Utilization of e-Portfolios in Teacher Education Institutions of Higher Education in Central Visayas, Philippines

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***Abstract*—E-portfolios are useful tools for learning and assessment. With this, this paper investigated the utilization of these electronic tools in teacher education institutions (TEIs) of higher education. Using embedded mixed design, a survey and focus group discussions were conducted with 85 college teachers in TEIs in Central Visayas, Philippines. Findings revealed that teachers utilized e-portfolios for students' progress and the former's school work but moderately implemented them for improving the latter's learning experiences. The use of e-portfolios is highly effective towards pedagogical considerations and effective in academics' teaching and usability. Qualitative results show that e-portfolios have gains and challenges, but teachers acknowledge the importance of the tools in education. In conclusion, e-portfolios have helped college teachers in TEIs in enhancing students' experiences in learning and assessment, particularly during the COVID-19 pandemic. A framework for utilizing e-portfolios in higher education is crafted.**

***Index Terms*—E-portfolio, effectiveness, implementation, teacher education institutions, utilization.**

I. Introduction

COVID-19 has affected the education systems around the globe, leading to the formulation of strategies to continue academics and learning amidst the pandemic [1]. Institutions offering higher courses on teacher education programs called teacher education institutions (TEIs) implemented flexible learning delivery as a strategy for learning continuity [2]. This implementation enables teachers to apply different forms of assessment. A performance-based assessment like developing an e-portfolio is essential to determine how students perform in flexible learning, particularly online learning delivery. Utilizing an e-portfolio in teaching and learning is a form of alternative assessment that has gained recognition in documenting students' learning, as it is synchronous with both product and process [3]. An e-portfolio is a purposeful collection of examples of learning that provides evidence of someone's knowledge, skills, and dispositions [4]. It is very important, especially in utilizing an e-portfolio in assessing college students.

To determine the students' actual achievements, effective assessment techniques are vital as they support the teachers in checking students' progress and identifying the students' learned competencies [3]. "Online teaching and learning activities rely greatly on the teacher's ability to manipulate technology to his or her advantage and also determine the successes and failures of the educational processes" [5]. Students work on a learning portfolio to show what they have achieved and learned and reflect on their learning process.

In this instance, as the teaching and learning process can be affected by the educational technology available, the portfolio has grown and changed to utilize that technology [4]. In flexible delivery, the assessment also has diverted to technology-based like an e-portfolio, which means that technology is introduced, making them flexible and accessible to learners during the pandemic.

21st-century teaching and learning need technological advancement on the part of the teachers in the Philippines. To ensure preparedness for the utilization of e-portfolio, especially in flexible learning delivery, teachers undergo several online ICT training and programs with the contention that the teaching skills of teachers have to be built and enhanced. Moreover, teacher education institutions utilized an e-portfolio as an alternative assessment during the COVID-19 pandemic.

Educational institutions like local colleges in Region VII are challenged in finding and using alternative assessments and re-inventing education [5]. Therefore, determining the importance of utilizing an e-portfolio is essential to identify students' learning and potential at this time of the pandemic. This study will also help teachers and local colleges' administration to identify the assessment methods to improve student learning.

II. Objectives of the Study

This study aimed at looking into the utilization of e-portfolio as teaching, learning, and assessment tools that can be beneficial and useful to the college teachers in teacher education institutions (TEIs). It specifically explored the following: a) the level of utilization of e-portfolios in TEIs, b) the level of usefulness of e-portfolio teaching in TEIS, in terms of pedagogical considerations, academics' teaching, and usability, and c) the challenges and opportunities encountered by the college teachers in utilizing e-portfolio. Based on the findings, the researchers crafted a framework utilizing e-portfolios in higher education.

III. Literature Review

Manuscript received January 18, 2022; revised April 17, 2022.

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doi: 10.18178/ijiet.2022.12.9.1701

A. E-Portfolio as a Learning and Assessment Tool

Learning is what matters. Creating an e-portfolio employs skills essential for 21st-century learning. Students organize and plan materials, give and receive feedback, reflect, select and arrange contents to communicate with a particular audience in the most effective way [6]. It also taps into necessary technological literacy skills such as information and media literacy. According to the University of California, Berkeley - Center for Teaching and Learning [7], an electronic portfolio (commonly known as an e-portfolio) is a purposeful collection of sample student work, demonstrations, and artifacts that showcase students' learning progression, achievement, and evidence of what students can do. This collection may include reflection logs, blogs and vlogs, multimedia presentations, interviews, videos, graphics, essays, and papers.

E-portfolios are considered learning tools and assessment tools. This tool is a way to generate learning as well as document learning [8]. It has been used to facilitate, document, and archive student learning. It is a learning tool for students to clarify their educational goals, integrate and solidify learning through reflection, and showcase their achievements. By having students reflect on what they learned, how they learned it, and how much they learned, they start to take control of their learning. Paulson and Paulson [9] said, "portfolio is a laboratory where students construct meaning from their accumulated experience." As students select their representative work and reflect on what they learned, they start to make sense of their educational experiences in various courses. They derive new meaning from the process [10]. As an assessment tool, the e-Portfolio functions as a tool for teachers to examine student achievement. Portfolios can be a useful way to organize, sample, and assess what students gained from the program. Portfolios enable teachers to observe what students know and can do and learn through student reflections.

