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Pre-service Teachers' Readiness on Online Learning and their 21st Century Pedagogical Skills

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Abstract

This study looked at the online learning readiness and 21st century pedagogical skills among pre-service teachers of a state university in the Philippines during the school year 2021-2022. The descriptive-correlational method was applied through an adapted survey questionnaire administered to 28 pre-service teachers. The findings revealed that pre-service teachers were ready for online learning in terms of computer/internet self-efficacy, self-directed learning, learner control, motivation for learning, and online communication self-efficacy. They were also equipped with 21st century pedagogical skills such as information and communication technology skills, life-long learning skills, flexibility skills, creative problem-solving skills, and critical thinking skills. The findings also indicated a substantial relationship between the pre-service teachers' readiness in online learning and their 21st century pedagogical skills. The study suggests that universities may create appropriate provisions to provide their faculty members with the necessary professional development training opportunities to raise awareness and improve e-pedagogical skills.

Keywords: *Online learning readiness, 21st-century skills, teaching pedagogy, pre-service teachers*

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1. Introduction

The outbreak of the COVID virus worldwide has significantly altered almost all parts of life, including education. To contain the spread of the virus, the World Health Organization (2019) recommended social and physical distancing standards while several countries implemented community lockdown and quarantine. Most countries worldwide imposed short-term closure of educational institutions (UNESCO, 2020), which also pushed the education landscape to online learning platforms (Crawford et al., 2020). However, the introduction of online learning brought a variety of hazards, issues, and concerns for both teachers and students, particularly in higher education institutions (HEIs) (Bao, 2020).

Learners can benefit from online courses in a variety of ways, including convenience, flexibility, and the ability to collaborate and closely with teachers and other students from various schools or even around the world (Hung et al., 2010). However, self-regulated nature and the distance between instructors and students, online learning can be stressful for students. According to Liu and Roberts-Kaye (2016), online learning readiness, cog develops for successful learning in a web-based environment, is necessary for academic success. With online learning readiness, it manifests the attributes of recognizing the self-directed nature, formulating learning strategies, obtaining technology competencies, adjusting to digital etiquettes, and being open for help-seeking (Liu, 2019). According to Liu (2019), student preparation for online learning has been found strongly linked to online learning success. Meanwhile, Mosa et al. (2016) and Yilmaz (2017) found that students' online learning readiness affects their academic achievement.

With these arguments, this paper explores and presents the readiness level of the pre-service teacher at a state university in the province of Laguna, Philippines and tests any relationship to their teaching pedagogy. As mandated by the Commission on Higher Education (CHED), no education student can graduate without accomplishing the prescribed hours for both actual classroom observation and practice teaching. Pre-service teachers usually take their practicum teaching experience outside campus, in the nearby public elementary and high schools, or in-campus at the primary education department of their university or college. Although the pre-service teacher's practicum experience is more formal because it is guided by policies and standards from the Department of Education (DepEd) compared with the immersion experience of the Bachelor of Arts students, these student-teachers are trained to become well-equipped and

qualified teachers who can pass on their expertise and technical knowledge to the next generation of students. However, face-to-face learning was nowhere near possible with the virus surrounding our premises, and online learning was favored. Through this paper, the result sheds light on how the pre-service teachers' level of readiness affects their teaching pedagogy viz-a-viz how teacher education institution prepares student teacher for online learning.

2. Literature review

2.1. Online Learning Readiness

In recent years, online learning in higher education has evolved from an instructor-led paradigm to a learner-centered paradigm through the use of technology (Ituma, 2011). The capacity to bypass the temporal and spatial constraints of traditional educational environments is one of the potential benefits of online learning (Bates, 2015). Students must be prepared to learn online in order to completely realize the benefits of online learning. Warner et al. (1998) first characterized online learning readiness in the Australian technical vocational education and training (TVET) sector. Many scholars have examined this idea since then (Hung et al., 2010), and various variables of online learning readiness have been identified and verified. Computer and internet self-efficacy, learner control, online communication self-efficacy, motivation for learning, and self-directed learning are several factors associated with online learning readiness.

