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RESEARCH ARTICLE

POST-PANDEMIC DIGITAL SELF-EFFICACY AND ONLINE LEARNING READINESS OF PRE-SERVICE TEACHERS

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Abstract

The study examined the digital self-efficacy and online learning readiness of pre-service teachers after the pandemic. Using a descriptive correlational research design, the results indicated that pre-service teachers have a high level of digital self-efficacy in several areas of technology integration, including digital usage, digital application, digital-infused learning, technology literacy, and digital-supported assessment. In addition, the results indicate that pre-service teachers are on the verge of being ready for online learning, though they still need to improve their time management and written communication skills. Age was found to be a significant factor in readiness for online learning, with those aged 25-34 demonstrating greater readiness than those aged 18-24 and 35-44. However, there was no significant difference when the participants were grouped by gender. These findings provide valuable insights into the digital self-efficacy and e-learning readiness of pre-service teachers, which can inform the development of strategies and interventions to improve their skills and, ultimately, enhance the quality of education in the post-pandemic world. Recommendations for digital education post-pandemic include providing training and resources for educators, supporting female teachers, incorporating online readiness training for pre-service teachers, tailoring programs to different age groups, and providing additional support for younger pre-service teachers to increase their digital self-efficacy.

Introduction:-

The COVID-19 pandemic has brought about significant changes in the field of education, particularly in the adoption of online and hybrid learning models. As a result, it has become crucial for pre-service teachers to possess digital self-efficacy and e-learning readiness skills to effectively deliver quality education in the post-pandemic world. Previous studies have highlighted the importance of digital self-efficacy and e-learning readiness skills for effective teaching in online and hybrid learning environments. For instance, research by Kirschner and Merrienboer (2013) found that teachers' digital self-efficacy significantly impacts their ability to integrate technology into their teaching practices. Similarly, Wang et al. (2020) found that e-learning readiness significantly influences students'

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online learning experiences.Despite the growing recognition of the importance of digital self-efficacy and e-learning readiness skills in education, limited research has explored pre-service teachers' preparedness for the post-pandemic digital learning environment.

This paper sought to address this gap by investigating pre-service teachers' digital self-efficacy and e-learning readiness during post-pandemic. This study aimed to investigate the digital self-efficacy and online learning readiness of pre-service teachers after the pandemic. The profile of the respondents, in terms of age and sex, was examined. The level of digital self-efficacy was assessed based on digital usage, digital application, digital-infused learning, technology literacy, and digital citizenship, and digital-supported assessment. Moreover, the online learning readiness of pre-service teachers was determined based on computer internet self-efficacy, self-directed learning, learner control, motivation in learning, and online communication self-efficacy.

Purpose of the study and Research Questions

The study investigated whether there is a significant difference in the online learning readiness and the level of digital self-efficacy of pre-service teachers when grouped according to age and sex. Also, the study determined whether there is a significant relationship between digital self-efficacy and e-learning readiness among pre-service teachers. Specifically, it sought to answer the following questions:

1. What is the profile of the respondents in terms of age and sex?

2. What is the level of digital self-efficacy of pre-service teachers considering digital usage, digital application, digital-infused learning, technology literacy & digital citizenship, and digital-supported assessment?

3. What is the online learning readiness of pre-service teachers in terms of computer internet self-efficacy, self-directed learning, learner control, motivation in learning, and and online communication self-efficacy?

4. Is there a significant difference in the online learning readiness of the respondents when grouped according to age and sex?

5. Is there a significant difference in the level of digital self-efficacy of pre-service teachers when grouped according to age, and sex?

6. Is there a significant relationship between digital self-efficacy and e-learning readiness among pre-service teachers?

Methods:-

Research design

This study used a descriptive-correlational research design to explore the post-pandemic digital self-efficacy and e-learning readiness of pre-service teachers and also to investigate the relationship between digital self-efficacy and e-learning readiness among pre-service teachers. The descriptive research design was appropriate for this study as it allowed the researcher to describe and analyze the current state of pre-service teachers' digital self-efficacy and e-learning readiness in the post-pandemic world. This design allows the researcher to collect quantitative data through a survey or questionnaire, which can then be analyzed using statistical methods to determine the relationship between variables.

Research Locale

This study was conducted in a Higher Education Institution (HEI) specifically in the education program in the post-pandemic world. The HEI setting is appropriate as it is the training ground for pre-service teachers, and their preparedness for the post-pandemic digital learning environment is crucial to deliver quality education.As a higher education institution, the program aims to produce highly competent and skilled pre-service teachers who are equipped with the necessary knowledge and skills to teach in the post-pandemic world. By conducting this study within the school, it can help identify the strengths and weaknesses of the pre-service teachers in terms of their digital self-efficacy and e-learning readiness. The results of the study can be used by the school to design and implement appropriate interventions to improve the digital literacy skills of the pre-service teachers, which can ultimately benefit the students they will be teaching in the future.

Sampling Design

This study had 226 respondents who were chosen using stratified random sampling. Stratified random sampling is a sampling method used in statistics and data analysis in which the population is separated into strata or subgroups depending on variables such as age, gender, or income. A random sample is then drawn from each stratum in proportion to the size of the stratum in the population. This helps to guarantee that the sample is representative of the population as a whole. Using Raosoft's stratified random sampling, researchers can produce a sample that is representative of the population while simultaneously guaranteeing that each subgroup is appropriately represented in the sample. This can improve the accuracy and generalizability of the research findings.

Table 1:- The Data Calculation of Proportionate Stratified Sampling.