B. Advantages of e-Portfolios

The important aspect of a reflective e-portfolio is its open character [4], [11]. The teachers introduce students who have no experience in producing an e-portfolio as an alternative assessment. e-Portfolios are effective learning tools because 1) they support students' knowledge construction, 2) make otherwise invisible aspects of the learning process visible, and 3) place agency in the hands of students, which fosters learners' motivation. The use of e-portfolios can be explained by social constructivism. This theory proposes that learning happens most effectively when students construct knowledge systems for themselves, rather than simply having information presented. Bass and Eynon [12] describe the process of critical reflection involved in creating effective e-Portfolios as making "invisible learning" visible. Finally, because e-portfolios are a student-centered activity – one in which the student is free to choose what artifacts are included and is free to reflect on the process of their learning – they foster engagement and motivation [13].

In the study of Bangalan and Hipona [14], they found that students recognized e-portfolio as a useful learning tool. Students have a positive attitude toward e-portfolios as a learning and assessment tool. Students feel that e-portfolio improves their learning experiences through the use of reflection. They also believe that using their e-portfolio helps them develop their ICT skills and manage their learning better. Most students said that they enjoyed creating the e-portfolio. E-portfolios developed by the students were found to be of varied quality. Education in its broadest sense presupposes a better understanding of teaching and learning.

C. Challenges of e-Portfolios

In utilizing e-portfolios, one should be aware of the challenges it brings. Teachers should know how to address these challenges for them to utilize e-portfolios in the class effectively. Some of these challenges are concerned with authenticating work [15] and deciding what constitutes good work [16], as well as the consistency of assessment between assessors [17], [18], and the time necessary to read and assess the work [18]-[20]. Other issues include how to score evidence [15], [18], whether the credit awarded appears to be proportionate to the time invested [13], and whether the assessment is unduly influenced by the students' technical skills or lack thereof [15].

The literature cited above is important in determining the utilization level of e-portfolio in higher education institutions.

IV. Research Methodology

A. Research Design

The study employed the embedded design. Embedded design is a mixed-methods design in which one data set provides a supportive, secondary role in a study based primarily on the other data type [21]. The researchers used this design to include narratives (qualitative data) collected through the focus group discussions to respond to the research objectives within this largely quantitative study.

Specifically, the study used a survey method to gather the pertinent data on the implementation and effectiveness of e-portfolios and followed this with focus group discussions (FGD) to draw out the challenges and opportunities of utilizing e-portfolios in TEIs.

B. Research Environment and Participants

The study was conducted in 10 TEIs in Central Visayas, the Philippines, through online data gathering. Eighty-five college teachers from these TEIs participated in the survey phase of the study. Of these participants, 25 college teachers were selected for the FGD through purposive sampling. They should 1) be employed in participating TEIs, 2) be teaching in their respective institutions for at least a year, and 3) have implemented e-portfolios in their classes.

C. Research Instruments

The study utilized three adapted questionnaires but modified them to suit the Philippine setting. The first instrument was a nine-item four-scale Likert questionnaire adapted from Bangalan and Hipona [14]. The context of the study dealt with the level of implementation of e-portfolios based on effectiveness. The second instrument was called *Questionnaire on E-portfolios in Higher Education* (QEPHE), adapted from Hinojosa-Pareja *et al.* [22]

determined the effectiveness of e-portfolios based on three constructs: pedagogical considerations, academics' teaching, and usability. The last instrument was a set of interview questions for the focus group discussion; these questions were based on the instrument by Dougherty and Coelho [23].

D. Data Gathering Procedures

The researchers subjected the study to ethics review by the Research Ethics Committee of the University for evaluation. Permissions from the presidents of HEIs and deans of TEIs were sought before conducting the study in their respective institutions. Informed consent was asked from the participants, indicating the study procedure, descriptions, compensation, risks and benefits, confidentiality, contact information, and voluntary participation in the study. The names of the schools and college teachers remained confidential, and the data obtained were kept private, including the recorded interview.

The questionnaires were administered to the participants through online surveys constructed using Google Forms. Focus group discussions followed the survey using Google Meet as a platform where five college teachers participated in the FGD at a time. Thus, a total of five FGDs were conducted throughout the study. The collected data were stored and managed in Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS).

E. Data Analysis

The study used both quantitative and qualitative analyses to determine the utilization of e-portfolios in teacher education institutions. Quantitative data were analyzed through descriptive statistics, using frequencies and percentages and weighted means and standard deviations. Qualitative data were analyzed through thematic analysis, following the data analysis process of Braun and Clarke [24].

V. Results and Discussion

The college teachers from TEIs have certain levels of utilization and effectiveness towards e-portfolios as used in their teaching and school work. However, they also have opportunities and challenges while using these electronic tools in the teaching and learning process. The results are presented in the succeeding subsections.

A. Level of Utilization of e-Portfolios in TEIs

The level of utilization of e-portfolios by teachers in TEIs is presented in Table I.

Based on Table I, e-portfolios are utilized according to their purpose. Most of these ways of utilization were implemented by the higher education institutions. Teachers from HEIs adequately use e-portfolios to monitor and give feedback on students' progress and plan for their respective classes. This usage is attributed to the authentic nature of e-portfolios to track the latter's formative and summative progress [25], making these tools be efficacious means to assess learning and a timely medium to give feedback [26]. Furthermore, E-portfolios are used in the teachers' professional practice, including planning their classes [27], signifying that these digital tools are indispensable in assessment and learning in higher education.