Computer and Internet Self-efficacy. Because online lectures are provided using technology-enhanced devices, students must be prepared and proficient in using a computer and the internet. Hung et al. (2016) established the notion of computer and online self-efficacy, which combines computer and internet self-efficacy. This notion refers to students' technological knowledge, abilities, attitudes, and competencies when it comes to using technology to achieve educational goals and objectives in Universities (Hong & Kim, 2018).

Learner Control. Traditional face-to-face learning differs substantially from online learning. Without face-to-face sessions with professors, online learning requires students to direct their own learning. Despite the fact that learner control has been studied for more than half a century, due to its multidimensionality, no clear definition or theory has emerged (DeRouin et al., 2015). Learner control refers to the amount to which students can choose what they want to learn, when they want to study it, and how they want to learn it (Kraiger & Jerden, 2017). Although

DeRouin et al. (2015) define learner control as "sequence, pacing, content, context, method of presentation, optional content, task difficulty, and incentives" in this study, learner control is defined as the ability to direct one's own learning progress, to maintain learning without being distracted by other online activities, and to repeat online material based on one's educational needs.

Online Communication Self-efficacy. In their studies of internet self-efficacy and anxiety, Kim and Glassman (2013) and Paul and Glassman (2017) proposed that online communication self-efficacy, along with search self-efficacy, organization efficacy, differentiation self-efficacy, and reactive/generative self-efficacy, is part of a larger concept of internet self-efficacy. Due to the lack of face-to-face connection between the lecturer and the student in online learning, students' only means of communicating with the professor and other classmates is through online communication. It is critical for students to engage in online communication (McVay, 2000) in order to reflect on and internalize what they have learned by posting questions and expressing their feelings and views. In this study, online communication self-efficacy is deemed important enough to be included in the assessment of students' preparation for online learning (Hung et al, 2016).

Self-directed Learning. It is a learning strategy, which allows learners to take control of their own learning process through the diagnosis of learning needs, learning goals, learning strategies and evaluate learning performance and outcomes (Knowles, 2012). Self-directed learning is critical in the online learning environment to guarantee that students are prepared for this style of instruction. Self-directed learners are more engaged in learning tasks such as reading online learning materials, completing classroom tasks, and planning and reviewing learning milestones. Five items were used to assess learners' self-directed learning in this study. They included the ability to carry out our own study plans, request help when challenges arose, time management, setting learning goals, and establishing learning performance standards.

Motivation for Learning. Schunk et al. (2018) define motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 4). Motivation can influence what, how, and when student learn (Schunk, 1995). Past research also shows that motivated learners are more likely to adopt a deep approach to learning, undertake challenging activities, to be actively engaged, to enjoy and, and to exhibit enhanced performance, persistence, and creativity (Schunk et al., 2008). Studies that explore motivation to learn in online contexts are relatively limited both in number and scope (Artino, 2008; Bekele, 2010). Yang Tsia et al. (2000) found that motivation

is positively related to how learner perceive each other's presence in online courses. According to Saadé et al. (2007), intrinsic and extrinsic motivation both play a part in the success or failure of online learning. In this study, motivation to for online learning focused on students' openness to new ideas, motivated to learn, improve from past mistakes and sharing ideas with others.

2.2. 21st Century Pedagogical Skills

The search for universal change in formal education, which prompted the mandate for qualified and professional teachers, is part of the Education for All (EFA), Millennium Development Goal (MDG), and Sustainable Development Goal (SDG) lineups (Humphreys et al., 2020; Komila, 2020; Ismail & Jarrah, 2019; Zanfir, 2019; Baxodirovna, 2019). Relative to this, the CHED mandated all HEIs to improve the quality of Philippine education by offering superior preservation training to future teachers. In addition, CHED has urged all TEIs to improve their curriculum by establishing higher standards in the definition of their programs' aims, methods, and procedures, as well as offering appropriate, goal-oriented, and contextualized experiences for pre-service teachers (CMO 30, s. 2004). According to Voogt et al. (2013), not only students, but also teachers must learn 21st century skills, and teachers must be equipped to facilitate the development of 21st century abilities. Teachers are expected to be familiar with diverse educational techniques and suitable ways to employ information and communication technology in encouraging the development of their students' 21st century skills (Valtonen et al., 2017). As such, teachers should have a good understanding of how to develop and utilize 21st-century skills (Valli et al., 2014). Teacher education, which is critical in the preparation of future teachers, is critical in establishing the knowledge and abilities necessary for teachers to acquire these skills.