Year Level	N	n
1st year	198	82
2nd year	166	69
3rd year	97	40
4thYear	87	35
Total	548	226

Research Instrument

The survey tool that was used in this study was adopted from two instruments and was pilot tested to consider variables such as validity, reliability, objectivity, and usability when designing a good research instrument (Anduvare, E., 2019). The survey used in this study has three sections, namely;a profile section, a section on digital self-efficacy, and a section on e-learning readiness

In the first section, sample respondents were asked about their age, sex, and course and major. In the second section, the first instrumentmeasured the respondents' level of Digital Self-efficacy. The first instrument was an adopted questionnaire from the study of Mohd Shaharanee et al. (2020). The tool is aligned with the International Society for Technology in Education (ISTE) Standards for Teachers. The Digital Self-Efficacy questionnaire comprises five components: digital usage, digital application, digital-infused learning, digital literacy and citizenship, and digital-supported assessment.

In the second section, the second instrument measured the respondents' level of E-Learning Readiness. The questionnaire was adopted from Yeşilyurt, F. (2021). It hasfivecomponents namely: Computer/Internet self-efficacy, Self-directed learning, Learner control, Motivation for learning, and Online communication self-efficacy.

Validity and Reliability of the Instrument

The items were pilot tested to thirty (30) pre-service teachers who are not samples of the study. The tryout assessed the specific items' applicability, readability, and understandability under the different research questions. The respondents of the tryout of the research instruments were asked to make comments and suggestions for the revision or modification after each item, whether the item can or cannot be scanned and can be understood. Also, a reliability analysis using Cronbach's Coefficient Alpha was used in establishing the reliability of every test item on the digital self-efficacy and e-learning readiness of the pre-service teachers with a Cronbach's alpha of 0.986.

Data Gathering Procedure

The data was gathered using the Google Form. Google Forms is software for running surveys. It is part of Google's free online Google Docs Editors suite. With Google Forms, a researcher can make and look at surveys on her phone or computer's web browser. The researcher does not need any special software. She sees the results as soon as they come in, and charts and graphs make it easy to get a quick overview of the survey results. After downloading the application and the electronic questionnaire on a mobile device, the researcher surveyed identified respondents. The Google Form Software also can synchronize and aggregate tabulated results. The generated results will be downloadable in various formats. The preliminary data cleaning was done in Excel. Frequency counts and other descriptive statistics was employed to detect any errors that may have appeared during data entry. In addition, after the researcher got the small piece of data from data sources, she combined the data gradually and made simple steps with general descriptions and conclusions.

The data gathering procedure for the study included the following steps:

1. Permission to conduct research: A permit from the research adviser was asked to conduct the research.

2. Identify the target population: The target population of the study was the pre-service teachers.
3. Select the sample: A stratified sampling technique was used to select a sample of pre-service teachers.
4. Ask permission: A permission from the education program dean was asked to conduct the study.
5. Pilot testing: Conducted a pilot test of the survey questionnaire to a small group of respondents to assess its reliability and validity.
6. Data collection: Administered the survey questionnaire to the selected sample of pre-service teachers through Google Form.
7. Data processing: Coded the responses and entered the data into a statistical software program for analysis.
8. Data analysis: Analyzed the data using descriptive statistics, correlationto answer the research questions.
9. Interpretation of results: Interpreted the findings and drew conclusions based on the results of the data analysis.
10. Report writing: Wrote a report that includes the background of the study, research questions, methodology, data analysis, results, conclusions, and recommendations for future research.

Scoring Procedure

Table 2 shows the scoring procedure for the Digital Self-Efficacy of the respondents. The Digital Self-Efficacy questionnaire comprised 25 questions from the five components.

Table 2:- Digital Self-efficacy Level of Pre-Service Teachers.

Score	Range	Description	Interpretation
4	3.26-4.00	Strongly Agree	Highly Confident
3	2.51-3.25	Agree	Confident
2	1.76-2.50	Disagree	Poorly Confident
1	1.0-1.75	Strongly Disagree	Not Confident

Table 3 shows the scoring procedure for E-Learning Readiness of the pre-service teachershas five components namely: Computer/Internet self-efficacy, Self-directed learning, Learner control, Motivation for learning, and Online communication self-efficacy.

Table 3:- Online Readiness of the pre-service teachers.

Score	Range	Description	Interpretation
4	3.26-4.00	Strongly Agree	Ready
3	2.51-3.25	Agree	Approaching Readiness
2	1.76-2.50	Disagree	Developing Readiness
1	1.0-1.75	Strongly Disagree	Not Ready

Results:-

Table 4:- Profile of the respondents in terms of age.

AGE	FREQUENCY	PERCENTAGE
18-24	186	82%
25-34	35	15%
35-44	5	2%
TOTAL	226	100

The study investigates the post-pandemic digital self-efficacy and e-learning readiness of pre-service teachers, with a focus on the profile of the respondents in terms of age. The statistical results show that the majority of the respondents are within the age range of 18-24, comprising 82.30% of the total respondents. This is followed by the age range of 25-34, which represents 15.49% of the total respondents, while the age range of 35-44 has the smallest number of respondents at 2.21%.These findings are consistent with previous studies that have shown that younger individuals are more likely to be comfortable with technology and have a higher level of digital literacy compared to older individuals (Deng et al., 2021; Jung et al., 2018). This is likely due to the fact that younger individuals have grown up with technology and have had more exposure to it compared to older individuals.Moreover, the study's findings suggest that pre-service teachers, who are likely to be digital natives and comfortable with technology, are ready to adopt e-learning as a mode of education. This is an important finding as e-learning is becoming increasingly

popular in the post-pandemic world (Mkumbo et al., 2021), and the readiness of pre-service teachers to adopt this mode of education bodes well for the future of education.

Table 5:- Profile of the respondents in terms of sex.

SEX	FREQUENCY	PERCENTAGE
Male	47	21%
Female	179	79%
TOTAL	**226**	**100%**

The statistical results on table 5indicate that the majority of the respondents are female, comprising 79.20% of the total respondents. On the other hand, male respondents only comprise 20.80% of the total respondents.These findings are consistent with previous studies that have shown that the teaching profession is predominantly female (Cai, Reeve, & Robinson, 2018; Lederer &Goller, 2020). In fact, according to UNESCO, in most countries around the world, the teaching profession is more than 70% female (UNESCO, 2021). Thus, the study's findings are not surprising given that the respondents are pre-service teachers.Moreover, the study's findings suggest that female pre-service teachers are ready to adopt e-learning as a mode of education. This is an important finding as e-learning is becoming increasingly popular in the post-pandemic world (Mkumbo et al., 2021), and the readiness of pre-service teachers to adopt this mode of education bodes well for the future of education.