TABLE I: Level of Utilization of e-Portfolios in TEIs

Statements	Mean	SD	Description
Monitoring students' progress	3.58	1.10	Utilized
Planning what to achieve in class	3.55	1.10	Utilized
Giving feedback on the students' progress	3.53	1.10	Utilized
Organizing my school work	3.51	1.08	Utilized
Adding interest in my classwork	3.51	1.06	Utilized
Giving feedback on my work	3.44	1.12	Utilized
Reflection on my work	3.41	1.08	Utilized
Improvement of learning experiences	3.40	1.10	Moderately Utilized
Having fun at teaching work	3.28	1.06	Moderately Utilized
Overall Utilization	**3.47**	**0.99**	**Utilized**

Moreover, teachers utilize enough of their e-portfolios to organize schoolwork, add interest, give feedback, and reflect on it. As user-centric tools, teachers take advantage of these tools to enhance their work and reflect on it [28]. During the COVID-19 pandemic, e-portfolios become more useful. Teachers can use the tool to learn from their teaching practice and demonstrate better self-reflective assessment, thereby adding interest to their work [29]. The reflective dimension of the e-portfolios paves the way for teachers to use e-portfolios as mere tools and integrate the e-portfolios for improving teaching practice and commitment [30].

Furthermore, some uses of e-portfolios are moderately utilized only by college educators. Tertiary teachers sometimes use the tools for improving learning experiences in class and having fun at teaching work. There may be a barrier in the link between e-portfolios and curriculum that leads teachers to only use to some extent the latter for improving activities in class [31]. Additionally, the intricacy of preparing the e-portfolios, which require personal experience, technical, operational skills, and technology acceptance, may also become a challenge, perceiving that these e-portfolios are fairly used for fun at work [32], [33].

In general, teachers from HEIs utilized the e-portfolios according to their purpose and use. E-portfolios are implemented in HEIs because these tools provide flexibility, interactivity, and personalization in the teaching-learning process [29]. In addition, these digital tools are innovative strategies to improve teaching, learning, and assessment [25] and teachers' professional practice and commitment [29], [30].

B. Level of Usefulness of e-Portfolios

The level of usefulness of the e-portfolio is presented in Table II. There are three dimensions of the usefulness of using an e-portfolio. These are pedagogical considerations, academics' teaching, and relative to usability.

TABLE II: Level of Usefulness of e-Portfolios in Three Dimensions

Dimensions	Mean	SD	Description
Pedagogical Considerations	3.33	0.56	Highly Useful
Academics' Teaching	3.22	0.58	Useful
Usability	3.22	0.61	Useful

The table shows that, in general, with the probability of

95%, the level of usefulness of using an e-portfolio is expected to be highly useful or useful. The *pedagogical considerations* are revealed to be highly useful and *academic' teaching* and *usability* to be useful. The very high level of e-portfolio usefulness in terms of pedagogy means that the use of e-portfolio in teaching has greatly helped instructors enhance the students' learning experiences, make learning more relevant to the students, motivate students to participate and learn and assess outcomes-based learning. The e-portfolio can involve students in deep learning while serving as a meaningful way for students and instructors to engage in outcomes-based assessment. It is a valid way to document student academic progress, encourage greater student involvement in the learning process, showcase work samples, improve the capacity of students to work collaboratively, enable awareness of their own mistakes, facilitate their self-assessment, and provide a method of learning outcomes assessment and curriculum evaluation. The use of an e-portfolio helped students better understand learning goals, think about what they have learned in college, and reflect on the knowledge and skills they have developed [34], [35].

While the high level of e-portfolio usefulness in terms of teaching tells that instructors have provided opportunities to play their roles as facilitators, managers, and assessors of learning when using the e-portfolio. According to Gordon [36], using an e-portfolio enables instructors to follow up on their students' work; based on predefined criteria that enable the evaluation and feedback of completed activities or materials. Thus, besides providing tools for professional empowerment, an e-portfolio encourages instructors to assume very high levels of responsibility [37].

The high level of e-portfolio usefulness in terms of usability explains that using the e-portfolio for teaching is considerably easy for instructors to use. With their prior knowledge of educational technology, which emphasizes information and communication technologies in education, instructors can easily learn and use the various platforms in the e-portfolio. In addition, the sudden and unprecedented shuttering of many nations' schools due to the COVID-19 pandemic has forced instructors to leave their classrooms indefinitely and, in most cases, to recreate a virtual learning environment. This situation has helped them embrace and learn technology to continue teaching.

In Table III, the extent of usefulness of the e-portfolio in terms of pedagogical considerations is specified and described based on the survey conducted. They also adapted the e-portfolios to the students' learning, facilitated collaborative learning, helped students establish connections between theory, their prior knowledge, and personal experience, facilitated reflection, developed students' creativity, and satisfied them with the methodology e-portfolio has offered. While they agreed that the amount of time predicted for preparing the e-portfolio was accurate, and their respective schools have sufficient resources to make the e-portfolio.