3. Methodology

3.1. Research Design

The study utilized a descriptive-correlational research design that described and analyzed the respondents' readiness for online learning and how it affects the development of their 21st century pedagogical skills. The goal of descriptive research is to describe a phenomenon and its characteristics, so it is more concerned with what rather than how or why something has happened. Therefore, observation and survey tools are often used to gather data (Rebmann, 2020). Meanwhile, correlational research design involves measuring two or more relevant variables and

assessing their relationship to other variables either a positive correlation, a negative correlation, or zero correlation (Gravetter & Forzano, 2019).

3.2. Respondents of the Study

The respondents of the study consisted of 173 Technology and Livelihood Education (TLE) pre-service teachers distributed to the four campuses of a state university in Laguna, Philippines. The study used a random sampling technique because of the big number of population. The distribution of the samples emerged as 44 from Sta. Cruz and San Pablo, 23 from Siniloan and 17 from Los Baños.

3.3. Research Instrument

The survey questionnaire was the primary instrument used as data-gathering tool. The study adopted a questionnaire to describe and gather information from the respondents. The questionnaire consisted of two parts. The first part focused on the Online Learning Readiness based on Hung et al. (2010), which contained 1) computer/internet self-efficacy, 2) self-directed learning, 3) learner control, 4) motivation for learning, and 5) online communication self-efficacy. The second part focused on the 21st Century Pedagogical Skills adapted from RPMS-PPST of the Department of Education. These contained skills possessed by a 21st century teacher for them to be able to bring quality education. This set of skills consists of 1) information and communication skills, 2) lifelong learning skills, 3) flexibility skills, 4) creative problem-solving skills, and 5) critical thinking skills. To guarantee the research instrument's validity and reliability, the study hired experts to validate the survey questionnaire.

3.4. Research Procedure and Ethical Consideration

The survey was conducted through the aid of Google Forms. The link was sent to the participants through email and social media accounts. The study ensured that respondents were never forced to attend the data collection procedures especially when they believe that the conduct of this study would bring them harm of any kind and/or type. The respondents were given the total freedom to withdraw anytime once conflicts especially on their schedule arise. This study also upheld that all personal information, experiences, encounters, conditions, and situations disclosed were kept with utmost confidentiality, assurance, anonymity, and security. The respondents were also reminded that copies of this study are freely available once they request such; for them to be

able to see how their responses were treated, interpreted, or discussed. The study used data only for academic and research purposes and should never be used as an instrument to spread hasty generalizations, misinterpretations, confusion, and insecurities that are directly or indirectly related to the situation of the respondents involved.

3.5.Statistical Treatment

The measures of central tendencies and standard deviation were utilized for the respondents' perceptions. Furthermore, Pearson Product Moment Correlation was used to answer the inferential question of whether there is a significant relationship between pre-service teachers' online learning readiness and their 21st century pedagogical skills.

4. Findings and Discussion

Table 1 shows the extent to how the respondents described their readiness in online learning. The result of the study reveals that the online learning readiness in terms of computer/internet self-efficacy were perceived as 'ready' with an overall mean of 3.41, which only indicates that most of the respondents strongly perceive themselves as highly capable when it comes to navigating online learning elevated by their computer or internet self-efficacy. It is because pre-service teachers use internet on a daily basis to prepare lessons, to accomplish school tasks and also to extend the range of their learning as it is significant for them to exhibit interactive teaching method, supported by the internet, which will enable them to give more attention to learners' needs and support shared learnings as well.