Table 6:- Digital self-efficacy level of pre-service teachers in terms of digital usage.

Statements	Mean	SD	Description	Interpretation
I am confident in using technology to stay current with research to support student learning outcomes.	3.22	.592	Agree	Confident
I am confident in facilitating and supporting student learning opportunities with technology.	3.24	.572	Agree	Confident
I am confident in modeling for colleagues the identification, exploration, evaluation, curation, and adoption of new digital resources and tools for learning.	3.00	.696	Agree	Confident
I am confident in collaborating and co-learning with students to discover and use new digital resources as well as diagnose and troubleshoot technology issues.	3.20	.699	Agree	Confident
I am confident with actively participating in virtual and blended learning communities to support my CPD.	3.11	.697	Agree	Confident
I am confident in designing authentic learning activities that align with content area standards and using digital tools and resources to maximize active, deep learning.	3.08	.720	Agree	Confident
TOTAL	**3.22**	**.607**	**Agree**	**Confident**

Table 6 shows the results of a study on the level of digital self-efficacy among pre-service teachers in terms of digital usage. The results indicate that the pre-service teachers, on average, agree that they are confident in their ability to use technology to support student learning outcomes, facilitate and support student learning opportunities, collaborate with students to use new digital resources and troubleshoot technology issues, participate in virtual and blended learning communities, and design authentic learning activities using digital tools and resources.These findings are consistent with previous research that has shown that digital self-efficacy is positively associated with

the use of technology in education (Ertmer& Ottenbreit-Leftwich, 2010). Teachers who are confident in their ability to use technology are more likely to integrate it into their teaching practice, leading to positive outcomes for students (Ertmer& Ottenbreit-Leftwich, 2010).This is consistent with recent research that has shown that digital self-efficacy is positively associated with technology use in education (Özalp-Yıldız&Çoklar, 2018). According to Özalp-Yıldız and Çoklar (2018), teachers who are confident in their ability to use technology are more likely to integrate it into their teaching practice, leading to improved student outcomes.Furthermore, a recent study by Khine and Lourdusamy (2021) found that pre-service teachers who reported high levels of digital self-efficacy were also more likely to be prepared for online teaching and learning. This suggests that pre-service teachers with high levels of digital self-efficacy may be better equipped to adapt to the challenges of e-learning, such as those presented by the COVID-19 pandemic. Overall, the high level of digital self-efficacy among pre-service teachers in the study suggests that they are well-positioned to use technology effectively in their future teaching practice, which is important for meeting the needs of 21st-century learners.

Table 7:- Digital self-efficacy level of pre-service teachers in terms of Digital Application.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I am confident in exploring and applying instructional design principles to create innovative digital learning environments that engage and support learning	3.25	.606	Agree	Confident
I am confident in using technology to create, adapt, and personalize learning experiences that foster independent learning and accommodate learner differences and needs.	3.17	.597	Agree	Confident
I am confident in creating learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.	3.18	.614	Agree	Confident
I am confident in managing the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.	3.07	.649	Agree	Confident
I am confident in providing alternative ways for students to demonstrate competency and reflect on their learning using technology.	3.09	.619	Agree	Confident
TOTAL	**3.16**	**.567**	**Agree**	**Confident**

Table 7 shows that pre-service teachers have a high level of digital self-efficacy regarding the application of instructional design principles to create innovative digital learning environments, using technology to create personalized learning experiences, creating learning opportunities that challenge students to use a design process and computational thinking, managing the use of technology and student learning strategies in digital platforms, providing alternative ways for students to demonstrate competency and reflect on their learning using technology.This suggests that pre-service teachers feel confident in their ability to integrate technology into their teaching practices, which is essential given the current climate of e-learning and the need for teachers to be prepared to teach online. This is supported by recent research indicating that technology is becoming increasingly integrated into teaching practices, and there is a growing demand for teachers who are skilled in the use of technology in the classroom (Fernandez-Sanz et al., 2020). Additionally, studies have shown that pre-service teachers who have higher levels of digital self-efficacy are more likely to integrate technology into their teaching practices (Morrone& Smiley, 2018).Overall, the high level of digital self-efficacy demonstrated by pre-service teachers in this study suggests that they are well-prepared to adapt to the demands of e-learning and use technology effectively in their future teaching practices.

Table 8:- Digital self-efficacy level of pre-service teachers in terms of Digital-infused Learning.

Statements	Mean	SD	Description	Interpretation
I am confident in learning about, testing or adding into regular practice a variety of proven, promising, and emerging learning strategies along with technology to support and enhance student learning.	3.13	.594	Agree	Confident
I am confident in using technology to support student needs through increased personalization and differentiation.	3.23	.602	Agree	Confident
I am confident in using technology to support student learning and enhance student engagement through virtual collaboration.	3.27	.613	Strongly Agree	Highly Confident
I am confident in using technology to support the demands of the student-centered pedagogy for project-based learning.	3.20	.621	Agree	Confident
I am confident in using technology to support STEAM (Science, Technology, Engineering, the Arts and Mathematics) as an access point to guide student inquiry, dialogue, and critical thinking.	3.18	.629	Agree	Confident
TOTAL	**3.21**	**.541**	**Agree**	**Confident**

Table 8 results indicate that pre-service teachers have a high level of digital self-efficacy when it comes to using technology to support and enhance student learning through various strategies, personalization, virtual collaboration, project-based learning, and STEAM (Science, Technology, Engineering, Arts, and Mathematics). The findings show that pre-service teachers are confident in integrating technology into their teaching practices to create engaging and effective learning experiences for their students.This is consistent with previous research indicating that pre-service teachers who have higher levels of digital self-efficacy are more likely to integrate technology into their teaching practices and provide students with engaging and effective learning experiences (Morrone& Smiley, 2018). Additionally, research has shown that pre-service teachers who receive training on technology integration are more likely to use technology in their teaching practices (Al-Azawei et al., 2020).The high level of digital self-efficacy demonstrated by pre-service teachers in this study suggests that they are well-prepared to incorporate technology into their teaching practices to support and enhance student learning. This is particularly important given the increasing demand for technology-infused learning in the post-pandemic era.

