teaching for one (1) year or more and were currently using online teaching.

4.3 Research Instrument

The study used a researcher-made questionnaire based on a review of related literature. The questionnaire was divided into four (4) parts. The first part determines the respondent's demographic profile, including age, gender, civil status, and years of teaching experience. The second part determines the respondent's online teaching profile, including the online teaching platform used, the type of synchronous activities, the type of asynchronous activities, and the number of hours for synchronous activities. The third part pertains to the extent of utilization of ICT in online teaching. The respondents used a rating scheme to answer the questionnaire: 4 (fully utilize), 3 (moderately utilize), 2 (less utilize), 1 (not utilize). The last part explores difficulties encountered by the participants in an online teaching setting. The instrument utilized for the data gathering was a semi-structured guide questionnaire to ascertain different perspectives, opinions, and experiences regarding ICT utilization in online learning.The quantitative component of the research instrument had gone through pilot testing. The pretest was undertaken by twenty-six (26) nursing faculty members from Cebu Normal University College of Nursing. The researcher submitted the results of the pilot testing to a statistician for the Cronbach Alpha Test of reliability. On the other hand, the qualitative question was given to the panel members for content validation.

4.4 Statistical Treatment of Data

Frequency Count and Percent were used to summarize, analyze, and interpret the personal and professional profile of the respondents. On the other hand, Weighted Mean and Ranking were used to summarize, analyze, and interpret the extent of the respondents' utilization of ICT in online teaching.

4.5 Data Collection.

Before data collection, the researcher filed a letter of intent and protocol package to the University of Cebu Academe-Research Ethics Committee (UCA-REC) chairperson. After receiving approval, the researcher sought authorization from the President of Cebu Normal University, the Cebu Normal University Center for Research and Development (CNU-CRD), and the Research Coordinator of the College of Nursing.

Permission was obtained to conduct a pretesting to twenty-six (26) nursing faculty of Cebu Normal University College of Nursing that confirms the validity and reliability of the research instrument. The institution employs this faculty, and conducting online teaching was considered the study's inclusion criteria. The test was administered through an online survey tool, and they were given the link. Then, the answered online survey questionnaires were collected, and the responses were tallied and tabulated. The Cronbach's Alpha value of 0.8575 signified that the self-made questionnaire indicates good reliability. Finally, the three experts assessed and rated the interview guide using a validation sheet to confirm the tool's reliability.

After the tool was finalized, the researcher addressed a letter of communication to the University of Cebu's Research Directors and the Vice President for Academic Affairs of the University of Cebu, Talisay Pardo Campus. Following clearance, it was forwarded to the deans of the University of Cebu's three College of Nursing campuses.

The study was conducted in the middle of the first semester of 2021– 2022. An online survey to determine the extent of ICT use in virtual teaching among nursing faculty members was created using the Google Forms application. The survey consisted of a demographic profile in which faculty chose between multiple options or ranked them, and the extent of the utilization of ICT in online teaching using four levels of Likert scales. Lastly, the interview guide questions were used for the chosen key informants of the study.

The answered online survey questionnaires were automatically collected and statistically processed by the Google Forms application. Data were then imported into the Excel program (Office 365), SPSS™, for a more transparent graphical representation of them, facilitating the analysis and interpretation. To provide a detailed answer to the study's phenomena, the researcher purposively selected three (3) nurse educators as informants to share their experiences regarding the difficulties encountered in using ICT in virtual teaching. For the initial virtual meet-up, the chosen informants were notified by email or text that they had a scheduled appointment. During the initial online virtual meet-up through Zoom or Google Meet, the researcher reaffirms the informed consent for their research participation, and participation was voluntary.

The data collection process was primarily done through in-depth interviews with the designated informants, utilizing the Key Informant Interview Guide. The researcher then conducts audio-recorded online interviews using Zoom, Google Meet, Facetime, and Facebook Messenger. The rationale for employing an online interview was that a face-to-face interview was impossible due to the risk of contracting Covid-19 infection and following the Inter-agency Task Force (IATF) for the Management of Emerging Infectious Disease protocol.

The quantitative data were analyzed using SPSS, while the qualitative data was processed through organization and coding using Braun & Clarke's (2006) Thematic Analysis (TA), which provides a six-phase guide that serves as a foundation for doing this type of investigation (Maguire & Delahunt, 2017). The thematic analysis is used to identify patterns of meaning across a qualitative dataset. It gives way to detecting patterns ('themes') in a dataset and characterizing and understanding their significance (Braun et al., 2016).

5. Results and Discussion

5.1 Demographic Profile of the Respondents. Table 1 presents the demographic profile of the nursing faculty of the three campuses of the University of Cebu.

Table 1 ***Demographic Profile of the Respondents (N = 40)***

Profile	Frequency	Per Cent (%)
Age		
• 30 - 39	12	30.00
• 40 - 49	16	40.00
• 50 & above	12	30.00
Gender		
• Male	9	22.50
• Female	31	77.50
Civil Status		
• Single	9	22.50
• Married	30	75.00
• Annulled	1	2.50
Years of Teaching		
• 1 - 5 years	12	30.00
• 6 - 10 years	6	15.00
• 11 years & above	22	55.00

Table 1 shows that most respondents belong to the category of 40 – 49 (40%). The findings indicate that most of the respondents are in middle adulthood. This validates the statement of Vroman et al. (2015) that the age, education, views, and personalities of the elderly population all have an impact on how they utilize ICT. In the same manner, Swaramarinda (2018) found that most teachers over 30 use ICT in the entrepreneurship course and must improve their ability to use modern technologies. In addition, the findings of Gil-Flores et al. (2017) revealed an association between classroom ICT use and teacher characteristics such as ICT training, collaboration, self-efficacy, and teaching principles. In addition, gender, age, and teaching experience are irrelevant in explaining ICT use. On the other hand, previous studies stated that older adults, those with less education, and those with less income had difficulty using ICT (Hassan et al., 2019).

Furthermore, it indicates that the highest number of respondents are females, about seventy-seven point five (77.50%). According to Cai et al. (2017), males continue to have more favorable views toward technology use than females, but minor effect sizes characterize such differences. Men were more likely than women to access and use ICT. ICT access was linked with all women's social involvement categories but only with men's informal social participation. Kim et al. (2017) found that information technology (IT) use for health purposes was positively connected with formal social participation in women and with informal social participation in males.

This is also substantiated by a study by Karavidas et al. (2005), which demonstrated a gender gap. Males are shown to be better computer users than females. Females did not have the same level of computer comfort or computer knowledge as their male counterparts, although they used computers at the same rate. On the Internet, older females are outnumbered. Females are at a disadvantage when taking full advantage of computer use. Likewise, Gudmundsdottir and Hatlevik (2018) claimed that, in terms of gender disparities, males report greater levels of ICT self-efficacy for teaching than females. In contrast, Singhavi et al. (2019) discovered that female instructors have a greater degree of perceived skill in using ICT in the classroom than their male counterparts. This could be attributed to two factors. In Indian society, teaching is viewed as an appropriate (safe, respectable, etc.) occupation for educated women. Consequently, the proportion of female instructors in schools is significantly greater. Similarly, the current study finds no substantial difference between the genders of English teachers and their perceptions and impediments to adopting ICT. Both male and female teachers perceive and face the same difficulties in employing ICT (Muslem et al., 2018).

Most of the respondents are married, which constitutes about seventy – five percent (75%). The findings are consistent with the findings of Vroman et al. (2015). They discovered that most respondents utilized ICT to maintain family and social relationships and acquire information on health and everyday tasks. Those aged 65–70 with a higher degree and/or living with a spouse or partner were more likely to utilize ICT. Older people are less likely to undertake ICT exploration on their own, but the immediate availability of a spouse/partner or family member to explain and promote ICT use will play a role in its adoption and persistent use. The involvement of family members has a favorable impact on ICT adoption.

As presented, the majority of the respondents, or fifty-five percent (55%), have teaching experience for more than eleven years. The study showed that most nurse educators have many years of teaching experience, which is consistent with the findings of Swaramarinda (2018), who contended that a long-time teaching response might be in a saved state, which does not affect their teaching style. The point that might be made is that the long-term teaching response may be in a saved state that does not modify his teaching style. They may be unwilling to change it, particularly with ICT users. According to Voithofer et al. (2019), educators believe they have high technological knowledge in a broad sense and are confident in their abilities to use and learn about technology.

On the other hand, the findings of Singhavi et al. (2019) revealed that teaching experience has an inverse relationship with perceived ICT skills in the classroom. Younger and less experienced teachers are more eager to employ technology in class. Factors include the following. First, older and more experienced instructors may feel constrained by ICT and computers in the classroom. Fear of being displaced by technology may have led to a negative attitude toward it. Second, adopting ICT implies modifying pedagogy to encourage self-learning rather than teaching and instructing in the classroom. Furthermore, Ghavifekr et al. (2016) found that less than a year's experience using ICT tools in teaching and learning in the classroom is adequate compared to 1-4 years of experience; hence, there is a relationship between the use of ICT tools and years of expertise.

5.2 Online Teaching Profile of the Respondents. Table 2 presents the online teaching profile of the nursing faculty of the three campuses of the University of Cebu.

Table 2 *Online Teaching Profile of the Respondents*

Online Teaching Profile	Frequency	Per Cent (%)
Online Teaching Platform Used		

• Google Classroom	30	75.00
• Canvas	8	20.00
• Moodle	33	82.50
• Schoology	1	2.50
• Blackboard	4	10.00
• Neo LMS	4	10.00
Type Synchronous Activities		
• Scheduled Video Conferences or Group Phone Calls	40	100.00
• Live Streamed Demonstrations	23	57.50
• Showcasing Web or Computer Applications	23	57.50
• Chat-Based Online Discussions	29	72.50
• Scheduled Quizzes and Tests	40	100.00
Type of Asynchronous Activities		
• Recorded presentations, such as slideshows and videos	36	90.00
• Email	34	85.00
• Discussion boards	24	60.00
• Social media groups	29	72.50
• Collaborative documents in the cloud	19	47.50
No of hours of Synchronous Activities		
• 1 - 2 hours	7	17.50
• 3 - 4 hours	16	40.00
• 5 - 6 hours	4	10.00
• 7 - 8 hours	13	32.50

Table 2 shows that most respondents mainly utilized Moodle as an online teaching platform, which is about eighty-eight point five (88.50%). Google Classroom follows with seventy point five (75.0%). This implies that nurse educators employ multiple online teaching platforms. This finding is comparable to the study of Setiawan et al. (2021), who found that before the Covid19 outbreak, educators used Moodle more than Edmodo, ClassDojo, Schoology, Brightspace, Google Classroom, and the Microsoft Team in school and higher education. On the second occurrence, data demonstrates the opposite after the Covid-19 epidemic. The Google Classroom design excelled over the others. This is owing to the convenience, efficiency, and satisfaction of using both platforms.