These findings are consistent with Mazen's study [38]. He discussed that the e-portfolio offers the following benefits: 1) It enhances students' self-assessment and reflection, and 2) it serves as an achievement of personal satisfaction and reflects innovation. This gives a true picture of their performance in the classroom, thereby allowing them to reflect on and analyze educational experiences and events, which can ultimately promote self-assessment and reflective thinking. The e-portfolio is the product of students' efforts.

It is the purposeful collection of their evidence of learning consistent with that of the standards being assessed through the e-portfolio within a certain period. Thus, it demonstrates the students' personalities and the extent of their progress and development in different areas [39]. Thereby giving them a sense of satisfaction, self-confidence, and motivation.

TABLE III: LEVEL OF E-PORTFOLIO USEFULNESS IN TERMS OF PEDAGOGICAL CONSIDERATIONS

Statements	Mean	SD	Description
Increased my students' motivation in the course	3.41	0.66	Highly Useful
Helped the students achieve the learning objectives through the activities they performed	3.40	0.64	Highly Useful
Enabled my students to realize their progress in learning	3.39	0.64	Highly Useful
Promoted active student participation in learning	3.39	0.67	Highly Useful
Enabled my student to be autonomous in their education and learning	3.39	0.66	Highly Useful
Was a useful tool for evaluating student learning	3.36	0.63	Highly Useful
Facilitated reflection on my students' learning	3.36	0.63	Highly Useful
Helped students establish connections between theory, their prior knowledge, and personal experience	3.34	0.65	Highly Useful
Strengthened the development of my students' creativity	3.33	0.62	Highly Useful
Satisfied with the methodology used by my students	3.32	0.60	Highly Useful
Was adapted to how students learn	3.29	0.63	Highly Useful
Facilitated collaborative learning among students	3.27	0.62	Highly Useful
Had an accurate amount of time to prepare the e-portfolio	3.24	0.65	Useful
Had sufficient school resources to prepare the e-portfolio	3.18	0.73	Useful

TABLE IV: LEVEL OF E-PORTFOLIO USEFULNESS IN TERMS OF THE ACADEMICS' TEACHING

Statements	Mean	SD	Description
Encouraged a good climate for learning	3.32	0.64	Highly Useful
Was concerned about the learning process	3.29	0.67	Highly Useful
Encouraged me to express ideas	3.28	0.67	Highly Useful
Satisfied with my teaching using e-portfolios	3.20	0.69	Useful
Promoted communication	3.19	0.72	Useful
Explained its use and function	3.19	0.70	Useful
Explained the evaluation procedure that would be used with the portfolio	3.18	0.71	Useful
Helped and guided the students in making the portfolio	3.18	0.69	Useful
Informed the students about e-portfolio and justified its use in my class	3.16	0.68	Useful

The extent of usefulness of the e-portfolio in terms of academics' teaching is specified and described as shown in the proceeding table (Table IV).

Table IV shows that the instructors strongly agreed that the e-portfolio encouraged them to express ideas, made them more concerned about the learning process, and encouraged a good climate for learning. While they agreed that the use of the e-portfolio was justified and the evaluation procedure used with the e-portfolio was explained, help and guidance were provided to students in making the e-portfolio. Communication among students was promoted, the platform's use and function were explained well, and the e-portfolio satisfied their teaching.

E-portfolio served as a tool for professional empowerment [38]. It encourages teachers to carry greater responsibilities and set their goals and plans for continuous professional growth, enabling them to learn and grow professionally. According to Andreson and DeMuelle [40], teachers who use e-portfolio are more aware of topics related to the challenges in the teaching profession. They are more capable of doing self-evaluation and can better understand the significance of continuing professional development. And all of these can greatly influence the teachers to thrive for better and quality performance in teaching.

The extent of usefulness of the e-portfolio in terms of usability is specified and described in Table V.

TABLE V: LEVEL OF E-PORTFOLIO USEFULNESS IN TERMS OF USABILITY

Statements	Mean	SD	Description
Liked using the e-portfolio and was satisfied with what learned from it	3.33	0.64	Highly Useful
Had clear organization of the resources and coherent with the learning objective	3.25	0.69	Highly Useful
Had appropriate and attractive design of the page	3.24	0.68	Useful
Provided the right tools for interaction and communication with classmates and professor	3.22	0.66	Useful
Was easy to learning to use	3.20	0.65	Useful
Had sufficient technological knowledge to carry out the activities assigned	3.20	0.67	Useful
Had simple and intuitive navigation of the platform and its contents	3.20	0.69	Useful
Was easy to use	3.19	0.66	Useful
Was able to find the help aids on the platform that needed to solve my problems using it	3.18	0.66	Useful

The table presents that the instructors strongly agreed that the organization of the resources in the platform was clear and coherent with the learning objectives. They liked using the e-portfolio and were satisfied with what they learned through the e-portfolio. While they agreed that the portfolio was easy to use, their technological knowledge was sufficient to carry out the activities. Navigating the platform and its contents was simple and intuitive. The page's design was appropriate and attractive. The platform provided the right tools for interaction and communication with the students and the professor.