Table 9:- Digital self-efficacy level of pre-service teachers in terms of Technology Literacy & Digital Citizenship.

Statements	Mean	SD	Description	Interpretation
I am confident in teaching students to think critically, be safe, and responsible in the digital world.	3.40	.640	Strongly Agree	Highly Confident
I am confident in establishing a learning culture that promotes curiosity, critical examination of online resources, digital literacy, and media fluency for learners.	3.31	.700	Strongly Agree	Highly Confident
I am confident in mentoring students to use digital tools in safe, legal, and ethical ways	3.29	.674	Strongly Agree	Highly Confident

including the protection of intellectual rights and property.				
I am confident in modeling and promoting management of personal data and digital identity as well as protect student data privacy.	3.30	.540	Strongly Agree	Highly Confident
TOTAL	**3.42**	**.637**	**Strongly Agree**	**Highly Confident**

Table 9 statistical results show that pre-service teachers have a high level of digital self-efficacy in different aspects of technology integration in their teaching practice. Specifically, they have a high level of confidence in exploring and applying instructional design principles, creating personalized and innovative learning experiences, using technology to support student-centered pedagogy, promoting critical examination of online resources and digital literacy, and mentoring students to use digital tools safely, legally, and ethically. Overall, pre-service teachers have a positive attitude towards technology integration and its potential benefits for enhancing student learning.These findings are consistent with previous research that suggests that pre-service teachers' digital self-efficacy and readiness for technology integration are important factors in successful technology integration in their teaching practice (Lin & Chen, 2019; Ottenbreit-Leftwich et al., 2018). Moreover, the current study's findings suggest that the COVID-19 pandemic might have positively impacted pre-service teachers' digital self-efficacy and readiness for e-learning, which could lead to more effective technology integration in their teaching practice (Gao et al., 2021).

Table 10:- Digital self-efficacy level of pre-service teachers in terms of Digital-supported Assessment.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I am confident in facilitating data-driven instruction and guiding learning based on competency-based assessment and new data analysis tools.]	3.11	.559	Agree	Confident
I am confident in using digital tools to provide immediate feedback to students.	3.24	.645	Agree	Confident
I am confident in dedicating planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.	3.25	.542	Agree	Confident
I am confident in using technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students, and inform instruction.	3.21	.630	Agree	Confident
TOTAL	**3.23**	**.536**	**Agree**	**Confident**

Table 10 show that pre-service teachers have a moderate level of digital self-efficacy regarding digital-supported assessment. The mean score for all statements is above 3, indicating that the participants generally agree that they are confident in using digital tools for assessment purposes.Research from 2018 to 2023 supports the idea that digital assessment is becoming increasingly common in educational contexts, and teachers are expected to be proficient in using technology for assessment purposes (Cavanagh et al., 2018; Sartori et al., 2020). A study by Liu et al. (2021) found that pre-service teachers who received training in digital assessment reported higher levels of self-efficacy in using digital tools for assessment purposes. The findings of this study suggest that training and support are crucial in improving pre-service teachers' digital self-efficacy in assessment.Overall, the results suggest that pre-service teachers have a moderate level of confidence in using digital tools for assessment purposes, which highlights the need for training and support to enhance their digital self-efficacy in this area.

Table 11:- Level of Online learning readiness of pre-service teachers in terms of Computer internet self-efficacy.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS	3.13	.547	Agree	Approaching Readiness

PowerPoint)				
I feel confident in my knowledge and skills of how to manage software for online learning.	3.00	.585	Agree	Approaching Readiness
I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.	3.16	.569	Agree	Approaching Readiness
Total	**3.08**	**.505**	**Agree**	**Approaching Readiness**

The statistical results in table 11 indicate that the pre-service teachers have an approaching level of readiness regarding their computer internet self-efficacy for online learning. Specifically, the mean scores for feeling confident in performing basic functions of Microsoft Office programs, managing software for online learning, and using the internet to find or gather information for online learning all fall within the "Agree" range. These findings suggest that while the pre-service teachers have some level of confidence in their computer and internet skills, there is still room for improvement in terms of their readiness for online learning.Recent research has also highlighted the importance of computer and internet self-efficacy in online learning readiness. For example, a study by Gao et al. (2021) found that computer self-efficacy significantly predicted online learning readiness among college students. Similarly, a study by Wang and Liu (2021) reported that internet self-efficacy was positively related to online learning readiness among Chinese college students. These findings underscore the need for pre-service teacher education programs to provide targeted support and training to enhance graduating pre-service teachers' computer and internet self-efficacy, which can improve their readiness for online learning.

Table 12:- Level of Online learning readiness of pre-service teachers in terms of Self-directed learning.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I carry out my own study plan	3.04	.584	Agree	Approaching Readiness
I seek assistance when facing learning problems.	3.27	.607	Strongly Agree	Ready
I manage time well.	2.62	.703	Disagree	Developing Readiness
I set up my learning goals	3.14	.658	Agree	Approaching Readiness
TOTAL	**3.16**	**.526**	**Agree**	**Approaching Readiness**

Table 12 results suggest that pre-service teachers have an "approaching" level of online learning readiness regarding self-directed learning, with a mean score of 3.16 and standard deviation of .526. Specifically, they are confident in seeking assistance when facing learning problems (mean = 3.27, SD = .607) and in setting up their learning goals (mean = 3.14, SD = .658), but they are less confident in managing their time well (mean = 2.62, SD = .703) and carrying out their own study plan (mean = 3.04, SD = .584).Research conducted in recent years also highlights the importance of self-directed learning in online education. For example, a study by Wang, Li, and Wang (2020) found that students who exhibited higher levels of self-directed learning were more likely to achieve better academic outcomes in online courses. Another study by Li and Marquardson (2018) found that self-directed learning was positively associated with students' satisfaction and perceived learning outcomes in online courses. These findings suggest that developing self-directed learning skills is crucial for success in online learning environments.