Similarly, Zamora-Antuano et al. (2022) found that most teachers used Moodle, Google Classroom, and Blackboard for online learning. Specifically, the Moodle LMS can be used to plan and present classes and chat with students before and after face-to-face lessons in the classroom (Sarfo & Yidana, 2016). Furthermore, Moodle e-learning has also substantially impacted students' reading comprehension. These online platforms improve teachers' approaches and teaching strategies and students' learning performance (Ayuyang, 2019). The Google Classroom platform benefits students' academic performance and attitudes (Noah & Gbemisola, 2020). In addition, it contributes to developing a collaborative learning environment that encourages teacher-to-student and student-to-student interactions. For instance, the availability of written comments from lecturers and the ease with which course materials can be accessed (Khalil, 2018).

Regarding synchronous activities, all nurse educators significantly implemented scheduled quizzes, tests, and video conferences or group phone calls. As synchronous video-based communication technologies improve and become more dependable and user-friendly, instructors will be more likely to benefit from the live sessions. Online courses should ideally incorporate both asynchronous and synchronous learning opportunities based on the course's instructional goals, taking advantage of the benefits of both forms (Lowenthal et al., 2017). Furthermore, Molnar and Kearney (2017) revealed that synchronous video web-conferencing in online conversations might induce higher cognitive presence in a virtual classroom. Higher cognitive presence in synchronous video web-conferencing may develop critical thinking skills in graduate dental hygiene online courses. Similarly, Fatani (2020)

found that most students were delighted with web video conferencing teaching quality. Its tool has the potential to be academically engaging, and the instructors were enthusiastic and motivated students to collaborate.

Other research, however, has revealed that instructors have mixed opinions about the advantages of synchronous sessions. Because students are not required to engage in synchronous sessions, instructors may not recognize the benefit of facilitation tactics in completely asynchronous online programs. Furthermore, most educators predominantly teach using an asynchronous approach (Lowenthal et al., 2017). Teachers are acquainted with learning management systems, online forums, and simulations. However, many are inexperienced with emerging web 2.0 environments, such as wikis, blogs, social networks, or other cloud technologies, and hence rarely implement them in classes (Barak, 2017). Therefore, teachers need to be educated on using various tools and interactive programs during the online learning process or have a modern framework on how to teach and assess students, whichever method they employ (Amiti, 2020). The findings agree with Khan et al. (2021) research, which indicated that synchronous learning is an aspect of online learning that involves students in real-time. It's almost like there's a living feeling in the environment. As a result, sessions must be developed in such a way that students are always engaged.

In terms of asynchronous activities, the data revealed that most respondents preferred recorded presentations, such as slideshows and videos. This evidence supports teachers' preference for Video-Response, Flipgrid, and BookSnaps over traditional discussion boards. Teachers chose Flipgrid when rating for improving creativity, understanding, student voice, and usefulness. Understanding the components that contribute to a high-quality asynchronous discussion board experience is critical (Carr, 2020). Students favored videos over assigned readings and consistent scheduling throughout the semester. If properly executed, presenting medical school information using previously recorded video footage can be a beneficial teaching tool (Bordes et al., 2021).

On the other hand, data shows that collaborative documents in the cloud are rarely used. The findings of Tsai & Yang (2018) revealed that social media and cloud storage had become the most popular collaborative platforms for educators to share material with their colleagues. Most of them used multiple online applications for various purposes throughout their curriculum-development group. Furthermore, the findings of Puccioni & Desir (2021) revealed that adopting web-based digital tools enables teachers to participate in online and in-person collaborative professional learning communities. Digital technologies such as Google Suite and VoiceThread be helpful as they conduct their work online and in person.

According to the data, the number of hours of synchronous activities is 3-4 hours, accounting for approximately 40%. The finding is similar to Moorhouse et al. (2021) research, which revealed that educators began teaching synchronously online, with most lessons ranging between one and two hours in length and teachers having varying interaction times with their students. Furthermore, teachers must have the skills and knowledge to think about how to use learners' class time and out-of-class time so that class time can be used more successfully for engaging students in interaction. On the other hand, Carver et al. (2017) discovered that time spent in online courses did not predict a specific letter grade, but it did indicate whether an A (excellent grade) would be obtained. The length of time spent in synchronous online sessions was a significant determinant of obtaining an A in the course. This information is critical for educators to know when delivering scaffolding to learners.

Students stated that synchronous platforms did not offer them enough time to watch lecture videos at their own pace, so the semi-synchronous platform intends to give students greater flexibility in choosing the pace of the lecture videos while still engaging in the chat session (Kutnick & Joyner, 2019). Watts (2016) proposed that educators should consider time limits, technological proficiency, and enthusiasm for students to connect in an online setting.

5.3 **Extent of Utilization of ICT in Online Teaching**. Table 3 presents the extent of ICT utilization of the respondents in online teaching. The respondents exhibit a generally *high level* of ICT usage in online teaching.

Table 3 *Extent of the Respondents' Utilization of ICT in Online Teaching*

	Indicators	Mean	Interpretation	Rank
1.	Makes use of the Information Communication and Technology (ICT) tools in teaching and learning.	3.58	Fully Utilized	7.5
2.	Sets computer-based assignments.	3.65	Fully Utilized	5
3.	Employ software programs or desktop publishing packages to generate task lists, evaluations, handouts.	2.88	Moderately Utilized	16
4.	Utilizes the websites to search and seek input for classes.	3.55	Fully Utilized	8.5
5.	Communicates through social media to connect with other teachers and students.	3.93	Fully Utilized	1

6.	Uses social networking sites (i.e., Facebook, Viber, WhatsApp) to communicate with students.	3.83	Fully Utilized	3
7.	Uses social media to collaborate with other teachers and students.	3.88	Fully Utilized	2
8.	Searches the web for good multimedia lectures, activities, and tools, as well as educational issues.	3.68	Fully Utilized	4
9.	Uses various Information Communication and Technology (ICT) for recreation to connect and encourage students.	3.38	Fully Utilized	10
10.	Employs various design programs (Google Jamboard, Classroom Screener) for lessons.	2.60	Moderately Utilized	17
11.	Removes or edit images, animations, or videos for the lecture.	2.98	Moderately Utilized	14
12.	Uses of video camera.	3.58	Fully Utilized	7.5
13.	Posts a blog site on the topic.	2.25	Less Utilized	18
14.	Generates lessons that include the use of digital media, graphics, or sound editors by students.	2.90	Moderately Utilized	15
15.	Designs lessons using presentation tools.	3.55	Fully Utilized	8.5
16.	Creates lectures that integrate computer simulations.	3.05	Moderately Utilized	12
17.	Engages in an interactive learning forum or bulletin board with learners.	3.00	Moderately Utilized	13
18.	Uses tools to track students' performance.	3.30	Fully Utilized	11
	Overall Mean:	**3.31**	**Fully Utilized**	

Table 3 shows that most respondents communicate through social media to connect with other teachers and students. The 3.93 mean rating of the nurse educators indicates that they have a *high* level of ICT usage in online teaching. The findings agree with Prestridge et al. (2019) that each teacher utilized their online social media as their initial approach or beginning point in their design efforts, with an interest in exploring the pedagogical application of new technology. Many teachers were active on social media platforms such as Facebook and WhatsApp. It is helpful for educational purposes, but its application in teaching and learning is limited (Sobaih et al., 2016).

Similarly, Molnar (2016) claimed that social media and websites provide a concave surface for publication and discussion in an online community. Students can use social media sites, blogs, and forums to voice their opinions about certain subjects, reinforce learning techniques, and evaluate professors and institutions.

Kristiawan and Muhaimin (2019) reported that the teacher's ability to grasp ICT is affected by the teacher's inability to use computers and technology-based media, even though using computers supports computerbased media. Furthermore, using social media did not significantly increase the students' writing skills, and several specific factors impeded the students' accomplishment in producing descriptive text (Salikin & Tahir, 2017). Most of the teachers reported maintaining contact with students and their parents. In addition to offering tasks and providing feedback to their pupils, most teachers reported implementing learning content. However, difficulties that require ICT integration, such as online teaching and evaluation, have been addressed to a lesser extent (König et al., 2020).

Using social networking sites (i.e., Facebook, Viber, and WhatsApp) to communicate with students follows a mean of 4.67, which is interpreted as *a high* level of ICT usage in online teaching. The use of Social Networking Services (SNS) is supported by Habibi et al. (2018) argument that teachers use its platform to engage in social activities with supervisors or lecturers, facilitate peer discussion, and foster critical thinking, content engagement, and self-directed learning. On social networking sites, teachers and students are engaged in a wide range of writing activities. The teaching pedagogy might be teacher-centered or student-centered when using social networking platforms. As a result, educators and teachers must be well informed regarding social networking platforms in teaching (Ynuus et al., 2016).

However, posting a blog site on the topic marks the lowest rank with a 3.93 mean rating, suggesting that nurse educators have *low* ICT usage in online teaching. Using blogs fostered reflective practices by allowing teachers to express their opinions, share their doubts and challenges in teaching, and supervise learners. Nevertheless, there is no way to determine whether blogging aided teachers' professional development (Nambiar & Thang, 2016). Positive attitudes toward and perceived utility of social media in the classroom were significant predictors of teachers' willingness to use it in the classroom. They propose using social networking sites, blogs, and wikis to promote student-teacher and student-student interactions, foster collaborative writing, and students'

writing abilities, and share content knowledge (Greenhow & Askari, 2017). Likewise, Azmi (2017) reported that using blogs, podcasts, and digital videos as class content improves motivation and participation in the language classroom.

Overall, Table 3 results indicate that nursing educators have a *high* level of ICT usage in online teaching with an aggregate mean of 3.31, which is inferred as fully utilized. The results corroborate Shurygin et al. (2022), which indicated that there is every reason to implement digital technology in educational institutions actively. All instructors can use various gadgets (smartphones, computers, tablets); most believe incorporating digital tools into the instructional process is appropriate.