In terms of self-directed learning, the results indicate that all the indicators were perceived as ready with an overall mean of 3.29. It can be gleaned that since the pre-service teachers were exposed to high-order, open-ended, and situational questions that engage and stimulate their curiosity, this eventually leads them down the path of self-directed learning.

In terms of learner control, the findings reveal that all indicators were perceived as ready by the respondents with an overall mean of 3.24, which means that the respondents were able to make their own decisions regarding the sequence, pace, flow, amount, and review of instructions.

It can also be observed that the pre-service teachers have already profiled the learning styles that suit well their teaching goals.

Table 1

Perceived Online Learning Readiness

Indicators	Mean	SD	Descriptive Interpretation
Computer/Internet Self-efficacy			
1. Performing basic functions of Microsoft Office programs (MSWord, MS Excel, MS PowerPoint)	3.40	0.52	Ready
2. Knowledge and skills I have on how to manage software for online learning	3.31	0.54	Ready
3. Using the Internet to find information	**3.52**	0.50	Very Much Ready
Overall	3.41	0.45	Ready
Self-directed Learning			
1. Carry out my own study plan while learning online	3.30	0.48	Ready
2. Seek assistance when facing learning problems	3.34	0.54	Ready
3. Manage my time well while learning online	3.25	0.60	Ready
4. Set up my online learning goals	**3.35**	0.54	Ready
5. Achieve a high expectation for my learning performance	3.21	0.54	Ready
Overall	3.29	0.43	Ready
Learner Control			
1. Direct my own learning progress while learning online	3.30	0.51	Ready
2. Focus on online learning and not be distracted by other online activities such as WhatsApp, Insta, FB, etc.	3.06	0.67	Ready
3. Utilize the online learning materials based on my needs	**3.35**	0.48	Ready
Overall	3.24	0.48	Ready
Motivation for Learning			
1. Open to new ideas when learning online	3.51	0.50	Very Much Ready
2. Motivated to do online learning	3.31	0.59	Ready
3. Open for improvement based on my previous mistakes while learning online	3.48	0.50	Ready
4. Willing to share my ideas with others while learning online	**3.52**	0.50	Very Much Ready
Overall	3.46	0.45	Ready
Online Communication Self-efficacy			
1. Confident in using online tools to communicate with others	**3.41**	0.52	Ready
2. Expressing my thoughts through online text messages/ posting comments	3.32	0.57	Ready
3. Posting questions in online discussion for clarification of topic/lesson	3.30	0.55	Ready
Overall	3.34	0.49	Ready

Legend: 3.50-4.00 Very Much Ready, 2.50-3.49 Ready, 1.50-2.49 Slightly Ready, 1.00-1.49 Not Ready

In terms of motivation for learning, the results indicate that the overall mean is 3.46 which means that the respondents perceived their online learning readiness in terms of motivation for learning as ready. This means that pre-service teachers have high motivation when it comes to

making sure that they are motivated to do their teaching in a high-quality level. Since pre-service teachers were exposed to varied experiences and were also given the opportunity of handling students it helps boost their motivation for learning.

In terms of online communication self-efficacy, the findings reveal that all indicators were perceived as ready by the pre-service teachers with an overall mean of 3.34, which only means that the pre-service teachers are also highly competent and able when it comes to making sure that their lessons are well communicated during the online discussion. It is due to the fact that they were engaged in different activities that honed their communication skills, some of which are demonstration teaching, reporting, presentation, and practice teaching.

In summary, the respondents have been found to ready in all the aspects of online learning readiness. This only means that pre-service teachers' readiness to learn, their learning interests, and learning ability were already established. Results indicate that the TLE pre-service teachers were motivated to learn online, open to new ideas when learning online, open to improvement based on their previous mistakes, and willing to share ideas with others while learning online. These findings are congruent with that of Cooper et al. (2020) and Hung et al. (2020) that teachers are prepared to integrate technology into their teaching.