Table 13:- Level of Online learning readiness of pre-service teachers on Learner Control.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I have higher expectations for my learning performance.	3.06	.615	Agree	Approaching Readiness
I can direct my own learning progress.	2.85	.574	Agree	Approaching Readiness
I am not distracted by other online activities when learning online (instant messages, Internet surfing).	2.35	.652	Disagree	Developing Readiness

TOTAL	**2.79**	**.547**	**Agree**	**Approaching Readiness**

Based on the statistical results on table 13, the pre-service teachers have an approaching level of online learning readiness regarding learner control. They agree that they have higher expectations for their learning performance and can direct their own learning progress. However, they are still developing in terms of not being distracted by other online activities when learning online.According to a study by Leach and colleagues (2021), learners' autonomy and control in online learning positively affect their motivation and engagement in the learning process. Another study by Liu and colleagues (2018) found that learners' control over their own learning pace and sequence leads to better learning outcomes in online courses. Therefore, developing pre-service teachers' ability to manage online distractions and maintain focus on their learning goals can contribute to their success in online learning environments.

Table 14:- Level of Online learning readiness of pre-service teachers on Motivation in Learning.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I repeated the online instructional materials on the basis of my needs	3.04	.565	Agree	Approaching Readiness
I am open to new ideas.	3.69	.499	Strongly Agree	Ready
I have motivation to learn.	3.55	.625	Strongly Agree	Ready
I improve from my mistakes.	3.50	.648	Strongly Agree	Ready
TOTAL	**3.61**	**.557**	**Strongly Agree**	**Ready**

Based on the given statistical results shown on table 14, it can be interpreted that pre-service teachers have a high level of readiness for online learning. Specifically, they have a strong motivation to learn (mean=3.55, SD=.625) and are open to new ideas (mean=3.69, SD=.499), which are essential factors for successful online learning (Deng, Benckendorff, &Gannaway, 2019). Additionally, they exhibit a willingness to identify and improve from their mistakes (mean=3.50, SD=.648), which is a crucial aspect of self-regulated learning that has been found to be positively related to academic performance (Zimmerman, 2018).Moreover, the pre-service teachers in this study showed a positive attitude towards repeating online instructional materials based on their needs (mean=3.04, SD=.565), indicating that they are willing to engage in self-directed learning, which has been found to enhance learning outcomes (Kim & Jang, 2019).Overall, the high level of digital self-efficacy and e-learning readiness of pre-service teachers implies that they are well-prepared for online teaching and learning, which has become increasingly important in the post-pandemic era.

Table 15:- Level of Online learning readiness of pre-service teachers on Online communication self-efficacy.

Statements	**Mean**	**SD**	**Description**	**Interpretation**
I like to share my ideas with others.	3.26	.740	Strongly Agree	Ready
I feel confident in using online tools (email, discussion) to effectively communicate with others	3.17	.572	Agree	Approaching Readiness
I feel confident in expressing myself (emotions and humor) through text	3.00	.811	Agree	Approaching Readiness
TOTAL	**3.18**	**.631**	**Agree**	**Approaching Readiness**

Based on table 15, it can be interpreted that pre-service teachers have an adequate level of online learning readiness regarding online communication self-efficacy. They feel confident in sharing their ideas with others (mean=3.26, SD=.740), which is an important aspect of online communication that promotes collaborative learning and knowledge sharing (Kim, Jeong, & Park, 2018). Additionally, they exhibit a moderate level of confidence in using online tools such as email and discussion forums to communicate effectively with others (mean=3.17, SD=.572), which is also an essential component of online learning (Kuo, Belland, &Kuo, 2017).However, the pre-service teachers in this study showed a lower level of confidence in expressing their emotions and humor through text (mean=3.00, SD=.811), indicating that they may need additional support and training to develop their online

communication skills in this area. This finding is consistent with previous research that has shown that online communication can be challenging, particularly when it comes to expressing emotions and developing social presence (Wang, Chen, & Liang, 2018).Overall, the adequate level of online communication self-efficacy readiness among pre-service teachers is promising for effective online teaching and learning. However, further attention and support may be needed to enhance their online communication skills in specific areas such as expressing emotions and humor through text.

Table 16:- Online learning readiness of the respondents when grouped according to age.

AGE	MEANS	H-STATISTIC	LEVEL OF SIGNIFICANCE	P-VALUE	REMARKS
18-24	3.06	27.5531	0.05	< .00001	There is a significant difference.
25-34	3.40				
35-44	3.16				

Table 16 shows the difference in online learning readiness based on age. The results showed that there was a significant difference in online learning readiness among pre-service teachers when grouped according to age. Specifically, those in the age group of 25-34 had a higher mean score of 3.40, compared to those in the age group of 18-24 (mean=3.06) and 35-44 (mean=3.16). The H-statistic was 27.5531 with a p-value of <.00001, indicating a highly significant difference among the groups.Research findings have shown that age is a crucial factor in determining individuals' digital readiness and self-efficacy in e-learning. Several studies have reported that younger individuals have higher levels of digital self-efficacy and are more technologically savvy than older individuals (Shaw et al., 2018; Lin & Lai, 2019; Al Lily et al., 2020). However, some recent studies have challenged this notion and suggested that age may not be a significant predictor of digital readiness (Kao et al., 2020; Alzahrani&Melwani, 2021).Overall, the study's findings suggest that pre-service teachers' online learning readiness may be influenced by their age. These findings have implications for teacher education programs and highlight the need to provide support and training to pre-service teachers to enhance their digital self-efficacy and e-learning readiness, especially for those in the younger age group.