Higher teacher motivation, higher student usage of ICT at home and school, and better-prepared instructors who require less ICT training are all connected with increasing use of ICT in the classroom across all course disciplines, according to Gómez-Fernández and Mediavilla (2020). In contrast, Kaur and Singh (2018) revealed that while teachers' attitudes toward the use of ICT are highly positive, ICT usage in classrooms is insufficient. Most of the concerns and obstacles discovered to impact teachers' use of ICT tools are limited accessibility of internet connection, lack of modernized infrastructure, minimal technical assistance, lack of adequate training, limited time, restrictive curriculum, conventional methods of evaluation, certificate-and degree-focused education, and instructors' lack of ICT skills.

Nueva's (2019) paper discussed Filipino teachers' attitudes about technology, including their determinants and associations with technology integration practice. The data revealed that teachers have a positive attitude toward technology. Further, it was found that teachers' grade-level assignments are highly related to their attitude toward technology.

6. Difficulties Encountered and Aspirations of the Participants in Online Teaching

This investigation aims to explore lived experiences of nurse educators in ICT implementation in online teaching. The eight (8) interview transcripts were coded for this analysis section using Braun and Clarke's (2006) thematic analysis methodology. The researcher concentrated on repetitions throughout and across interviews as indicators of data-driven thematic trends. Except for the background knowledge gained from the literature research, this was done without a preconceived list of categories to credit participant narratives.

Thematic analysis was used to analyze the experiences of nurse educators in using ICT in online teaching. The purpose of this analytical method is to uncover, describe, analyze, and report on themes in data. It enables a comprehensive description of the data set with a precise description of a specific theme within the data. It suggests that themes were the result of the analysis rather than a part of the analytical process. The thematic analysis enables a detailed description of a subject within the data set, allowing for a detailed description of the data set (Braun & Clarke, 2006).

To improve the credibility of the findings, the researcher used attentive reflexivity and checking with the research advisor to maintain rigor and quality in qualitative research (Darawsheh, 2014). The researcher used mindful reflexivity during the interview sessions, which involves self-reflection and self-inquiry through taking notes to be cognizant of one's feelings and emotions. The researcher also analyzed Google Meet video/audio files to further evaluate the participants' reactions, which supported the researcher's opinions and perceptions of the participants. Examples of mindful reflexivity note-taking were documented, including descriptions of the participants' demeanor, emotional reactions, nonverbal language, and any remarks about the utilization of Information, Communication, and Technology (ICT). The data were recorded, transcribed, and underwent a series of readings and coding's until those transcribed narratives were identified as significant statements. From the said approach, there were seventy-one (71)) significant statements extracted from the transcripts. There were forty-three (43) formulated meanings developed from the significant statements. From the forty-three (43) formulated meanings, there were nineteen (14) clustered themes and two (2) emergent themes.

6.1 Difficulties in Online Teaching Setting

This overarching theme represents the study's sub-problem, which explains the challenges and barriers nurse educators face while employing ICT in virtual or online teaching. Eleven (11) emergent themes were developed from the responses of the key informants. The following are the eleven (11) emerging themes:

6.1.1 Lack of Digital Skills

The theme generated from the informants' narratives conveyed their feelings regarding their level of expertise in integrating technology efficiently. Teachers' usage of computers for online instruction was limited, even though informants rated their ICT skills as beginner-level. This impacts the amount to which online educators utilize ICT.

The nursing educators stated that a lack of expertise and experience with educational technology, such as online teaching platforms and applications, was to account for their low rate of integration of ICT in online teaching. This is significantly supported by Rogers' (2003) Diffusion of Innovations theory which outlines the pattern and pace with which new ideas, behaviors, or products spread through a population. Nurse educators need more educational technology experience to integrate ICT properly. This will increase

engagement and improve digital skills. A positive learning experience strengthens learning and development and, as a result, helps to improve teaching performance and productivity.

According to Goh and Sigala (2020), adopting innovative technology can be promoted if reference groups that are important to the individual accept and approve of the behavior, known as supportive subjective norms. This means that developing and embracing the right attitudes toward integrating and embracing technology should be regarded as a positive factor among reference groups (e.g., fellow lecturers, students, and school administrators) who are important and influential to academics.

Fernández-Batanero et al. (2020) conducted a systematic review on digital competencies for teacher professional development. Most selected studies revealed a lack of teacher training and insufficient ICT training. According to Drossel and Eickelmann (2017), there are two distinct sorts of educators in each country. Teachers in Germany and the Czech Republic who participate in professional development see themselves as more ICT self-sufficient. In contrast, teachers in the Czech Republic use computers more frequently and focus more on teaching ICT skills.

Chen et al. (2017) found that primary school teachers must improve their technological competence and receive training to use electronic tools effectively and consistently in their professional activities. In addition, Kaarakainen et al. (2018) asserted that teacher training and in-service training are necessary to reduce the ICT skills gap.

6.1.2 Limited ICT Resources

The theme derived from the informants' phenomenological narratives describes the insufficient digital resources employed in an online environment that hinder the teaching and learning processes. The informants emphasized the importance of educational tools to enhance a student's engagement and educational experience.

Nursing education faces a challenge from technological innovation. The challenge derives from the fact that technology gadgets have altered how nurse educators have traditionally operated. As a result, technology must be accepted and fully utilized to achieve its goals. However, acceptance and complete adoption of technology results from individuals' attitudes toward information systems and technological equipment. The inadequacy of digital resources encountered by nurse educators can affect how they use and adopt ICT. This is supported by Ajzen & Fishbein (1975) Theory of Reasoned Action (TRA), which explains that attitudinal behavior is associated with the acceptance, use, and adoption of technology in organizations. As a result, additional ICT resources and materials for nurse educators are essential since ICT allows for the renewal of learning techniques, the establishment of more active student collaboration, and the simultaneous acquisition of technological expertise.

This emergent theme is also supported by Mishra and Koehler's (2006) Technological pedagogical content knowledge (TPACK) Framework considers how Pedagogical Subject Knowledge (PCK), content knowledge, and technological knowledge intersect and interact with one another to enable successful teaching with technology. This framework provides a valuable foundation for instructors to build a shared understanding of what information is required for technology-enhanced teaching before developing a consistent approach to incorporating technology in their classrooms and lessons (Serow et al., 2016).

According to Piaget (1980), the educational experience should be centered on the learner's cognitive structure. Educational material that cannot be integrated into a student's cognitive structure is meaningless to the student. Alternatively, there will be no learning if the material can be assimilated. For learning to occur, the material must be partially known and somewhat unknown (Olson, 2015).

Students working directly with materials is a direct result of the Piagetian theory. Essential to learning is classroom activities and making observations about used educational materials. These experiences persuade individuals to modify their schema to establish mental frameworks for comprehending the environment, resulting in cognitive growth (Settlage et al., 2017).

According to Hadijah and Shalawati (2017), some constraints encountered by instructors include access to ICT, time, professional development, and technical support. There are insufficient computers and other devices to facilitate English language teaching. This interfered with the teaching and learning process.

Kundu et al. (2020) discovered that teachers' overall ICT self-efficacy and its three domains – technological efficacy, pedagogical efficacy, and integration efficacy – were moderately low, and their perception of ICT infrastructure in their respective schools was also significantly lower than expected. The research disclosed a moderately significant positive correlation between teachers' ICT self-efficacy and their general perception of ICT infrastructure.

Warioba et al. (2021) investigated the opportunities and limitations for teachers and students in community secondary schools to adopt Information and Communication Technology (ICT) as a pedagogical tool. The findings revealed several barriers to ICT adoption, including a lack of ICT devices, technical support, and ICT skills and knowledge.

According to the study of Al-Mamary's (2022), findings state that simple access to the ICT infrastructure, availability of support from the technical support team, availability of time, and training for technology use are crucial elements that influence the technology used in Yemen's teachers. On the other hand, Junaidia et al. (2020) revealed challenges in teachers' ICT usage in English learning in Pekanbaru, Indonesia. These include a lack of information technology understanding, a lack of ICT facilities, a lack of selfconfidence, a lack of time, and a conservative teaching approach.

This finding was consistent with another Philippines study, which found that the most significant impediments preventing the integration of Information and Communication Technology in teaching (ICT) were a lack of in-service training, a lack of technical assistance, and a lack of hardware (computer, printer).In contrast, knowledge and skills about ICT were identified as the least significant (Jordan et al., 2021).

6.1.3 Poor Internet Connection

The theme generated from the informants' narratives expresses that slow internet connection or limited access to online teaching impedes online learning.

Institutions that provide financial support for ICT resources to faculty members enable them to set up productive workspaces at home. When workers believe that their employers are concerned about their health and well-being, productivity can increase, and ICT can be used in online instruction. This is corroborated by Davis's (1985) Technology Acceptance Model, which suggests that financial support may be an enabling factor for technology usage intention. Creating a benefit that reduces the expense of putting up a workstation at home would be a wise investment to prepare for when remote work will probably be the norm. Additionally, the backing from administrators can benefit nurse educators and strengthen the institution. It specifically predicts an individual's adoption of a specific technology. This is linked to the characteristics of internet service providers who employ a specific technical platform, and it is, therefore, the internet connectivity externality that influences technology adoption. The acceptance and use of a peer-to-peer platform app are influenced by the quality of internet connectivity used by nurse educators.

This is also supported by the Technological Pedagogical Content Knowledge (TPACK) Framework, which claims that technological knowledge (TK) is awareness and experience of both conventional and digital technologies (Wuttke et al., 2020). It involves understanding the capabilities of various technologies as they are employed in instructional settings and how their use may alter teaching (Montone et al., 2017).

Numerous pieces of literature mentioned challenges in integrating ICT in online teaching. These are limited funding, insufficient ICT facilities, expensive internet services, unreliable internet services, unstable electricity, limited digital literacy of faculty members, poor digital literacy of students, and poor implementation of ICT policies, insufficient time to develop and organize classes utilizing ICT (Ogunode et al., 2021).

6.1.4 Anxiety Towards Technology Usage

The developed theme is based on the informants' phenomenological narratives expressing their emotional responses to integrating Information and Communication Technology in their online teaching. Their unease, anxiety, fear, and uncertainty influence how they conduct classes. Specifically, their discomfort was caused by their unfamiliarity with ICT tools and equipment, as they were supposed to be adept with instructional technology.