With the efforts on ICT integration in Philippine education, the Department of Education and the Higher education institutions have formulated policies and initiatives on ICT use. Generally, these policies and initiatives include offering courses designed to learn technology and its application in other learning areas as a tool for teaching and learning and applying computer skills to the other learning areas. This is based on the principle that teaching-learning must be engaging and interactive, and educational processes must take advantage of technological advancements. Additionally, the education modernization programs in the education sector equip educational institutions with the necessary ICT infrastructures and capacitate the teachers to use technology in the teaching and learning process [41]. With this, the teachers and instructors, in general, are more knowledgeable and more capable of using technologies than before. Therefore, navigating various ICT platforms and resources and developing the digital teaching and learning materials would not be an issue when using an e-portfolio in their respective classes.

C. Challenges and Opportunities Encountered by the Teachers in Utilizing e-Portfolios

The e-portfolio demonstrated great potential in the educational process. Still, to implement an e-portfolio, teachers, students and institutions need to have a clear idea of what it is, what its purpose is, and why it should be used in education. Educators are not properly trained to embed ICT in their pedagogical practices. Creating an e-portfolio employs skills essential for 21st-century learning. e-Portfolios are considered tools to generate learning as well as document learning [8]. As an assessment tool, the e-Portfolio functions as a tool for teachers to examine student achievement. E-portfolios can be a useful way to organize, sample, and assess what students gained from the program. E-portfolios enable teachers to observe what students know and can do and learn through student reflections.

Teacher participants of this study expressed their feelings and experiences in utilizing E-portfolio in their respective classes. Varied answers were shared, especially on their accounts on what they like most and like least in using e-portfolio, the challenges they encountered, and what they do to improve their skills in utilizing e-portfolio.

1) Theme 1: E-portfolio as a teaching tool

An e-portfolio reflects the work of a student in one or more disciplines that are intended to be presented to others. It is a tool where college teachers want to clarify their students' educational goals and integrate and solidify their learning. The portfolio is a laboratory where students construct meaning from their accumulated experience [9]. Therefore, a portfolio is a digital collection created by an individual or organization for a specific purpose. They are holistic activities that have a structural and meaningful unity and have specific consequences [42]. The latest e-Portfolio is a platform for assembling, organizing, and developing digital presentations. It can be updated and customized for a variety of purposes and audiences. As mentioned above, you can save your e-portfolio by linking to various electronic media and external sources. For example, e-portfolios can be stored on computer hard drives, USB sticks, smartphones, iPods,

CDs, commercial websites, and educational websites [42].

When asked about e-portfolio as a learning tool, informants considered it very useful.

"I use e-portfolio as a learning tool. My students learn from each other's views and experiences" (Participant 11)

E-portfolio is an effective learning tool because they support students' knowledge construction, makes otherwise invisible aspects of the learning process visible, and placement agency in the hands of the students, which fosters learners' motivation. It is used in making the students learn and remember and to save what they have learned. It is very easy for the teacher to check or correct all the work. It also helps students produce outputs easily in which they can save all the important outputs they have, and teachers can easily access them.

Moreover, teachers find that students can use e-portfolio to submit their performance tasks and give immediate feedback on their performance. In the study of Bangalan and Hipona [14], they found that students recognized e-portfolio as a useful learning tool. Informants also expressed that they will be able to see it to enhance their teaching methods and adapt education to the needs of today's society. Informants also expressed that an e-portfolio is a student-centered activity. Her students are free to choose what documents are included and reflect on their learning process. An E-portfolio fosters engagement and motivation [13]. E-portfolio offers opportunities for students to control and support or promote learning. It is this recognition that learning occurs beyond the classroom that makes e-portfolio attractive to many teachers.

E-portfolio also functions as a tool for teachers to monitor and evaluate the performance of their students. Although it can be very useful to examine student achievement for improvement collectively, it is also useful to organize, sample, and assess what students gained from the lesson or topic. It will enable teachers to observe what students know and can do and learn how their students learn through student reflections. One of the participants said:

"So far, I've only tried utilizing an e-portfolio containing the child's performance monitoring form, which includes their test score in every assessment and project that they have. The students are somehow encouraged and get motivated to do better after seeing their e-portfolios since it also contains feedback from the teacher. Hence, the e-portfolios serve as the guide or basis as to which part of our classroom activities they should work on or improve" (Participant 26).

This situation implies that teachers are using e-portfolio as an educational tool for assessing student learning. Another teacher said:

"*Proud to be using digital technology, students' strong interest in the process, and their disciplined behavior during discussions*" (Participant 22).

Moreover, it helps in the evaluation process, in which teachers readily assess and evaluate the students' work samples. But, of course, she needs to have a checklist or rubrics in evaluating what is expected in the portfolio before the students begin to submit their work. In line with this, another teacher said:

"*A day before class, condition all equipment/devices, refresh learning materials, sleep early; Upgraded internet connectivity; Always think enthusiastically and be enthusiastic* (Participant 17).

Student conditioning and preparation matter most. An E-portfolio is another way of showing evidence of learning. Through the use of an e-portfolio, teachers would check how far the students learn from the lesson. So the informants expressed they need to choose the type of assessment that best meets the goals and objectives of a particular unit/lesson.

2) Theme 2: Benefits of using e-portfolios in teaching and learning

Teachers generally use an e-portfolio to collect their students' work by letting them reflect on their work, strengths, and weaknesses and motivating students to strive hard to improve. However, what is more beneficial are the data collected when the teachers assess the work in an e-portfolio, reflect upon it in a curricular context and use the data and reflection to plan for improvement.