Table 17:- Online learning readiness of the respondents when grouped according to sex.

SEX	MEANS	Z-Score	LEVEL OF SIGNIFICANCE	P-VALUE	REMARKS
Male	3.12	0.81217	0.05	0.418	There is no significant difference.
Female	3.10				

Table 17 shows the difference in online learning readiness based on sex. The statistical results showed that there was no significant difference in online learning readiness between male and female pre-service teachers, with a mean score of 3.12 and 3.10, respectively. The z-score was 0.81217 with a p-value of 0.41794, indicating no significant difference between the groups.Recent research findings have reported mixed results regarding the relationship between gender and digital readiness in e-learning. Some studies have found that females tend to have higher levels of digital self-efficacy than males (Lin & Lai, 2019; Alzahrani&Melwani, 2021), while others have reported no significant differences between males and females (Shaw et al., 2018; Kao et al., 2020).Overall, the study's findings suggest that there is no significant difference in online learning readiness between male and female pre-service teachers. These findings have implications for teacher education programs, which should ensure that both male and female pre-service teachers receive equal support and training to enhance their digital self-efficacy and e-learning readiness.

Table 18:- Digital self-efficacy of the respondents when grouped according to age.

AGE	MEANS	H-STATISTIC	LEVEL OF SIGNIFICANCE	P-VALUE	REMARKS
18-24	3.15	10.337	0.05	0.00569	There is a significant difference.
25-34	3.46				
35-44	3.19				

The statistical results showed on table 18 that there was a significant difference in digital self-efficacy among pre-service teachers when grouped according to age. Specifically, those in the age group of 25-34 had a higher mean score of 3.46, compared to those in the age group of 18-24 (mean=3.15) and 35-44 (mean=3.19). The H-statistic was 10.337 with a p-value of 0.00569, indicating a significant difference among the groups.Recent research has suggested that age can influence an individual's level of digital self-efficacy. For instance, a study by Liu and Liu (2018) found that younger individuals tend to have higher levels of digital self-efficacy compared to older individuals. Similarly, a study by Wang et al. (2019) reported that age was a significant predictor of digital self-efficacy, with younger individuals demonstrating higher levels of self-efficacy in digital tasks. These findings support the results of the current study, which found that younger pre-service teachers (aged 18-24) had lower levels of digital self-efficacy compared to their older counterparts (aged 25-34).The study's findings have implications for teacher education programs, which should provide tailored support and training to pre-service teachers to enhance their digital self-efficacy, especially for those in the younger age group. This can include incorporating more digital technologies and tools in teaching and learning, providing opportunities for hands-on practice and feedback, and promoting a growth mindset towards technology use.

Table 19:-Digital self-efficacy of the respondents when grouped according to sex.

SEX	MEANS	Z-SCORE	LEVEL OF SIGNIFICANCE	P-VALUE	REMARKS
Male	3.25	-0.15291	0.05	0.88076	There is no significant difference.
Female	3.18				

Table 19 results showed that there was no significant difference in digital self-efficacy among pre-service teachers when grouped according to sex. Specifically, male pre-service teachers had a mean score of 3.25, while female pre-service teachers had a mean score of 3.18, with a Z-score of -0.15291 and a p-value of 0.88076, indicating no significant difference among the groups.Recent research has also yielded mixed findings regarding the relationship between gender and digital self-efficacy. For instance, a study by Park and Lee (2019) found that there was no significant difference in digital self-efficacy between male and female college students. Similarly, a study by Kang et al. (2020) reported that gender was not a significant predictor of digital self-efficacy among Korean university students. These findings support the results of the current study, which found no significant difference in digital self-efficacy based on sex among pre-service teachers.The study's findings suggest that teacher education programs should not focus on gender as a factor in promoting digital self-efficacy among pre-service teachers. Instead, efforts should be made to provide tailored support and training to all pre-service teachers, regardless of gender, to enhance their digital self-efficacy, such as incorporating more digital technologies and tools in teaching and learning and providing opportunities for hands-on practice and feedback.

Table 20:-Correlations between digital self-efficacy and e-learning readiness among pre-service teachers.

Correlation		Digital Self-Efficacy	E-Learning Readiness
Digital Self-Efficacy	Pearson Correlation	1	.718**
	p-value		.000
	N	226	226
E-Learning Readiness	Pearson Correlation	.718**	1
	p-value	.000	
	N	226	226
**. Correlation is significant at the 0.01 level (2-tailed).			

Based on the statistical results in table 20, there is a significant positive correlation (r=.718, p<.01) between digital self-efficacy and e-learning readiness among pre-service teachers. This suggests that pre-service teachers who exhibit higher levels of digital self-efficacy are more likely to have a higher level of readiness for e-learning.This finding is consistent with previous research that has shown a positive relationship between digital self-efficacy and e-learning readiness among students (Wang & Chen, 2018; Al-Fraihat et al., 2020). Digital self-efficacy is an important factor that affects students' attitudes and beliefs towards technology, which, in turn, impacts their

readiness for e-learning (Al-Fraihat et al., 2020). Pre-service teachers who are more confident in their ability to use digital technologies are more likely to have a positive attitude towards e-learning and a higher level of readiness to engage in online learning activities.Overall, the significant positive correlation between digital self-efficacy and e-learning readiness among pre-service teachers in this study highlights the importance of developing digital self-efficacy as a means of enhancing their readiness for e-learning. Educational institutions should provide pre-service teachers with adequate training and support to develop their digital skills and confidence, which could ultimately lead to more effective e-learning experiences.

Discussions:-

This study investigated the digital self-efficacy and online learning readiness of pre-service teachers during post-pandemic. The profile of the respondents, in terms of age and sex, was examined. The level of digital self-efficacy was assessed based on digital usage, digital application, digital-infused learning, technology literacy, and digital citizenship, and digital-supported assessment. Moreover, the online learning readiness of pre-service teachers was determined based on computer internet self-efficacy, self-directed learning, learner control, motivation in learning, and online communication self-efficacy. The study investigated whether there is a significant difference in the online learning readiness and the level of digital self-efficacy of pre-service teachers when grouped according to age and sex. Finally, the study determined whether there is a significant relationship between digital self-efficacy and e-learning readiness among pre-service teachers.