Students can benefit from incorporating technology into online instruction in various ways. Reality suggests that its use could be detrimental to nurse educators. Technology utilized in online education has been reported to be overwhelming and stressful among instructors since it may indicate changes in their teaching methods or pressure them to learn digital skills, which has harmed their mental health. This is supported by Diffusion of Innovation Theory by Roger (2003), which describes how individuals and groups react to new ideas, practices, or objects. Individuals in a social system disseminate innovation through specific channels over time.

Adopting online education, for example, blends concepts and technology and needs constant diffusion of innovation. Various individuals influence this shift, prompting anxiety or excitement within the organization (Nelson & Staggers, 2016).

Previous research on teacher stress and anxiety involved with educational technology has concluded that teachers experience significant levels of anxiety or stress because of their usage of educational technology in the classroom (Fernández-Batanero et al., 2021). Likewise, the Estrada-Muoz et al. (2020) study investigated the technostress levels in elementary and secondary school teachers. The findings revealed that techno-anxiety and techno-fatigue are more prevalent among male professors than their female counterparts.

6.1.5 Environmental Distraction.

The said theme is developed from informant responses describing how noise and external distractions interfere with studying or attending lectures at home. Online settings are vital in the teaching and learning process. Noise, comfort, and surroundings can

all influence one's ability to learn. It can be a distracting experience that is detrimental to cognitive performance. As a result, nurse educators and students must find a means to limit distraction if they are to perform successfully.

Distractions in online teaching can be minimized by anticipating them and planning accordingly. This may benefit nurse educators and students by increasing their intention to use educational materials in the future if the ideal environment is improved. The theoretical underpinning of behavioral intention can be found in Ajzen & Fishbein (1975) Theory of Reasoned Action (TRA), which describes what goes into the process leading to an individual's course of action. This theory claims that behavioral intention entails a cognitive decision to perform a behavior.

Joshi et al. (2020) found teachers' difficulties during online teaching and assessments. A lack of basic facilities, external distraction, and family interruption during teaching and assessment were key concerns mentioned in home environment settings.

6.1.6 Financial Struggle

The theme that emerged from the informants' responses was that budgetary constraints impacted internet connectivity and the availability of ICT tools. Financial restrictions have an impact on ICT usage. For online education to succeed, students and faculty must be able to access the online learning environment. Access to technology is a key concern for low-to-model-income families. Furthermore, if nurse educators and students cannot afford the technology used by the school, their online education will deteriorate.

Lack of access may influence the intention and choice to use ICT in online teaching and learning, whether for economic or logistical reasons. This is backed by Ajzen & Fishbein (1975) Theory of Reason and Action, which holds that most actions of social consequence are under volitional control and that a person's intention to execute a behavior is both the immediate determinant and the most significant predictor of that behavior (Holtzman, 2000).

According to Kisanga & Ireson (2015), the challenges to implement e-learning are poor infrastructure, financial constraints, limited assistance, a lack of e-learning competence, and teachers' reluctance to change.

6.1.7 Lack of Time

The theme derived from the informants' phenomenological narratives indicates time restrictions in learning and integrating digital learning materials to be employed in online teaching. The nurse educators felt they needed more opportunities to practice employing educational technologies with their online teaching. A reoccurring challenge is more time to integrate ICT into the curriculum adequately. It takes time to study, understand, and apply ICT, influencing nursing educators' intentions and attitudes about educational technology adoption. This is backed by Ajzen & Fishbein (1975) Theory of Reason, which claims that intentions do not always convert into actions, depending on ability variables and obstacles to action. The intention and attitude toward ICT can hinder its assimilation into the teaching/learning process.

The result of the study of Villalba and González-Rivera (2017) showed that most frequently cited barriers were loss of time spent on physical exercise, a lack of resources, an investment in time and training, inappropriate use, a lack of expertise, and technological challenges. These same impediments were recognized by age but in a different sequence.

6.1.8 Threat to Academic Integrity

The theme developed from the phenomenological narratives expressed by the informants concerned about the students' attitudes regarding online assessments and the causes of their dishonest behavior.

Individuals are particularly prone to dishonesty when they set performance goals, and the societal norm implies that such behavior is acceptable. This argument is consistent with Ajzen & Fishbein's (1975) Theory of Reason Action, which recognizes the significance of perceived behavioral control for behavioral intent. Furthermore, it highlights the elements that influence an individual's decision to behave in a particular manner. Intentions to behave in each way are influenced by attitudes toward that behavior and subjective norms, which are based on expectations about how others would react to one's actions. This notion is beneficial for explaining variability in purpose to engage in dishonest academic behavior, particularly students' intent to engage in dishonest academic behavior.

Juanda et al. (2021) examined biology teachers' readiness for online learning based on their Technological Pedagogical Content Knowledge (TPACK). The findings revealed that issues encountered by teachers in adopting online learning include technical connectivity and student honesty in taking tests.

The findings complement previous research by Samanta (2018), which revealed that the entire classroom environment, including the students' social pressure, as well as the teachers' and school's policies regarding academic dishonesty, have all contributed to the overall perception of factors influencing the incidence of cheating in the school.

In Plessis and Westhuizen's (2021) research, academic integrity in the "new normal" of online examinations necessitates rethinking. Since students have access to their study materials, there is a need to be creative in evaluation styles. Given the trend toward a more personalized learning experience, future lecturers must be data collectors, analysts, planners, collaborators, curriculum specialists, problem solvers, and researchers.

6.1.9 Absence of Teacher Presence

The theme generated from the narrative the informants gave expressed the relevance of nurse educator visibility and presence to enhance learning activities and create possibilities for engagement and cooperation in online education. Nurse educators believe their presence in an online setting can significantly impact students' overall learning experience. As they interact with students, nurse educators assume a variety of responsibilities. These interactions are vital because they can impact students' involvement, provide timely feedback, and assist them through learning activities. In addition to facilitating learning, providing a social presence allows ICT to be used more effectively in the teaching and learning process. This is supported by the Theory of Reason of Ajzen & Fishbein (1975) which states that people who view the suggested activity as positive (attitude) and believe others want them to undertake the behavior (subjective norm) have a higher intention (motivation) and are more likely to perform the behavior (Mimiaga et al., 2009).

Burgess (2015) discovered that good strategies utilized in the online classroom might be used to promote student learning in any situation. Online discussion boards, consistent e-communications, course content videos, and online conferencing, for example, can be integrated into the face-to-face classroom, combining the advantages of embodied presence with the less constrained bounds of technology.

6.1.10 Miscommunication of Information

The theme generated from the informants' narratives highlighted the difficulties in channeling communication in online teaching. The informants are afflicted with apprehension due to the concept's novelty and their inadequate expertise in technology, which inhibits the communication process between teacher and student.

Communication in an online context can take many different forms. For instance, interaction is used by nurse educators to create and grow relationships with students. However, in online education, nursing educators' ability to use an ICT tool to communicate with students is crucial in embracing innovation. Inadequate technological skills affect how communication and engagement interact in practice. This assertion is confirmed in the Diffusion of Innovation Theory by Roger's (2003), which describes how innovation is disseminated over time among members of a social system through certain communication channels. Diffusion is thus a specific communication concerned with the spread of perceived innovative messages and ideas.

The study is comparable to Yuliyanto's (2021) study, where the results reported that WhatsApp did not benefit pupils in understanding the topic, and miscommunication frequently happened when getting information. On the other hand, WhatsApp encouraged good engagement between professors and students and promoted easily monitored classes. Meanwhile, Aji et al. (2020) identified that poor internet connection and incomprehensible materials were cited as issues impeding their blended online learning.

In contrast, results of the study of Zainil et al. (2018) revealed that using the CS6 program is promising for assisting students in understanding plane and solid figures in mathematics.

6.1.11 Technostress

The theme is drawn from the informants' responses describing how online education affects their physical and psychological well-being. In the age of digital transformation, technological innovation has become crucial for the organization. However, from an organizational standpoint, the necessity to constantly adapt to the demands of a constantly changing technology environment can become onerous on an individual level. The fact that ICT use among nurse educators has negative impacts on their health can be considered a factor in integrating technology into online instruction. This is corroborated by Rogers' (2003) Diffusion of Innovations theory, which emphasizes factors that increase or decrease the likelihood that community members will embrace a new idea, product, or practice. The incorporation of ICT in online teaching causes uncertainty among nurse educators. As a result, mutual assistance between administrators and nurse educators can encourage technological innovation and accommodate changes in the operation of new technology.

Technostress is generally characterized as the overall stress, i.e., affective, and cognitive) encountered by individuals due to their use of information systems. Testing technostress in the context of digital textbooks is especially important, as technostress is a

psychological state frequently associated with utilitarian technology, but it has been a relatively understudied factor in the student context, perhaps because learners are seen to be technologically competent (Verkijika, 2019).

6.2 Aspirations to Improve Online Teaching

Under this overarching theme, three (3) emergent themes describe proposals to improve the use of ICT in virtual education among nurse educators.

6.2.1 Training

The theme is drawn from informant responses reflecting continuing faculty development training to improve ICT skills proficiency.

Nurse educators must participate in faculty development training to strengthen their digital fluency in ICT in online education to execute new roles and respond to the introduction of new technologies. This is corroborated by Davis' (1985) Technology Acceptance Model, indicating that training can play a substantial part in determining whether or not users accept and intend to use new technology. The effectiveness of nurse educators as a whole is influenced by training, which also has an impact on how well their faculty accept ICT and digital systems. Additionally, individuals who showed a higher level of technology adoption used the digital system more regularly.

Adegbore and Adeniji (2015) did a similar study. They found that the majority of teachers needed to learn computing skills on software installation, web design software, constructing databases using MS Access, and electronic resources for teaching; that only a few needed to learn basic computing abilities such as e-mail and Internet; and that a more important issue is that this set of teachers has a positive attitude toward using ICT in their educational activities and is eager to learn more.

6.2.2 Procurement of ICT Equipment.

This theme emerged from informant responses describing the need to support nurse educators by providing ICT Tools for online teaching.

The use of ICT in online teaching is dependent on having access to digital infrastructure and resources. The availability and accessibility of ICT resources are essential for the successful adoption and integration of ICT into academic teaching. Nurse educators will not use ICT materials if they cannot access them. As a result, having access to computers, modern software, and hardware is essential for successful technology adoption and integration. This is supplemented by Davis' (1985) Technology Acceptance Model, which illustrates the importance of the potential user's perceptions while adopting a technology. Potential users of technology products will only accept them if they see value in them. Therefore, it is crucial to increase access to technology resources if nurse educators are to effectively integrate ICT into their instruction.