Informants mentioned that an e-portfolio provides a resource for both students and teachers to learn about the achievement of important outcomes over time and gain some insights, which leads to improving their teaching and strategies.

E-portfolio provides rich opportunities for metacognition through reflections which may help students develop their skills. It promotes innovativeness because students find ways and means to make their work more creative, become organized in presenting their work sample, and become more responsible, which is an important thing that a student must possess. Some teachers mention that:

"*My students became very creative using google sites. They utilize this application in creating their e-portfolio"* (Participant 8).

This response implies that students are learning using an e-portfolio. Another teacher mentioned,

"*E-portfolio helps learners develop new learning or deeper understanding which results in higher grades, helps learners develop a better sense of themselves and showcase learners' achievements"* (Participant 3).

An E-portfolio speeds up the assessment process because all samples are there, so teachers can just assess all outputs at once and give feedback immediately. In addition, it stores the files for future reference; teachers can monitor their understanding since all works are saved in an e-portfolio. Finally, teachers can review the files any time of the day, paperless in nature, and save videos and images, which are also important in assessing the students' performance.

Moreover, student reflections have provided insight into the effectiveness of each learning experience and the link between the artifact and the program's outcome for which it was selected [43]. Some teachers said:

"*In the e-portfolio of my students, there are online resources that act to record to store students output and to archive the artifacts of learning and reflection for an individual learner*" (Participant 5).

Another said:

"*Familiarity of the features of the PowerPoint presentation and excel, reflection and insights are available in their e-portfolio"* (Participant 4).

Reflections are essential in a student e-portfolio, whether traditional or electronic. E-portfolios are often used to

compile a student's best work or assessments across the entire didactic and experiential curriculum and may contain student reflections that demonstrate self-awareness [44].

3) Theme 3: Challenges and opportunities encountered by the teachers in utilizing e-portfolios

Findings indicate that in utilizing e-portfolio, teachers faced several challenges such as difficulty accessing the internet for documenting, their overloaded teaching hours, other extracurricular activities, and other deliverables in school. In addition, it is time-consuming and lacks technical skills and technological resources. There are also challenges in using an e-portfolio.

"*Students need to be motivated to reflect; implementation needs support from the administration, teachers need to have a positive attitude towards the implementation of its use" as quoted in* (Participant 9).

According to Tosh *et al*. [13], whatever system is chosen must meet the users' needs and be sufficiently flexible for the more advanced. College teachers need training and knowledge so that they can obtain assistance when needed. If college teachers are offered the opportunity to use an e-portfolio, continued technical assistance needs to be considered. One college teacher said:

"*The training conducted on the use of e-portfolio is very important to us teachers. Although, we have internet connectivity problem we tried our best to share the benefits of e-portfolio in learning"*, (*Participant 15*).

Thus, teachers' training in developing e-portfolio is also necessary. Although the e-portfolio offers clear advantages over the traditional portfolio when it comes to allowing access, this brings corresponding challenges, like providing all students with appropriate access to their e-portfolio and maintaining the security of the information.

Informants expressed that using an e-portfolio is time-consuming. Therefore, time is often cited as an important consideration when implementing an e-portfolio system [45]. In utilizing e-portfolios, planning needs to be done to analyze the time demands of training teachers and students, introduce the e-portfolio project, provide technical and academic support, and give students feedback after checking how this may impact the curriculum, especially during this pandemic [46].

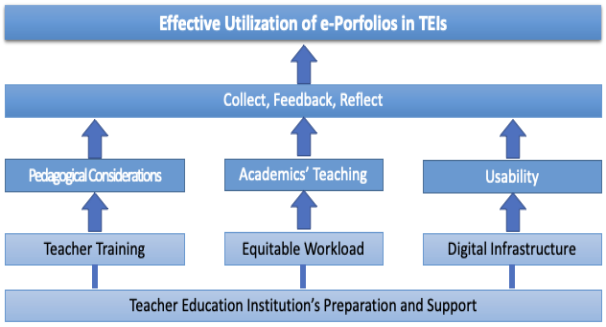

Fig. 1. Framework for effective utilization of e-portfolios in TEIs.

Assessment challenges demand a significant amount of time for both students and teachers, and learners may have difficulty understanding the need to reflect on their work and the need for them to make connections between different courses and experiences. All teachers must be aware of the significant amount of time it may take to construct their e-portfolio and keep it up to date, especially in the early stages, but this will become less of an issue as their confidence and proficiency increase.

Fig. 1 shows a framework for effective utilization of e-Portfolios in TEIs.

Effective utilization of e-portfolio considers three dimensions, namely pedagogical considerations, academics' teaching, and usability. In these dimensions, teachers need to collect evidence, give feedback, and reflect on how these could improve the teaching-learning process. To effectively implement e-portfolios, TEIs conduct training on e-portfolios to improve pedagogical considerations, provide an equitable workload to offer good academics' teaching, and provide the digital structure needed to increase and efficiently use e-portfolios.