Table 2 presents the respondents' perception of their 21st-century pedagogical skills. In terms of information and communication technology skills, the results showed an overall mean of 3.31 (equipped), which only means that majority of the pre-service teachers are highly confident that their information and communication technology skills are enough or sufficient to make online learning efficient and feasible. This is due to the fact that the respondents use the internet as part of their daily lives especially in accomplishing school tasks.

Students claim that ICT facilitates teacher-student interaction. It assists them in planning their lessons and providing feedback and gain access to institutions and universities. This is parallel with the findings of Jones (2020) on the efficient usage of ICT software and hardware for the teaching-learning process.

Table 2

Perceived 21st Century Pedagogical Skills

Indicators	Mean	SD	Interpretation
Information and Communication Technology Skills			
1. use computer operating systems, to access software programs and manage the basic functions of a computer.	3.32	0.53	Equipped
2. confidently use core computer programs to produce common digital information such as Word documents and PowerPoint presentations.	3.33	0.56	Equipped
3. create microblogging in posting and sharing my educational views and ideas.	3.11	0.62	Equipped
4. communicate and interact with students through the use of various communication applications such as Google meet, Zoom, and Microsoft teams	**3.37**	0.52	Equipped
5. understand deliberately the ethical and legal issues surrounding the access and use of information.	3.35	0.53	Equipped
6. create and engage with digital information for a specific task	3.36	0.48	Equipped
7. use appropriate software to solve a problem or to communicate an idea more clearly	3.30	0.51	Equipped
Overall	3.31	0.43	Equipped
Lifelong Learning Skills			
1. knowledge is redefining every second and I should know those as I apply them	3.42	0.50	Equipped
2. technology can be used as a tool to research, organize, evaluate, and communicate information and to develop further my literacy in various areas of knowledge.	3.48	0.53	Equipped
3. having advanced knowledge than what my students have on many topics is needed in delivering the lesson.	3.43	0.53	Equipped
4. learning is not a stagnant thing, so I conduct action research.	3.37	0.52	Equipped
Overall	3.42	0.46	Equipped
Flexibility Skills			
1. always prepared for the changes in delivering learning to students.	3.38	0.50	Equipped
2. know how to shift from one teaching method to another as the need arises.	3.36	0.54	Equipped
3. know how to prepare traditional lesson plans, differentiated instructions, and MI-based activities and how to handle those simultaneously.	3.39	0.52	Equipped
4. accept change as it happens inside and outside of the classrooms.	3.41	0.51	Equipped
5. know how to accept and adjust my technical know-how and am always prepared to execute those in my delivery of instruction.	3.37	0.53	Equipped
Overall	3.38	0.46	Equipped
Creative Problem-solving Skills			
1. analyze and evaluate major alternative points of view before arriving at a solution.	3.34	0.49	Equipped
2. solve different kinds of non-familiar problems in both conventional and innovative ways.	3.27	0.52	Equipped
3. identify and ask significant questions that clarify various points of view and lead to better solutions.	3.34	0.52	Equipped
4. analyze how parts of a whole interact with each other to produce overall outcomes in complex systems.	3.36	0.56	Equipped
5. immediately address classroom-related concerns in varying ways.	3.34	0.54	Equipped
Overall	3.33	0.45	Equipped
Critical Thinking Skills			
1. use various types of reasoning (inductive, deductive, intuitive, etc.) as appropriate to the situation.	3.28	0.59	Equipped
2. analyze and evaluate evidence, arguments, claims, and beliefs.	3.31	0.56	Equipped
3. synthesize and make connections between information and arguments.	3.34	0.51	Equipped
4. interpret information and draw conclusions based on the best analysis.	3.34	0.54	Equipped
5. reflect critically on learning experiences and processes.	3.38	0.55	Equipped
Overall	3.33	0.49	Equipped

Legend: 3.50-4.00 Well Equipped, 2.50-3.49 Equipped, 1.50-2.49 Slightly Equipped, 1.00-1.49 Not Equipped