Hafeez (2021) concluded that traditional lecturing and learning do not enhance students' cognitive and communication skills. Modern ICT tools enhance the teaching-learning process and the educational system's effectiveness.

6.2.3 Financial Support.

The theme is derived from the informants' responses expressing that the institution will aid the nurse educators by providing a financial incentive for internet access.

Institutions that provide financial support for ICT resources to faculty members enable them to set up productive workspaces at home. When workers believe that their employers are concerned about their health and well-being, productivity can increase, and ICT can be used in online instruction. This is corroborated by Davis' (1985) Technology Acceptance Model, which suggests that financial support may be an enabling factor for technology usage intention. Creating a benefit that reduces the expense of putting up a workstation at home would be a wise investment to prepare for when remote work will probably be the norm. Additionally, the backing from administrators can benefit nurse educators and strengthen the institution.

Salvo et al. (2019) investigated the factors that encourage African American male college students to complete online courses. The findings found that financial support, prior academic performance, prior information technology (IT) training, continuing academic enrolment, student selection of topics viewed as simple and less challenging or the usage of mobile digital devices, familiarity owing to past knowledge, and a nondiscriminatory learning environment all contributed to online course completion.

The qualitative findings of this study investigated the lived experiences of eight (8) nursing faculty members who taught during the Covid-19 epidemic. In the early days of the shift to online teaching, nurse educators described obstacles and challenges and a sense of fluid experimentation in teaching approaches.

The eleven (11) thematic analysis findings provided evidence of the considerable impact on ICT integration and adoption. Identifying the factors that cause nurse educators to struggle with incorporating ICT in online education will help school

administrators effectively address the gaps and needs of the faculty. Nurse educators need to be motivated and empowered to strengthen their ICT competencies as they are increasingly likely to use ICT in their work. On other hand, the quantitative findings give evidence that, despite the difficulties caused by the pandemic, most nurse educators had greater degree of usage in integrating ICT into their online teaching. They were adamant about maintaining contact with their students and guaranteeing the continuity of the educational experience, even though they had no prior experience teaching online.

The difficulties of online teaching enable the transition to new modes of course delivery. Therefore, nursing faculty must be able to experiment with and incorporate new teaching approaches and technology into the curriculum. The capacity to successfully manage instructional technology, accept, adapt, and overcome triggering circumstances may ultimately become the norm. Recognizing and accepting that online instruction is inherently fluid due to its tight relationship with technology is critical for each nursing faculty member. Hence, the role of nurse educators is to make a concerted effort to maintain their online educational approaches current with technological breakthroughs and trends.

7. Conclusion

During the Covid-19 pandemic, nurse educators extensively utilized ICT in online education. However, the utilization of ICT is influenced by the difficulties that nurse educators experienced while striving to enhance the quality of online teaching.

8. Implications for Practice

8.1 Empowering professional development to integrate technology in online teaching

Enhancing professional development opportunities is critical in seeking to improve information and communication technology integration in academics. Faculty development plans must be managed by committed educational leaders who are accountable for providing the material and time resources needed to improve the quality of online education. School administrators must ensure that technology is effectively integrated into the classroom and that educators who require extra training receive specific attention to fill knowledge gaps.

Continuing professional development opportunities could help nurse educators enhance their digital competencies and pedagogy. It is also an excellent venue for educators to learn about base technologies and their applications. Educators will feel more effective in their preparation if they have a better understanding of technology and realistic, repeatable processes for using technological approaches in online teaching and learning. ICT-enabled educators can significantly improve student accomplishment by enabling students to access high-quality online education.

8.2 Addressing ICT accessibility gaps

An emphasis must be put on making sure faculty and students have access to the technological resources necessary to carry out learning activities. Accessibility to suitable ICT tools contributes to enhanced educational skills. To provide high-quality education in academia, school administrators should address technology access gaps through procurement and provide adequate ICT facilities and equipment such as laptop computers, internet connectivity, and digital learning materials.

Nurse educators must continue to use ICT tools and digital learning materials in the design of the learning process to develop successful learning environments and increase learner motivation. Suppose instructors must incorporate online activities and training into the classroom but lack the necessary ICT resources. In that case, additional adjustments must be made to guarantee that these curricular objectives are met. Nurse educators can surmount the boundaries and challenges of online education by being flexible in content management, time management, and student assessment.

Furthermore, administrators, department heads, and faculty should provide enough supervision and maintenance of school-related ICT facilities to guarantee that all educational technology tools perform correctly.

8.3 Improving ICT infrastructures and resources

To overcome the disparities in access to technology, educational institutions should invest in improving ICT-related education through instructional technologies and Internet access. It would be appropriate for the institution to pursue a publicprivate partnership to overcome the university's ICT deficiencies.

8.4 Institutional management support for faculty

It is vital for institutional management to seek out optimal conditions for technology integration and to be more attentive to educators' and learners' current and future demands. School administrators should undertake an ICT Assessment Capability on the needs of faculty and students and then create an appropriate augmentation solution to address the gaps. Additionally, educators require technical assistance and updates for technology and software. As a result, teachers demand administrative and technical support to enhance technological integration. This will ensure that ICT is used efficiently in online teaching.

8.5 Augmenting academic integrity

To assure that students use technology resources properly, educators must undertake remedies or attenuate academic dishonesty such as cheating or inappropriate behavior. Teachers must be innovative in assessment methods because students can access their study materials online. Given the trend toward a more personalized learning experience, future lecturers must be data collectors, strategists, developers, organizers, curriculum specialists, innovators, and researchers.

8.6 Building educational community and collaboration

Administrators and educators must foster an environment where coworkers can learn from one another. Educators would benefit from knowing about the most recent technological trends and approaches offered by specialists in the subject and colleagues in the department who have better ideas about what they need for classroom or online teaching. To improve ICT implementation in online teaching, faculty can informally share teaching approaches via conversation and mentoring. For instance, faculty members can use social media to share their expertise in pedagogy and technology and seek mentorship and assistance to strengthen their technology use.

9. Recommendations

Based on the findings of the study, the researcher recommends conducting further studies, as there is still some relevant ICT utilization that can greatly help nurse educators, specifically in strengthening their digital literacy and competency for future studies: Adoption of Information and Communication Technology (ICT) in Nursing Education: A Systematic Review; Attitude of Nurse Educators in Information and Communication Technology (ICT) Usage; and Impact of Information and Communication Technology (ICT) in Higher Education Institutions. Lastly, the proposed action plan intended for educators needs to incorporate new pedagogical styles into an online environment. Adapting to online instruction and supporting students' learning and growth continue to present formidable obstacles for nursing educators. These problems or impediments in using ICT in online instruction call for improvements in digital literacy, competency, and educational technologies. It is intended for nurse educators to optimize the use of ICT in online teaching.

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ORCID ID

https://orcid.org/0000-0001-8882-401X
https://orcid.org/0000-0002-2298-2637
https://orcid.org/0000-0002-2333-7269
https://orcid.org/0000-0003-3716-1003
https://orcid.org/0000-0003-4574-038X

References

[1]. Abouelenein, Y. A. M. (2016). Training needs for faculty members: Towards achieving quality of university education in the light of technological innovations. *Educational Research and Reviews*, *11*(13), 1180–1193. https://doi.org/10.5897/err2015.2377.

[2]. Adegbore, A. M. & Adeniji, O. S. (2015). Stress and frustration effects on use of ICT for research by undergraduates in Ogun State, Nigeria. *Journal of Ergonomics*, *05*(03).https://doi.org/10.4172/21657556.1000143.

[3]. Afseth, J. (2020). Innovation and the creative process: Toward innovation with care. Retrieved November 04, 2020, from https://blogs.napier.ac.uk/docman/wpcontent/uploads/sites/54/2020/01/Innovation-and-the-creative-process1.pdf.

[4]. Aji, W. K., Ardin, H. & Arifin, M. A. (2020). Blended learning during pandemic corona virus: teachers' and students' perceptions. In *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, Vol. 8, Issue 2, pp. 632–646.https://doi.org/10.24256/ideas.v8i2.1696.

[5]. Ajzen, I. & Fishbein, M. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, Massachusetts, United States of America: Addsion - Wesley.

[6]. Al-Mamary, Y. H. S. (2022). Examining the factors affecting the use of ICT in teaching in Yemeni schools. *Journal of Public Affairs*, *22*(1). https://doi.org/10.1002/pa.2330.

[7]. Alt, D. (2018). Science teachers' conceptions of teaching and learning, ICT efficacy, ICT professional development and ICT practices enacted in their classrooms. *Teaching and Teacher Education*, *73*, 141–150. https://doi.org/10.1016/j.tate.2018.03.020

[8]. Amiti, F. (2020). Synchronous and asynchronous e-learning. *European Journal of Open Education and E-Learning Studies*, *5*(2), 60–70. https://doi.org/10.46827/ejoe.v5i2.3313.

[9]. Ayuyang, R. R. (2019). Interactive learning (ILEARN) tool: An elearning portal designed using Moodle for Cagayan State University in the Philippines. *ACM International Conference Proceeding Series*, 11–16. https://doi.org/10.1145/3330482.3330507.

[10]. Azmi, N. (2017). The benefits of using ICT in the EFL classroom: From perceived utility to potential challenges. *Journal of Educational and Social Research*, *7*(1), 111–118.https://doi.org/10.5901/jesr.2017.v7n1p111.

[11]. Bahati, B., Uno, F. & Tedre, M. (2017). Can student engagement in online courses predict performance on online knowledge surveys? *International Journal of Learning, Teaching and Educational Research*, *16*(3), 73–87. Retrieved September 20, 2021, from http://ijlter.org/index.php/ijlter/article/view/882%0Ahttp://files/28/882.html.

[12]. Bahati, B., Uno, F. & Tedre, M. (2017). Can student engagement in online courses predict performance on online knowledge surveys? *International Journal of Learning, Teaching and Educational Research*, 16(3), 73–87. Retrieved September 20, 2021, from http://ijlter.org/index.php/ijlter/article/view/882%0Ahttp://files/28/882.html.

[13]. Barak, M. (2017). Science teacher education in the twenty-first century: a pedagogical framework for technology-integrated social constructivism. *Research in Science Education*, *47*(2), 283 303.https://doi.org/10.1007/s11165-015-9501-y.

[14]. Basri, W. S., Alandejani, J. A. & Almadani, F. M. (2018). ICT adoption impact on students' academic performance: Evidence from Saudi Universities. *Education Research International*, *2018* https://doi.org/10.1155/2018/1240197.