VI. Conclusion and Future Directions

The e-portfolio has helped teachers in higher education institutions enhance the students' experiences in learning and assessment. In this time of health crises, in which instructors are restricted from conducting face-to-face classes, the use of e-portfolio has given them an alternative way of sustaining quality instruction in higher education institutions. e-portfolio has served as a mechanism for collecting evidence toward the achievement of students in tertiary education. The learning evidence uploaded by the students can be both formative and summative assessments. The electronic portfolio was used to document the students' proficiency, confirm their skills, and thus increase the students' self-confidence.

The study is limited to the utilization of e-portfolios among teachers in teacher education institutions. Future researchers may focus their studies using a bigger sample across different degree programs and locales and including other variables such as students' satisfaction and academic achievement. Qualitative studies on the designing, implementation, and evaluation of e-portfolios are also highly recommended. The link between e-portfolios and flexible learning may be explored to upgrade the country's modular and online learning modalities.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

H. B. Boholano, J. M. P. Sanchez, V. T. M. Balo, and T. M. M. Navarro have equal contributions in the conduct of this study.

Acknowledgment

The researchers would extend their gratitude to the Commission on Higher Education through Cebu Normal University's Institute for Research in Innovative Instructional Delivery (IRIID) for the research grant that paved the way for the conceptualization and completion of this timely paper.

REFERENCES

[1] J. M. P. Sanchez, B. A. Alejandro, M. M. J. Olvido, and I. M. V. Alejandro, "An analysis of online classes tweets using Gephi: Inputs for online learning," *International Journal of Information and Educational Technology*, vol. 11, pp. 583-589, 2021

[2] F. T. Dayagbil, D. R. Palompon, L. L. Garcia, and M. M. J. Olvido, "Teaching and learning continuity amid and beyond the pandemic," *Frontiers in Education*, vol. 6, article 678692, 2021

[3] M. K. Kabilan and M. A. Khan, "Assessing pre-service English language teachers' learning using e-portfolios: Benefits, challenges and competencies gained," *Computers and Education*, vol. 58, pp. 1007-1020, 2012

[4] E. Namaziandost, S. Alekasir, M. H. M. Sawalmeh, and M. Z. Miftah, "Investigating the Iranian EFL learners' attitudes towards the implementation of e-portfolios in English learning and assessment," *Cogent Education*, vol. 7, article 1856764, 2020.

[5] H. B. Boholano, J. A. Merin, and L. C. Dapat, "Building online facilitating skills in the new normal," *Journal of Research, Policy & Practice of Teachers and Teacher Education*, vol. 11, pp. 13-24, 2021.

[6] L. Gray. (July 2019). Getting started with e-portfolios. [Online]. Available: https://www.jisc.ac.uk/guides/getting-started-with-e-portfolios

[7] University of California, Berkeley – Center for Teaching & Learning. (2021). E-Portfolio. [Online]. Available: https://teaching.berkeley.edu/resources/assessment-and-evaluation/design-assessment/e-portfolio

[8] P. Basken. (April 2008). Electronic portfolios may answer calls for more accountability. [Online]. Available: https://www.chronicle.com/article/electronic-portfolios-may-answer-calls-for-more-accountability/

[9] P. R. Paulson and F. L. Paulson, "Portfolios: Stories of knowing," presented at the Annual Meeting of the Claremont Reading Conference, March 1991.

[10] T. W. Banta, *Introduction: Why Portfolios? Portfolio Assessment: Uses, Cases, Scoring, and Impact*, CA, USA: Jossey-Bass, 2003.

[11] J. Zubizarreta, *The Learning Portfolio: Reflective Practice for Improving Student Learning*, Bolton: Anker, 2004.

[12] R. Bass and B. Eynon. (Jan. 2009). Capturing the visible evidence of invisible learning. [Online]. Available: http://academiccommons.org/january-2009/capturing-the-visible-evidence-of-invisible-learning/

[13] D. Tosh, T. P. Light, K. Fleming, and J. Haywood, "Engaging with electronic portfolios: Challenges from the student perspective," *Journal of Learning and Technology*, vol. 31, p. 43170, 2005.

[14] R. C. Bangalan and J. B. Hipona, "E-portfolio: A potential e-learning tool to support student centered learning, reflective learning and outcome-based assessment," *Globus an International Journal of Management & IT*, vol. 12, pp. 32-37, 2020.

[15] P. C. Abrami and H. Barrett, "Directions for research and development on electronic portfolios," *Canadian Journal of Learning and Technology*, vol. 31, p. 43165, 2005.

[16] J. Parsons, "Portfolio assessment: Let us proceed with caution," *Adult Learning*, vol. 9, p. 28, 1998.

[17] D. Niguidula, "Documenting learning with digital portfolios," *Educational Leadership*, vol. 63, p. 44, 2005.

[18] M. L. van Sickle, M. Bogan, M. B. B. Karmen, and C. Dickman, "Use of portfolios for standards-based performance in teacher standards," *College Student Journal*, vol. 39, pp. 497-509, 2005.

[19] S. Corbett-Perez and S. M. Dorman, "Electronic portfolios enhance health instruction," *The Journal of School Health*, vol. 69, p. 247, 1999

[20] A. Wade, P. C. Abrami, and Scalater, J., "An electronic portfolio to support learning," *Canadian Journal of Learning and Technology*, vol. 31, p. 43167, 2005.