Pre-service Teachers' Age and Sex

The study's focused on the profile of the respondents in terms of age provides valuable insights into the digital self-efficacy and e-learning readiness of pre-service teachers. The findings that the majority of the respondents are within the age range of 18-24 and female, are consistent with previous studies on the teaching profession. It suggests that pre-service teachers, who are likely to be digital natives and comfortable with technology, are well-positioned to adopt e-learning as a mode of education. The high level of e-learning readiness of pre-service teachers, especially in the post-pandemic world, is crucial for the future of education. E-learning has become increasingly popular due to the pandemic, and its adoption is likely to continue even after the pandemic. Therefore, the study's findings can help policymakers and educators to develop strategies and interventions to enhance pre-service teachers' digital self-efficacy and e-learning readiness, which can ultimately improve the quality of education.

Pre-service Teachers' Level of Digital self-efficacy

The data provided in the results shows that the pre-service teachers have a high level of digital self-efficacy in all five areas assessed. The pre-service teachers are confident in their ability to use digital tools to support student learning and engagement, create innovative digital learning environments, implement competency-based assessment, promote digital literacy and citizenship, and collaborate with colleagues to create authentic learning experiences.

In terms of digital usage, the pre-service teachers have a mean score of 3.22, indicating a high level of confidence in their ability to stay current with research and support student learning outcomes. They also have a mean score of 3.16 in digital application, demonstrating their confidence in using technology to create personalized learning experiences and provide alternative ways for students to demonstrate competency.The pre-service teachers have a mean score of 3.21 in digital-infused learning, indicating that they are confident in using technology to support various learning strategies, such as personalization, differentiation, collaboration, project-based learning, and STEAM education. They have a particularly high level of confidence (mean score of 3.27) in using technology to support virtual collaboration and enhance student engagement.In terms of technology literacy and digital citizenship, the pre-service teachers have a mean score of 3.42, indicating a high level of confidence in promoting digital literacy, media fluency, and responsible use of technology among their students. They are also confident in protecting student data privacy and intellectual rights.Finally, in digital-supported assessment, the pre-service teachers have a mean score of 3.23, demonstrating their confidence in using technology to provide immediate feedback, create various types of assessments, and inform instruction based on data analysis.Overall, the pre-service teachers have demonstrated a high level of digital self-efficacy in various areas of technology integration. This bodes well for their future roles as educators who can leverage technology to create engaging and effective learning experiences for their students.

Pre-service Teachers' Level of E-Learning Readiness

The pre-service teachers have an overall approaching readiness in terms of online learning readiness, which means they have the potential to develop their readiness further. In terms of computer internet self-efficacy, the pre-service teachers feel confident in performing basic functions of Microsoft Office programs, managing software for online learning, and using the Internet to gather information for online learning. They also have an approaching readiness in self-directed learning, where they carry out their own study plan, seek assistance when facing learning problems, and set up their learning goals. However, they need further development in managing time well. In terms of learner control, the pre-service teachers have an approaching readiness in having higher expectations for their learning performance and directing their own learning progress, but they need further development in avoiding distractions from other online activities. In terms of motivation in learning, the pre-service teachers have a strong readiness and motivation to learn, as they repeated the online instructional materials based on their needs, are open to new ideas, have motivation to learn, and improve from their mistakes. Finally, in terms of online communication self-efficacy, the pre-service teachers have an approaching readiness in using online tools to communicate with others effectively, but they need further development in expressing themselves through text.

Difference in the Online Learning Readiness on Age and Sex

Two research questions were asked in the study, one of which is whether there is a significant difference in the online learning readiness of the respondents when grouped according to age and sex. The results of the study showed that there is a significant difference in the online learning readiness of the respondents when grouped according to age. Specifically, respondents aged 25-34 years old had higher online learning readiness compared to those aged 18-24 and 35-44. On the other hand, there was no significant difference in the online learning readiness of the respondents when grouped according to sex. These findings suggest that age is a significant factor that affects the online learning readiness of pre-service teachers. This could be because older respondents may have had more experience with online learning compared to their younger counterparts. However, sex does not seem to be a significant factor affecting online learning readiness among pre-service teachers. Overall, the study highlights the importance of considering factors such as age when designing online learning programs for pre-service teachers.

Pre-Service Teachers' Level of Digital Self-Efficacy and E-Learning Readiness

The study investigated whether there is a significant difference in the level of digital self-efficacy and e-learning readiness among pre-service teachers when grouped according to age and sex. The results showed that there is a significant difference in the online learning readiness of the respondents when grouped according to age, with the 25-34 age group having the highest mean score. On the other hand, there was no significant difference in the online learning readiness of the respondents when grouped according to sex. Moreover, the study found a significant difference in the level of digital self-efficacy of pre-service teachers when grouped according to age, with the 25-34 age group having the highest mean score. In contrast, there was no significant difference in the level of digital self-efficacy of pre-service teachers when grouped according to sex. These findings suggest that age may play a more critical role than sex in determining the digital self-efficacy and online learning readiness of pre-service teachers. Therefore, educational institutions must take into account the age differences of their students when developing programs to enhance their digital self-efficacy and online learning readiness.

Digital Self-Efficacy and E-Learning Readiness among Pre-Service Teachers

The results show a significant positive correlation between digital self-efficacy and e-learning readiness among pre-service teachers, as indicated by the high correlation coefficient of .718** (significant at the 0.01 level, 2-tailed). This suggests that pre-service teachers who have higher levels of digital self-efficacy are also more ready for e-learning. This finding has important implications for teacher education and training programs, as it highlights the importance of developing teachers' digital self-efficacy in order to enhance their readiness for e-learning. Teachers with high digital self-efficacy are likely to be more confident in using technology and integrating it into their teaching, which can lead to more effective and engaging online instruction. Thus, teacher education programs should consider incorporating training and development opportunities that focus on enhancing teachers' digital self-efficacy to better prepare them for the growing trend of online learning.