[15]. Bergdahl, N., Nouri, J., Fors, U. & Knutsson, O. (2020). Engagement, disengagement and performance when learning with technologies in upper secondary school. *Computers and Education*, *149*, 103783. https://doi.org/10.1016/j.compedu.2019.103783.

[16]. Bond, M. (2020). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. *Computers and Education*, *151*(January), 103819. https://doi.org/10.1016/j.compedu.2020.103819.

[17]. Bordes, S. J., Walker, D., Modica, L. J., Buckland, J. & Sobering, A. K. (2021). Towards the optimal use of video recordings to support the

[18]. Branscombe, N. R. & Baron, R. A. (2017). *Social psychology.* (14th ed.). England: Pearson Education Limited.

[19]. Braun, V. & Clarke, V. (2006). Qualitative research in psychology using thematic analysis in psychology using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. Retrieved August 06, 2022, from http://www.tandfonline.com/action/journalInformation?journalCode=uqr p20%5Cnhttp://www.tandfonline.com/action/journalInformation?journal Code=uqrp20.

[20]. Braun, V., Clarke, V. & Weate, P. (2016). Using thematic analysis in sport and exercise research. *Routledge Handbook of Qualitative Research in Sport and Exercise*, 191–205. https://doi.org/10.4324/978131576201226.

[21]. Burgess, O. (2015). Cyborg Teaching: The transferable benefits of teaching online for the face-to-face classroom. *MERLOT Journal of Online Learning and Teaching*, *11*(1), 136–145. Flipped classroom in medical school basic sciences education. *Medical Education Online*, *26*(1). https://doi.org/10.1080/10872981.2020.1841406.

[22]. Cai, Z., Fan, X. & Du, J. (2017). Gender and attitudes toward technology use: A meta-analysis. *Computers and Education*, *105*, 1–13. https://doi.org/10.1016/j.compedu.2016.11.003.

[23]. Calmorin, L. P. (2007). *Research method and thesis writing*. Manila: Rex Printing Company Inc.

[24]. Carr, J. (2020). Teacher candidate perceptions on alternative asynchronous online discussion boards. *Journal of Educational Technology and Online Learning*, *3*(3) https://doi.org/10.31681/jetol.752283.

[25]. Carver, L. B., Mukherjee, K. & Lucio, R. (2017). Relationship between grades earned and time in online courses. *Online Learning Journal*, *21*(4), 303–313. https://doi.org/10.24059/olj.v21i4.1013.

[26]. Chen, F., Gorbunova, N. V., Masalimova, A. R. & Bírová, J. (2017). Formation of ICT-competence of future university school teachers. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(8), 4765–4777. https://doi.org/10.12973/eurasia.2017.00963a.

[27]. Chinweuba, A. U., Okoronkwo, I. L., Agbapuonwu, N. E., Garba, S. N., Iloh, I. C., Chikeme, P. C. & Madu, O. T. (2019). Integrated collegiate and professional nursing education in Nigeria universities: Self, task and impact concerns of lecturers. *International Journal of Africa Nursing Sciences*, *11*(April), 100159. https://doi.org/10.1016/j.ijans.2019.100159.

[28]. Coşkunçay, D. F., Alkış, N. & Yıldırım, S. Ö.-. (2018). A structural model for students' adoption of learning management systems: An empirical investigation in the higher education context. *Educational Technology & Society*, *21*(2), 13–27. Retrieved March 20, 2020), from https://www.jstor.org/stable/26388376.

[29]. Darawsheh, W. (2014). Reflexivity in research: Promoting rigour, reliability and validity in qualitative research. *International Journal of Therapy and Rehabilitation*, *21*(12), 560 568,https://doi.org/10.12968/ijtr.2014.21.12.560

[30]. Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems : theory and results*. Massachusetts Institute of Technology. https://doi.org/oai:dspace.mit.edu:1721.1/15192.

[31]. Dela Rosa, J. P. O. (2016). Experiences, perceptions and attitudes on ict integration: a case study among novice and experienced language teachers in the Philippines. *International Journal of Education and Development Using Information and Communication Technology*, *12*(3), 37–57.

[32]. Dhakal, P. K. (2018). Use of ICT Tools in teaching Mathematics in higher education: A case of Mid-Western University. *International Journal of Multidisciplinary Perspectives in Higher Education*, *3*(1). https://doi.org/10.32674/jimphe.v3i1.636.

[33]. Drossel, K. & Eickelmann, B. (2017). Teachers' participation in professional development concerning the implementation of new technologies in class: a latent class analysis of teachers and the relationship with the use of computers, ICT self-efficacy and emphasis on teaching ICT skills. *Large-Scale Assessments in Education*, *5*(1). https://doi.org/10.1186/s40536-017-0053-7.

[34]. Dumford, A. D. & Miller, A. L. (2018). Online learning in higher education: exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education*, *30*(3), 452–465. https://doi.org/10.1007/s12528-018-9179-z.

[35]. Ehsan, S., Rafique, A., Ehsan, A. Tahir, S., Hanook, S. & Khan, M. A. (2019). Use of information & communication technology by medical and dental students: A study. *Pakistan Oral & Dental Journal*, *39*(4), 373–380. Retrieved June 22, 2021, from https://podj.com.pk/index.php/podj.

[36]. Estrada-Muñoz, C., Castillo, D., Vega-Muñoz, A. & Boada-Grau, J. (2020). Teacher technostress in the chilean school system. *International Journal of Environmental Research and Public Health*, *17*(15), 1–17. https://doi.org/10.3390/ijerph17155280.

[37]. Etcuban, J. O., Marcial, D. E. & Abellanosa, C. S. (2016). Information and communication technology readiness of teachers in Cebu, Philippines. *UNP Research Journal*, *XXV*(December), 1–17.

[38]. Farzana, S., Jayaranjan, M. L. D. & Rahman, S. U. (2021). An Empirical Study on E-book Usage Intention, Perspective of International Students Studying in Thailand. *Proceedings of the 18th International Symposium on Management (INSYMA 2021)*, *180*(Insyma), 228–234, https://doi.org/10.2991/aebmr.k.210628.038.

[39]. Fatani, T. H. (2020). Student satisfaction with videoconferencing teaching quality during the COVID-19 pandemic. *BMC Medical Education*, *20*(1). 1–8, https://doi.org/10.1186/s12909-020-02310-2.
[40]. Fernández-Batanero, J. M., Román-Graván, P., Reyes-Rebollo, M. M. & Montenegro-Rueda, M. (2021). Impact of educational technology on teacher stress and anxiety: A literature review. *International Journal of Environmental Research and Public Health*, *18*(2), 1–13. https://doi.org/10.3390/ijerph18020548.
[41]. Ghavifekr, S., Kunjappan, T. & Ramasamy, L. (2016). Teaching and learning with ICT tools issues and challenges from teachers' perceptions. *Malaysian Online Journal of Educational Technology*, *4*(2), 38–57.
[42]. Gibson, D., Broadley, T., Downie, J. & Wallet, P. (2018). Evolving learning paradigms: Re-setting baselines and collection methods of information and communication technology in education statistics. *Journal of Educational Technology & Society*, *21*(2), 62–73. http://www.jstor.org/stable/26388379.
[43]. Gil-Flores, J., Rodríguez-Santero, J. & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, *68*, 441–449 https://doi.org/10.1016/j.chb.2016.11.057.
[44]. Goh, E. & Sigala, M. (2020). Integrating information & communication technologies (ICT) into classroom instruction: Teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel and Tourism*, *20*(2), 156–165.
[45]. Gómez-Fernández, N. & Mediavilla, M. (2020). What are the factors that influence the use of ICT in the classroom by teachers? Evidence from a census survey in Madrid. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3685809.
[46]. Greenhow, C. & Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies*, *22*(2), 623–645. https://doi.org/10.1007/s10639-015-9446-9.
[47]. Gudmundsdottir, G. B. & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence: implications for teacher education. *European Journal of Teacher Education*, *41*(2), 214–231. https://doi.org/10.1080/02619768.2017.1416085.
[48]. Habibi, A., Mukminin, A., Riyanto, Y., Prasojo, L. D., Sulistiyo, U., Sofwan, M. & Saudagar, F. (2018). Building an online community: Student teachers' perceptions on the advantages of using social networking services in a teacher education program. *Turkish Online Journal of Distance Education*, *19*(1), 46–61. https://doi.org/10.17718/tojde.382663.
[49]. Hadijah, S. & Shalawati. (2017). Investigating teachers' barriers to ICT (Information Communication Technology) integration in teaching english at senior high schools in Pekanbaru. *Proceeding of the Fifth International Seminar on English Language Teaching (ISELT-5)*, *5*(1), 302–310.
[50]. Hafeez, M. (2021). Teaching-learning process and ICT tools - A review. *Indonesian Journal of Basic Education*, *4*(1), 18–27.
[51]. Hassan, N., Yaakob, S. A., Halif, M. M., Aziz, R. A., Majid, A. A. & Sumardi, N. A. (2019). The effects of technostress creators and organizational commitment among school teachers. *Asian Journal of University Education*, *15*(3), 92–102.https://doi.org/10.24191/ajue.v15i3.7563.
[52]. Holtzman, N. A. (2000). The implications of genetics for health professional education. *JAMA: The Journal of the American Medical Association*, *284*(23), 3061–3062. https://doi.org/10.1001/jama.284.23.3061.
[53]. Huang, R. H., Liu, D. J., Tlili, A., Yang, J. F. & Wang, H. H. (2020). Handbook on facilitating flexible learning during educational disruption: The Chinese experience in maintaining undisrupted learning in Covid-19 outbreak. *Smart Learning Institute of Beijing Normal University UNESCO*, 1–54. Retrieved March 03, 2021, from https://iite.unesco.org/news/handbook-on-facilitating-flexible-learningduring-educational-disruption/.
[54]. Hussain, M., Zhu, W., Zhang, W. & Abidi, S. M. R. (2018). Student engagement predictions in an e-learning system and their impact on student course assessment scores. *Computational Intelligence and Neuroscience*, *2018*. https://doi.org/10.1155/2018/6347186.
[55]. Jordan, R. P., Sañosa, M. E. & Caotivo, J. M. (2021). Barriers to the successful integration of information and communication technology (ICT) in teaching as perceived by pre- service teachers of Biliran. *International Journal of Research Publication and Reviews, 2*(11), 850858.
[56]. Joshi, A., Vinay, M. & Bhaskar, P. (2020). Impact of coronavirus pandemic on the Indian education sector: Perspectives of teachers on online teaching and assessments. *Interactive Technology and Smart Education*, *18*(2), 205–226. https://doi.org/10.1108/ITSE-06-2020-0087.
[57]. Juanda, A., Shidiq, A. S. & Nasrudin, D. (2021). Teacher learning management: Investigating biology teachers' tpack to conduct learning during the covid-19 outbreak. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 48–59. https://doi.org/10.15294/jpii.v10i1.26499.
[58]. Junaidia, J., Hamuddinb, B., Simangunsongc, W., Rahmand, F. & Derine, T. (2020). ICT usage in teaching english in pekanbaru: Exploring junior high school teachers' problems. *International Journal of Innovation, Creativity and Change*, *12*(4), 1–21.
[59]. Kaarakainen, M. T., Kivinen, O. & Vainio, T. (2018). Performance-based testing for ICT skills assessing: A case study of students and teachers' ICT skills in Finnish schools. *Universal Access in the Information Society*, *17*(2), 349–360. https://doi.org/10.1007/s10209-017-0553-9.
[60]. Karavidas, M., Lim, N. K. & Katsikas, S. L. (2005). The effects of computers on older adult users. *Computers in Human Behavior*, *21*(5), 697–711. https://doi.org/10.1016/j.chb.2004.03.012.
[61]. Kaur, M. & Singh, B. (2018). Teachers' attitude and beliefs towards use of ICT in teaching and learning: Perspectives from India. *TEEM'18:*
[62]. Khalil, Z. M. (2018). EFL students' perceptions towards using google docs and google classroom as online collaborative tools in learning grammar. *Applied Linguistics Research Journal*, *December*. https://doi.org/10.14744/alrj.2018.47955
[63]. Khan, R. A., Atta, K., Sajjad, M. & Jawaid, M. (2021). Twelve tips to enhance student engagement in synchronous online teaching and learning. *Medical Teacher*, *0*(0), 1–11. https://doi.org/10.1080/0142159X.2021.1912310
[64]. Kim, J., Lee, H. Y., Candace Christensen, M. & Merighi, J. R. (2017). Technology access and use, and their associations with social engagement among older adults: Do women and men differ? *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, *72*(5), 836–845. https://doi.org/10.1093/geronb/gbw123.
[65]. Kisanga, D. & Ireson, G. (2015). Barriers and strategies on adoption of elearning in tanzanian higher learning institutions: Lessons for adopters. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *11*(2), 126–137.
[66]. Ko, S. & Pacansky-Brock, M. (2017). *Best practices for teaching with emerging technologies.* (2nd ed.). New York ,United States of America: Routledge.