[21] J. W. Creswell, V. P. Clark, M. Gutmann, and W. Hanson, "Advanced mixed methods research designs," in *Handbook of Mixed Methods in Social and Behavioral Research*, A. Tashakkori and C. Teddle, Eds., Piscataway, Thousand Oaks, CA: Sage, 2003, pp. 209-240.

[22] E. F. Hinojosa-Pareja, E. Gutiérrez-Santiuste, and V. Gámiz-Sánchez, "Construction and validation of a questionnaire on e-portfolios in higher education (QEPHE)," *International Journal of Research and Method in Education*, vol. 44, pp. 53-66, Mar 2020.

[23] E. Dougherty and D. Coelho, "E-portfolios in English language learning: Perceptions of Arabic-speaking higher education students," *The Electronic Journal for English as a Second Language*, vol. 31, pp. 1-21, 2017.

[24] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, pp. 77-101, 2006.

[25] M. Ciesielkiewicz, "The use of e-portfolios in higher education: From the students' perspective," *Issues in Educational Research*, vol. 29, pp. 649-667, 2019.

[26] S. M. Fallowfield, M. Urtel, R. Swinford, L. Angermeier, and A. S. Plopper, "A case study in eportfolio implementation: A department-wide perspective," *International Journal of e-Portfolio*, vol. 9, pp. 111-118, 2019.

[27] A. Beka and D. Gilareva, "The importance of using electronic portfolios in teachers work," *Applied Technologies and Innovation*, vol. 12, pp. 32-42, 2016.

[28] P. Amaya, J. E. Agudo, H. Sánchez, M. Rico, and R. Hernández-Linares, "Educational e-portfolios: Uses and tools," *Procedia-Social and Behavioral Sciences*, vol. 93, pp. 1169-1173, 2013.

[29] I. P. Vorotnykova and O. H. Zakhar, "Teachers' readiness to use e-portfolios," *Information Technologies and Learning Tools*, vol. 81, pp. 327-339, 2021.

[30] L. Lewis, "A critical reflection on eportfolio as a teaching tool," *New Zealand Journal of Teachers' Work*, vol. 12, pp. 115-130, 2015.

[31] P. Poole, M. Brown, G. McNamara, J. O'Hara, S. O'Brien, and D. Burns, "Challenges and supports towards the integration of eportfolios in education. Lessons to be learned from Ireland," *Heliyon*, vol. 4, article e00899, 2018.

[32] P. J. F. Sipacio, "Confronting challenges in implementing e-portfolio via facebook in a Philippine university," *Indonesian Journal of Applied Linguistics*, vol. 2, pp. 44-55, 2015.

[33] A. E. Yastibas and S. Cepik, "Teachers' attitudes toward the use of e-portfolios in speaking classes in English language teaching and learning," *Procedia-Social and Behavioral Sciences*, vol. 176, pp. 514-525, 2015.

[34] N. Buzzetto-More, "Assessing the efficacy and effectiveness of an e-portfolio used for summative assessment," *Interdisciplinary Journal of e-Learning and Learning Objects*, vol. 6, pp. 61-85, 2010.

[35] E. Vázquez-Cano, E. López Meneses, and A. Jaén Martinez, "The group e-portfolio to improve teaching-learning process at university," *Journal of e-Learning and Knowledge Society*, vol. 13, p. 188118, 2017.

[36] M. Gordon, "Toward a pragmatic discourse of constructivism, reflections on lessons from practice," *Educational Studies*, vol. 24, pp. 17-20, 2009.

[37] H. Constantine and M. Lorenzo, *Professional Achievement Profile, Distinguished Teacher's Guide*, Palestine: Univesity Book House, 2004.

[38] H. Mazen, "Practical education to employ IT skills in the design, preparation and use of E-portfolios," *Journal of the Egyptian Association for Practical Education*, 2009.

[39] I. Gartner. (2011). Hype cycle research methodology. [Online]. Available: https://www.gartner.com/en/research/methodologies/gartner-hype-cycle

[40] R. S. Andreson and L. DeMuelle, "Portfolio use in twenty four teacher education programs," *Teacher Education Quarterly*, vol. 25, pp. 25-31, 1998.

[41] M. F. Baris, and N. Tosun, "E-portfolio in lifelong learning applications," *Procedia-Social and Behavioral Sciences*, vol. 28, pp. 522-525, 2011.

[42] Z. Syzdykova, K. Koblandin, N. Mikhayloya, and O. Akinina, "Assessment of e-portfolio in higher education," *International Journal of Emerging Technologies in Learning*, vol. 16, pp. 120-134, 2021.

[43] A. L. Bonifacio, "Developing information communication technology (ICT) curriculum standards for K-12 schools in the Philippines," presented at the Sixth Conference of MIT's Learning International Consortium, Cambridge, MA, June 16-19, 2013.

[44] M. Sidebotham, K. Baird, C. Walters, and J. Gamble, "Preparing student midwives for professional practice: Evaluation of a student e-portfolio assessment item," *Nurse Education in Practice*, vol. 32, pp. 84-89, 2018.

[45] R. A. Bobak, "Electronic portfolios," *Distance Learning*, vol. 1, pp. 1-8, 2004.

[46] G. Sumalinog, "Barriers of online education in the new normal: Teachers' perspectives," *International Journal of Learning, Teaching and Educational Research*, vol. 21, pp. 33-50, 2022.

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