In terms of lifelong learning skills, all indicators were perceived as equipped by the respondents with an overall mean of 3.42; pre-service teachers are in a constant agreement with themselves that learning should be a lifelong process of knowing what makes them competent and avoiding the things that make them incompetent. Since the respondents were engage in real life experiences, they were able to develop their lifelong learning skills. Because pre-service teachers attend seminars and training, classroom observation, and practice teaching, they were able to enhance this particular skill. This explains the findings of Sudhakar (2018) that teachers who embrace a lifelong learning mentality have access to material that they can utilize to collaborate with others and that they viewed mistakes and challenges as part of the learning process rather than failures by learning teachers.

In terms of flexibility skills, the results indicated respondents 'equipped' with an overall mean of 3.38, which means pre-service teachers can fit themselves in learning situations where pressure is indeed high and challenging. One reason for this is because the respondents were able to adapt to the sudden change in the educational system from face-to-face to online learning.

In terms of creative problem-solving skills, the findings showed pre-service teachers 'equipped' with all the skills indicators at an overall mean of 3.33. These indicators of problem-solving skills are congruent with that of Mandal (2018) on pedagogical tactics to address emotional, psychological, and cognitive impediments, Spot (2018) on nature of course material and Origo (2020) on comfortable learning environment.

In terms of critical thinking skills, the results revealed all indicators were perceived as equipped by the respondents with an overall mean of 3.33 implying pre-service teachers as highly competent driven by critical thinking. This is due to the fact that the respondents were given opportunity to participate in discussions, both online and offline. Through this, they were able to come across different perspective and it also makes way on the introduction of new information.

In summary, the pre-service teachers have been found equipped with the necessary 21st century pedagogical skills amidst the new normal settings. This is due to the fact that the respondents were also ready for online learning. The result confirms the findings of Alharby (2013) on the educators and learners 21st century skills, Bozalek et al. (2013) on digital skills, values, knowledge, and true learning and Hofny (2015) on the foundation of educational process.

Table 3

Test of Correlation Between Online Learning Readiness and 21st-Century Pedagogical Skills

Online Learning Readiness	21st Century Pedagogical Skills				
	Information and Communication Technology Skills	Lifelong Learning Skills	Flexibility Skills	Creative Problem-Solving Skills	Critical Thinking Skills
Computer/Internet Self-efficacy	.648**	.555**	.532**	.540**	.577**
Self-directed learning	.723**	.616**	.666**	.623**	.607**
Learner control	.718**	.586**	.594**	.585**	.511**
Motivation for learning	.628**	.700**	.620**	.571**	.500**
Online communication self-efficacy	.696**	.599**	.647**	.569**	.517**

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

As shown in table 3, there is a significant relationship between the online learning readiness level of the pre-service teacher and their 21st century pedagogical skills. It is revealed that computer/internet self-efficacy is significantly related to all the 21st century pedagogical skills in terms of information and communication skills (.648**), life-long learning skills (.555**), flexibility skills (.532**), creative problem-solving skills (.540**), and critical thinking skills (.577**). This means that the respondents online learning readiness in terms of computer/internet self-efficacy has significantly affected the development of their 21st century pedagogical skills, which is essential in today's learning of students. This implies then that having computer/internet self-efficacy would greatly contribute to the development of their skills. This is somewhat associated with the study of Kent and Giles (2017) that technology use as a teaching tool will probably increase as preservice teachers' self-efficacy for using it rises. Increased technological learning is a logical side effect of using technology as a teaching tool. Students graduating with the knowledge and abilities necessary to successfully use technology for lifelong learning is the ultimate result of improved teacher technology self-efficacy.

The table also revealed that self-directed learning is significantly related to all the 21st century pedagogical skills in terms of information and communication skills (.723**), life-long learning skills (.616**), flexibility skills (.666**), creative problem-solving skills (.623**), and critical thinking skills (.607**). This means that self-directed learning has significantly affected the development of their 21st-century skills; if pre-service teachers were self-directed learners,

they will be able to develop their teaching skills. This is similar to Geng et al. (2019) that effectiveness of students' learning can be impacted by their capacity for self-directed learning and their use of learning technology. People who are good at managing their own learning can learn new things and understand how to handle difficulties.