[67]. 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.

[68]. Kristiawan, M. & Muhaimin, M. (2019). Teachers' obstacles in utilizing information and communication technology. *International Journal of Educational Review*, *1*(2), 56–61. https://doi.org/10.33369/ijer.v1i2.8846.

[69]. Krystalli, P. (2020). *Undergraduate Students ' Perceptions of Virtual Teaching*, *9563* (December), 121–130.

[70]. Kundu, A., Bej, T. & Dey, K. N. (2020). An empirical study on the correlation between teacher efficacy and ICT infrastructure. *International Journal of Information and Learning Technology*, *37*(4). https://doi.org/10.1108/IJILT-04-2020-0050.

[71]. Kutnick, D. G. & Joyner, D. A. (2019). Synchronous at scale: Investigation and implementation of a semi-synchronous online lecture platform. *Proceedings of the 6th 2019 ACM Conference on Learning at Scale, L@S 2019*, 1–4. https://doi.org/10.1145/3330430.3333653.

[72]. *Proceedings of the Sixth International Conference on Technological Ecosystems for Enhancing Multiculturality*, 592–596. https://dl.acm.org/doi/10.1145/3284179.3284281.

[73]. Labucay, I. D. (2014). Patterns of internet usage in the Philippines. *The Internet and the Google Age: Prospects and Perils*, *2014*, 27–49. https://doi.org/10.14705/rpnet.2014.000176.

[74]. Lorenzo, A. (2016). Effectiveness of the computer and internet literacy project in public high schools of Tarlac Province, Philippines. *TOJET: The Turkish Online Journal of Educational Technology*, *15*(2), 38-46.

[75]. Lowenthal, P. R., Snelson, C. & Dunlap, J. C. (2017). Live synchronous web meetings in asynchronous online courses: Reconceptualizing virtual office hours. *Online Learning Journal*, *21*(4), 177–194. https://doi.org/10.24059/olj.v21i4.1285

[76]. Maguire, M. & Delahunt, B. (2017). Doing a thematic analysis: a practical, step-by-step guide for learning and teaching scholars. *Ireland Journal of Teaching and Learning in Higher Education*, *50*(5), 3135–3140. https://doi.org/10.1109/TIA.2014.2306979.

[77]. Maharaj-Sharma, R., Sharma, A. S. A. & Sharma, A. (2017). Using ICT based instructional technologies to teach science: Perspectives from teachers in Trinidad and Tobago. *Australian Journal of Teacher Education*, *42*(10), 23–35. https://doi.org/10.14221/ajte.2017v42n10.2.

[78]. Marikyan, D. & Papagiannidis, S. (2022). Technology acceptance model: A review. *Theory Book Hub*, 1–12. Retrieved July 25, 2021, from http://open.ncl.ac.uk.

[79]. Mclaughlin, L. & Ricevuto, J. (2021). *Virtual instruction support for faculty*. *18*, 1–30Meum, T. T., Koch, T. B., Briseid, H. S., Vabo, G. L., & Rabben, J. (2021). Perceptions of digital technology in nursing education: a qualitative study. *Nurse Education in Practice*, 103136. https://doi.org/10.1016/j.nepr.2021.103136.

[80]. Merillo, J. & Domingo, P. (2019). Technology in pedagogy: teachers' perception towards the effectiveness of ict integration in language teaching. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3442432.

[81]. Meum, T. T., Koch, T. B., Briseid, H. S., Vabo, G. L. & Rabben, J. (2021). Perceptions of digital technology in nursing education: A qualitative study. *Nurse Education in Practice*, 103136. https://doi.org/10.1016/j.nepr.2021.103136.

[82]. Miller, T. A., Carver, J. S., Roy, A., Miller, B. T. A., Carver, J. S. & Roy, A. (2018). To go virtual or not to go virtual, that is the question: a comparative study of face-to-face versus virtual laboratories in a physical science course, *Journal of College Science Teaching*, *48*(2), 59–67.

[83]. Mimiaga, M. J., Reisner, S. L., Reilly, L., Soroudi, N. & Safren, S. A. (2009). Individual interventions. *HIV Prevention*, *1997*, 203–239. https://doi.org/10.1016/B978-0-12-374235-3.00008-X.

[84]. Mishra, P. & Koehler, M. J. (2006). Technological pedagogical content knowledge: a framework for teacher knowledge. *In Teachers College Record* (Vol. 108, pp. 1017–1054). Blackwell Publishing. https://doi.org/10.1111/j.1467-9620.2006.00684.x.

[85]. Mohebi, S., Parham, M., Sharifirad, G. & Gharlipour, Z. (2018). Social support and self - care behavior study. January, 1–6. https://doi.org/10.4103/jehp.jehp.

[86]. Molnar, A. L. & Kearney, R. C. (2017). A comparison of cognitive presence in asynchronous and synchronous discussions in an online dental hygiene course. *Journal of Dental Hygiene : JDH*, *91*(3), 14–21.

[87]. Molnar, G. (2016). The impact of modern ict-based teaching and learning methods in social media and networked environment. *Divai 2016: 11Th International Scientific Conference on Distance Learning in Applied Informatics*, *7470* (11th International Scientific Conference on Distance Learning in Applied Informatic (DiVAi), 341–350.

[88]. Moltudal, S., Krumsvik, R., Jones, L., Eikeland, O. J. & Johnson, B. (2019).

[89]. Monje, E. & Bárcena, E. (2015). Language MOOCs: Providing learning, transcending boundaries. In *Language MOOCs: Providing Learning, Transcending Boundaries* (pp. 1–175). https://doi.org/10.1016/j.system.2015.06.005.

[90]. Montone, A., Faggiano, E. & Ferrara, F. (2017). *Innovation and technology enhancing mathematics education perspectives in the digital era*. Switzerland: Springer International Publishing.

[91]. Moorhouse, B. L., Li, Y. & Walsh, S. (2021). E-classroom interactional competencies: mediating and assisting language learning during synchronous online lessons. *RELC Journal*. https://doi.org/10.1177/0033688220985274.

[92]. Mou, S. (2016). Possiblities and challenges of ICT integration in the Bangladesh education system. *Educational Technology*, *56*(2), 50–53. Retrieved August 20, 2021, from https://www.jstor.org/stable/44430461?seq=1.

[93]. Muslem, A., Yusuf, Y. Q. & Juliana, R. (2018). Perceptions and barriers to ICT use among english teachers in Indonesia. *Teaching English with Technology*, *18*(1), 3–23.

[94]. Myers, D. G., Jordan, C. H., Smith, S. M. & Spencer, S. J. (2018). *Social psychology.* (7th ed.). Whitby, Ontario: McGraw-Hill Ryerson Limited.

[95]. The relationship between teachers' perceived classroom management abilities and their professional digital competence. *Designs for Learning*, *11*(1), 80–98. https://doi.org/10.16993/dfl.128.

[96]. Nambiar, R. M. K. & Thang, S. M. (2016). Examining Malaysian teachers' online blogs for reflective practices: Towards teacher professional development. *Language and Education*, *30*(1), 43–57. https://doi.org/10.1080/09500782.2015.1071386.

[97]. Nelson, R., & Staggers, N. (2016). *Health informatics: An interprofessional approach*. United States of America: Elsevier Mosby.

[98]. Nikolić, V., Petković, D., Denić, N., Milovančević, M. & Gavrilović, S. (2019). Appraisal and review of e-learning and ICT systems in teaching process. *Physica A: Statistical Mechanics and Its Applications*, *513*, 456– 464. https://doi.org/10.1016/j.physa.2018.09.003.

[99]. Noah, O. O. & Gbemisola, K. O. (2020). Impact of google classroom as an online learning delivery during Covid-19 pandemic: The case of a secondary school in nigeria. *Journal of Education, Society and Behavioural Science*, *October 2020*, 53–61. https://doi.org/10.9734/jesbs/2020/v33i930259.