Implications

The findings of the study imply that pre-service teachers, especially those who are younger and female, are well-equipped to embrace e-learning as a mode of education in the post-pandemic world. This highlights the importance of providing appropriate training and resources to educators, particularly those who may be less familiar with e-learning, to ensure a smooth transition to this new mode of education. Furthermore, the study's findings suggest that

the teaching profession may continue to be predominantly female, and it is important to ensure that female teachers are adequately supported and represented in the development and implementation of e-learning strategies. Overall, the study's findings provide valuable insights into the digital readiness of pre-service teachers, which could help guide the future of education in a post-pandemic world.

The implication of the data is that the pre-service teachers have a high level of confidence or self-efficacy in using digital technologies and integrating them into their teaching practices. Across all the domains of digital self-efficacy measured - digital usage, digital application, digital-infused learning, technology literacy and digital citizenship, and digital-supported assessment - the pre-service teachers reported high levels of confidence, with mean scores ranging from 3.16 to 3.42 (on a 4-point scale) and standard deviations ranging from 0.536 to 0.707. The consistent pattern of high mean scores and relatively low standard deviations suggests that the pre-service teachers have a high degree of confidence in their digital skills and knowledge, with relatively little variability in their responses. This implies that they are likely to be well-prepared to integrate digital technologies into their future teaching practices and to support their students' learning in a variety of ways.

The results indicate that the pre-service teachers in the study generally have an approaching level of online learning readiness across all the dimensions measured. Specifically, they reported confidence in performing basic functions of Microsoft Office programs, managing software for online learning, and using the internet to find or gather information for online learning. However, their time management skills were reported to be at a developing level, and they reported being distracted by other online activities while learning, indicating room for improvement. In terms of self-directed learning, the pre-service teachers in the study reported being able to carry out their own study plan and setting up their learning goals, indicating approaching levels of readiness. However, their time management skills were again reported to be developing. They did report seeking assistance when facing learning problems, indicating readiness in this aspect. Regarding learner control, the pre-service teachers in the study reported having higher expectations for their learning performance and feeling confident in directing their own learning progress, indicating approaching levels of readiness. However, they reported being distracted by other online activities when learning online, indicating a developing level of readiness in this aspect. In terms of motivation in learning, the pre-service teachers in the study reported repeating online instructional materials based on their needs and being open to new ideas, indicating approaching levels of readiness. They also reported having motivation to learn and improving from their mistakes, indicating readiness in these aspects. Lastly, in terms of online communication self-efficacy, the pre-service teachers in the study reported liking to share their ideas with others and feeling confident in using online tools to communicate with others effectively, indicating approaching levels of readiness. However, they reported feeling less confident in expressing themselves through text, indicating room for improvement in this aspect. Overall, the study's findings suggest that pre-service teachers have an overall approaching level of online learning readiness in the post-pandemic context. The study's implications could inform interventions aimed at improving pre-service teachers' online learning readiness, particularly in areas such as time management and minimizing distractions while learning online.

The study found that the pre-service teachers generally had an approaching level of readiness in all aspects except for time management skills, which were still developing. Furthermore, the study analyzed whether there was a significant difference in the online learning readiness of the respondents when grouped according to age and sex. The results showed that there was a significant difference in online learning readiness among respondents in different age groups, with those aged 25-34 having the highest mean score. However, there was no significant difference in online learning readiness between male and female respondents. The implication of these findings is that teacher education programs need to incorporate online learning readiness training to help pre-service teachers develop their skills and readiness for online teaching. Additionally, the study highlights the importance of considering age as a factor in designing such programs to ensure that training is tailored to meet the specific needs of different age groups.

The results of the study suggest that there is a significant difference in the level of digital self-efficacy among pre-service teachers when grouped according to age. Specifically, the younger age group (18-24) demonstrated a lower level of digital self-efficacy compared to the older age groups (25-34 and 35-44). This finding may have implications for teacher education programs, as they may need to provide additional support to younger pre-service teachers to enhance their digital self-efficacy. On the other hand, there was no significant difference in the level of digital self-efficacy of pre-service teachers when grouped according to sex. This finding suggests that both male and

female pre-service teachers have similar levels of digital self-efficacy. However, it is important to note that the sample size for male respondents was relatively small, which may limit the generalizability of the findings.

The results show that there is a significant and positive correlation between digital self-efficacy and e-learning readiness among pre-service teachers. This implies that pre-service teachers who have higher levels of digital self-efficacy are more likely to have higher levels of readiness for e-learning. This finding suggests that the development of digital self-efficacy can contribute to the enhancement of e-learning readiness among pre-service teachers, which can ultimately improve their effectiveness in delivering online instruction. It highlights the importance of providing adequate training and support to pre-service teachers in developing their digital self-efficacy and improving their readiness for e-learning.

Recommendations:-

The study post-pandemic digital self-efficacy and online learning readiness of pre-service teachers suggests several recommendations based on its implications.

First, it is essential to provide appropriate training and resources to pre-service teachers, particularly those who may be less familiar with e-learning, to ensure a smooth transition to this new mode of education.

Second, the teaching profession may continue to be predominantly female, and it is important to ensure that female teachers are adequately supported and represented in the development and implementation of e-learning strategies.

Third, teacher education programs need to incorporate online learning readiness training to help pre-service teachers develop their skills and readiness for online teaching, particularly in areas such as time management and minimizing distractions while learning online.

Fourth, the study highlights the importance of considering age as a factor in designing such programs to ensure that training is tailored to meet the specific needs of different age groups.

Finally, the study suggests providing additional support to younger pre-service teachers to enhance their digital self-efficacy and prepare them for e-learning.

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