The table also unveils that learner control is significantly related to all the 21st century pedagogical skills in terms of information and communication skills (.718**), life-long learning skills (.586**), flexibility skills (.594**), creative problem-solving skills (.585**), and critical thinking skills (.511**). This means pre-service teachers were able to direct their own learning progress while learning online and were able to utilize online learning material based on their needs, leading to the development of their 21st century skills. This supports Zhang et al. (2017) that perceived learner control was a significant antecedent for both perceived usefulness and perceived ease of use. Learning engagement, performance, and development outcomes may be influenced by learner control.

The table also revealed that motivation for learning is significantly related to all the 21st century pedagogical skills in terms of information and communication skills (.628**), life-long learning skills (.700**), flexibility skills (.620**), creative problem-solving skills (.571**), and critical thinking skills (.500**). While motivation for learning has significantly affected the development of the respondents' teaching skills, having motivation for learning surely increased the possibility of pre-service teachers to hone their skills as 21st-century educators. This is associated with Lin et al. (2017) that learning gains and learning outcomes appear to be greatly influenced by motivation for learning and it is anticipated that it will integrate with the present teaching trend and make use of the benefits of digital learning to create workable teaching strategies for the improvement of teaching.

Finally, online communication self-efficacy is significantly related to the 21st-century pedagogical skills of the respondents in terms of information and communication skills (.696**), life-long learning skills (.599**), flexibility skills (.647**), creative problem-solving skills (.569**), and critical thinking skills (.517**). With a higher level of online communication self-efficacy, there is a higher chance of pre-service teachers be equipped with the 21st century skills. This is similar to the findings of Jan (2015) on the strong and favorable correlation between academic self-efficacy and prior online learning experience, computer self-efficacy and prior online learning experience, and academic self-efficacy and student fulfillment. Similarly, it

supports Womble (2007) on the strong correlation between student achievement in online learning settings and computer self-efficacy.

The findings of the study support previous studies that many technologies have been used in the teaching and learning process in order to make it simpler and easier. The students' readiness for online learning is essential since it indicates how willing they are to switch from traditional to online learning. Further, because it introduces students to the technical facets of virtual learning, their familiarity with and aptitude for learning tools pertinent to the virtual environment are also essential. When assessing the methods students use to succeed in the present educational change, teachers must also take into account the different perspectives of the students (Panergayo & Almanza, 2020). There is a pedagogical revolution occurring in the methods of teaching and learning (Kim & Bonk, 2016). As a result, online distance education is growing popularity around the world, and high-quality instruction is in high demand (Kennedy, 2015).

5. Conclusion

The main objective of this study was to describe the online learning readiness of the respondents and how it affects the development of their 21st century pedagogical skills. In addition, it examined the significant relationship between pre-service teachers' readiness in online learning and their 21st-century pedagogical skills. The study utilized a descriptive research design and used a survey questionnaire that is administered to the total population of 128 students taking Technology and Livelihood Education at a state university in the Philippines.

Results revealed that there is a significant relationship between respondents' readiness in online learning and their 21st century pedagogical skills. As a result, the hypothesis stating that there is no significant relationship between respondents' readiness in online learning and their 21st century pedagogical skills is not sustained.

This study suggests that specific pedagogical skills may be required to pre-service teachers. Awareness of these abilities is critical for colleges as well as instructors involved in online education. Universities may create appropriate provisions to provide their faculty members with the necessary professional development training opportunities in order to raise awareness and improve e-pedagogical skills. Furthermore, in order to make the greatest use of these technological

tools, pre-service teachers may train their students as well, so that they become familiarized with the online teaching and learning environment. Further research is also suggested for a more in-depth examination of the problems and obstacles related to online teaching and learning that teachers, administrators, and students experience.

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