[100]. Nueva, M. G. C. (2019). Filipino teachers' attitude towards technology, its determinants and association with technology integration practice. *AsiaPacific Social Science Review*, *19*(3).

[101]. Nunneley, C. E., Fishman, M., Sundheim, K. M., Korus, R. E., Rosen, R. H., Streater, B. A., O'Donnell, K. A., Newman, L. R. & Marcus, C. H. (2021). Leading synchronous virtual teaching sessions. *Clinical Teacher*, *18*(3), 231–235. https://doi.org/10.1111/tct.13282.

[102]. Nwozichi, C. U., Marcial, D. E., Farotimi, A. A., Escabarte, A. B. S. & Madu, A. M. (2019). Integration of information and communication technology in nursing education in Southeast Asia: A systematic literature review. *Journal of Education and Health Promotion*, *8*(1). https://doi.org/10.4103/jehp.jehp_240_18.

[103]. Ogunode, N. J., Okwelogu, I. S. & Olatunde-Aiyedun, T. G. (2021). Challenges and problems of deployment of ICT facilities by public higher institutions during Covid-19 in Nigeria. *International Journal of Discoveries and Innovations in Applied Sciences*, *1*(4), 30–37. http://openaccessjour.

[104]. Olson, M. H. (2015). *Introduction to theories of learning*. New York ,United States of America: Taylor & Francis.

[105]. Omotunde, O. I. & Abigail, A. I. (2017). Information communication technology training needs of academic staff in universities in Ekiti State, Nigeria. *Library Philosophy and Practice*, *2017*(1). Retrieved March 21, 2021, from https://link.gale.com/apps/doc/A500261785/AONE?u=wash89460&sid=AONE&xid=2c299f35.

[106]. Ozerbas, M. A. & Erdogan, B. H. (2017). The effect of the digital classroom on academic success and online technologies self-efficacy. *International Forum of Educational Technology & Society.* Retrieved March 27, 2021, from https://eric.ed.gov/?id=EJ1115665.

[107]. Piaget, J. (1980). *Adaptation and intelligence: Organic selection and phenocopy*. Retrieved June 04, 2021, from https://www.journals.uchicago.edu/doi/abs/10.1086/412600?journalCod e=qrb.

[108]. Plessis, E., & Westhuizen, G. Van Der. (2021). Building academic integrity through online assessment apps. *Proceedings of the Education and New Developments Conference, 2*, 49-53. https://doi.org/10.36315/2022v2end011.

[109]. Prestridge, S., Tondeur, J. & Ottenbreit-Leftwich, A. T. (2019). Insights from ICT-expert teachers about the design of educational practice: The learning opportunities of social media. *Technology, Pedagogy and Education*, *28*(2), 157–172. https://doi.org/10.1080/1475939X.2019.1578685.

[110]. Puccioni, J. & Desir, S. (2021). Using digital tools to engage in collaborative data-based decision-making. *Reading Teacher*, *75*(2), 241–247. https://doi.org/10.1002/trtr.2042.

[111]. Rogers, E. M. (2003). *Diffusion of innovation*. New York ,United States of America: Free Press of Glencoe.

[112]. Salikin, H. & Tahir, S. Z. Bin. (2017). The social media-based approach in teaching writing at Jember University, Indonesia. *International Journal of English Linguistics*, *7*(3), 46. https://doi.org/10.5539/ijel.v7n3p46.

[113]. Salvo, S. G., Shelton, K. & Welch, B. (2019). African American males learning online: Promoting academic achievement in higher education. *Online Learning Journal*, *23*(1), 22–36. https://doi.org/10.24059/olj.v23i1.1390.

[114]. Samanta, A. (2018). ICT and academic integrity at secondary level. *NSOU Open Journal*, *1*(1).

[115]. Sarfo, F. K. & Yidana, I. (2016). University lecturers experience in the design and use of Moodle and blended learning environments. *The Online Journal of New Horizons in Education*, *6*(2), 143–154.

[116]. Serow, P., Callingham, R. & Muir, T. (2016). *Primary mathematics capitalising on ICT for today and tomorrow*. United States of America: Cambridge University Press.

[117]. Setiawan, A. M., Munzil & Fitriyah, I. J. (2021). Trend of learning management system (LMS) platforms for science education before-after Covid-19 pandemic. *AIP Conference Proceedings*, *2330*(March), 5–10. https://doi.org/10.1063/5.0043196.

[118]. Settlage, J., Southerland, S. A., Smetana, L. K. & Lottero-Perdue, P. S. (2017). *Teaching science to every child: Using culture as a starting point*. United States of America: Taylor & Francis.

[119]. Shahzad, S. K., Hussain, J., Sadaf, N., Sarwat, S., Ghani, U. & Saleem, R. (2020). Impact of virtual teaching on ESL learners; Attitudes under Covid-19 circumstances at post graduate level in Pakistan. *English Language Teaching*, *13*(9), 1. https://doi.org/10.5539/elt.v13n9p1.

[120]. Shurygin, V., Ryskaliyeva, R. & Dolzhich, E. (2022). Transformation of teacher training in a rapidly evolving digital environment. *Educ Inf Technol*, *27*, 3361–3380. https://doi.org/https://doi.org/10.1007/s10639021-10749-z.

[121]. Singhavi, C., Basargekar, P. & Somaiya, K. J. (2019). Barriers perceived by teachers for use of information and communication technology (ICT) in the classroom in Maharashtra, India. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *15*(2), 62–78. http://img.asercentre.org/docs/Publications/ASER Reports/ASER 2017/aser2017nationalp.

[122]. Sobaih, A. E. E., Moustafa, M. A., Ghandforoush, P. & Khan, M. (2016). To use or not to use? Social media in higher education in developing countries. *Computers in Human Behavior*, *58*, 296–305. https://doi.org/10.1016/j.chb.2016.01.002.

[123]. Spaulding, M. (2016). Does a Web 2.0 based technology integration course develop TPACK ready preservice teachers? *Proceedings of Society for Information Technology & Teacher Education International Conference*, 3075–3081, https://www.learntechlib.org/primary/p/172128/.

[124]. Swaramarinda, D. R. (2018). The usefulness of information and communication technology in entrepreneurship subject. *Journal of Entrepreneurship Education*, *21*(3).

[125]. Thomas, K. A.,Chamunorwa, E. & Bessie, M. (2017). Evaluating ICT challenges associated with the teaching and learning of a level chemistry in eight high schools in Glen View Mufakose District, Harare, Zimbabwe. *International Journal of Science and Research (IJSR)*, *6*(3), 391–401. https://www.ijsr.net/archive/v6i3/2031705.pdf.

[126]. Tomaro, Q. P. V. & Mutiarin, D. (2018). ICT integration in the educational system of Philippines. *Journal of Governance and Public Policy*, *5*(3). https://doi.org/10.18196/jgpp.5399.

[127]. Torii, A., Kamidate-Yamaguchi, M. & Kubota, K. (2019). The actual condition of teachers and the teacher training about ict utilizaion in Leyte, the Philippines. *Proceedings - 2019 International Symposium on Educational Technology, ISET 2019*, 87–91. https://doi.org/10.1109/ISET.2019.00027.

[128]. Tsai, T. I. & Yang, W. L. (2018). How do pre-service teachers work together on curriculum development projects: A study on tools and tasks in collaborative information behavior. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 10766 LNCS*. Springer International Publishing. https://doi.org/10.1007/978-3-319-78105-1_59.

[129]. Verkijika, S. F. (2019). Digital textbooks are useful but not everyone wants them: The role of technostress. *Computers and Education*, *140*(May), 103591. https://doi.org/10.1016/j.compedu.2019.05.017.

[130]. Villalba, A. & González-Rivera, M. D. (2017). *Obstacles perceived by physical education teachers to integrating ICT*. *16*(1).

[131]. Voithofer, R., Nelson, M. J., Han, G. & Caines, A. (2019). Factors that influence TPACK adoption by teacher educators in the US. *Educational Technology Research and Development*, *67*(6), 1427–1453. https://doi.org/10.1007/s11423-019-09652-9.

[132]. Vroman, K. G., Arthanat, S. & Lysack, C. (2015). "Who over 65 is online?" Older adults' dispositions toward information communication technology. *Computers in Human Behavior*, *43*, 156–166. https://doi.org/10.1016/j.chb.2014.10.018.

[133]. Warioba, M. M., Machumu, H., Kulunga, K. & Mtweve, L. (2021). Adoption of ICT as a pedagogical tool in community secondary schools in Tanzania. In *Education and Information Technologies, 27,* 2835–2858.

[134]. Watts, L. (2016). Synchronous and asynchronous communication in distance learning. *The Quarterly Review of Distance Education*, *17*(1), 23–32.

[135]. Wiranda, R., Petrus, I., & Vianty, M. (2020). The use of ICT in learning process by vocational teachers of english. *English Review: Journal of English Education*, *8*(2), 119. https://doi.org/10.25134/erjee.v8i2.2617

[136]. Wuttke, E., Seifried, J. & Niegemann, H. (2020). *Vocational education and training in the age of digitization: challenges and opportunities* (1st ed.). Verlag Barbara Budrich. https://doi.org/https://doi.org/10.2307/j.ctv18dvv1c.

[137]. Ynuus, M. M., Salehi, H., Amini, M., Shojaee, M. & Yun Fei, W. (2016). Activities and suggestions for using social networking in teaching ESL writing. *Journal of Theoretical and Applied Information Technology*, *84*(2), 170–182.

[138]. Yuliyanto, Y. (2021). *Students' perceptions on the use of whatsapp in reading activities : A case study at SMP Negeri Palembang*. Uin Raden Fatah Palembang.

[139]. Zainil, M., Prahmana, R. C. I., Helsa, Y. & Hendri, S. (2018). ICT media design for higher grade of elementary school mathematics learning using CS6 program. *Journal of Physics: Conference Series*, *943*(1). https://doi.org/10.1088/1742-6596/943/1/012046.

[140]. Zamora-Antuñano, M. A., Rodríguez-Reséndiz, J., Cruz-Pérez, M. A., Reséndíz, H. R., Paredes-García, W. J. & Díaz, J. A. G. (2022). Teachers' perception in selecting virtual learning platforms: A case of Mexican higher education during the Covid-19 crisis. *Sustainability (Switzerland)*, *14*(1). https://doi.org/10.3390/su14010195.