Pre-service Teachers' Perceptions of Digital Portfolio in Enhancing Learning Experiences During Teaching Practice

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Abstract

This study investigated pre-service teachers' (PSTs) perceptions and beliefs regarding the usefulness and ease of use of digital portfolios (DPs) in their teaching practice. It also aimed to identify factors that may influence the implementation of DPs as a learning tool and assess the feasibility of incorporating DPs during teaching practicum (TP). This study's participants consisted of nineteen pre-service teachers (PSTs) from a private university in Malaysia. They were involved in a twenty-four-week TP that spanned two semesters. The study applied the Technology Acceptance Model (TAM) as a conceptual framework to analyse the PSTs' perceptions and learning experiences. A mixed-methods approach was employed, which included questionnaires and structured interviews for data collection. Descriptive analysis was used to examine the quantitative data, and thematic analysis was used to analyse the qualitative data. The findings indicated that DPs were generally considered to be a valuable learning tool, although their use presented both opportunities and challenges. The study offers recommendations for enhancing the teacher education program at the university and identifies practical implications.

Keywords: Pre-service teachers (PSTs), digital portfolios (DP,) Technology Acceptance Model (TAM), and teacher education

Introduction

The contemporary teacher education landscape is characterized by technological advancements and the need for educators who are more dynamic and adaptable. In the field of teacher education, digital portfolios (DPs) or e-portfolios have become a game-changing tool that allows pre-service teachers (PSTs) to enhance their learning experiences (Barrett, 2010). DPs provide evidence for learners' performance and progress through the purposeful digital collections of their work, including their reflections (Butler, 2006; Buzzetto-More, 2015; Rezgui et al., 2014). This study investigated pre-service teachers' perceptions of DPs during their teaching practice (TP), particularly in the context of their application in a Malaysian teacher education program at a private British university in Malaysia.

Digital Portfolios (DPs), which emphasize competencies such as reflective practice, technology integration, and student-centred learning, are in alignment with the Malaysian Teacher Education Standard (MTeST). PSTs may find DPs useful for organizing and showcasing their work, enhancing their understanding of pedagogical concepts, and fostering a sense of ownership over their professional development (Hamilton, 2016). They allow PSTs to showcase lesson plans, teaching artifacts, and reflections on classroom experiences, aligning with the MOE's goal of producing highly qualified teachers (Malaysian Ministry of Education, 2013; Yunus et al., 2010). DPs support reflective thinking, collaboration, and the integration of technology into instructional practices, while also making it easier to document the growth and competencies of PSTs, mentors, and supervisors (Hopper et al., 2018; Khales, 2016). They also offer an alternative assessment method, avoiding exam-centered approaches that may lead to discrepancies between beliefs and practices (Hopper et al., 2018, Othman & Kiely, 2016).

Both teachers and students may face challenges in integrating technology and developing digital literacy skills for creating and maintaining DPs (Othman & Kiely, 2016). Factors such as the quality of training and support provided also influence attitudes towards DP use (Ward & Moser, 2020). Using DPs in pre-service teachers' TP may lead to challenges such as inconsistency in design and implementation (Mills & Ali, 2017), lack of communication between teachers and mentors (Yunus et al., 2010), and the need for alignment with 21st-century teaching and learning with technology (Nasri et al., 2020). The digital divide may exacerbate access and proficiency disparities (Buzzetto-More, 2015). Addressing the balance between formative and summative assessment components is crucial for effectively promoting reflective TPs (Yancey, 2015). A study using Facebook among Malaysian PSTs revealed a lack of clear structure and instructions in its implementation, indicating that DP use can generate unanticipated difficulties for students (Kabilan, 2016). Therefore, it is crucial to analyze assumptions, beliefs, and perceptions associated with DP use. It is also essential to gather feedback from PSTs about their DP usage during their TP and identify both positive and negative experiences. To this end, this study asks the following questions: 1. What is the (i) perceived usefulness; (ii) perceived ease of use; (iii) attitude towards the usage of digital portfolios and, (iv) intention to use digital portfolios among pre-service teachers at a private British university in Malaysia? And 2. What are the factors that influence the pre-service teachers' adoption of digital portfolios during their teaching practice?

Literature Review

**Theoretical framework**
Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was established by Fred Davis in 1986 to gauge users' acceptance of novel technologies (Davis, 1986, 1989). TAM has been applied extensively in research and is recognised for being transferable to various technological contexts (Abdul Karim et al., 2019; Mubarak et al., 2020; Ng et al., 2013). In Malaysia, the Ministry of Education has been actively promoting the integration of technology in education, including the use of DPs (MOE Malaysia, 2020). Studies show that perceived ease of use and usefulness significantly influence teachers' willingness to adopt DPs in teacher education (Abdul Karim et al., 2019; Mubarak et al., 2020). TAM helps researchers and policymakers in Malaysia understand factors influencing successful DP integration, aiding in the development of effective strategies for technology

adoption and implementation (Mubarak et al., 2020). In this study, TAM is used to evaluate the adoption and acceptance of DPs among PSTs.

Key factors in DP Adoption in TAM

A systematic literature review was conducted to ascertain factors that affect DP adoption, specifically in relation to the four variables of TAM i.e., the perceived usefulness (PU) of DP, perceived ease of use (PEU) of DP, attitudes towards the use (ATU) of DP and the intention of using (ITU) DP. This review identified five key factors that influence the adoption of DP (see Figure 1 below)

Figure 1
Factors Affecting the Adoption of DP
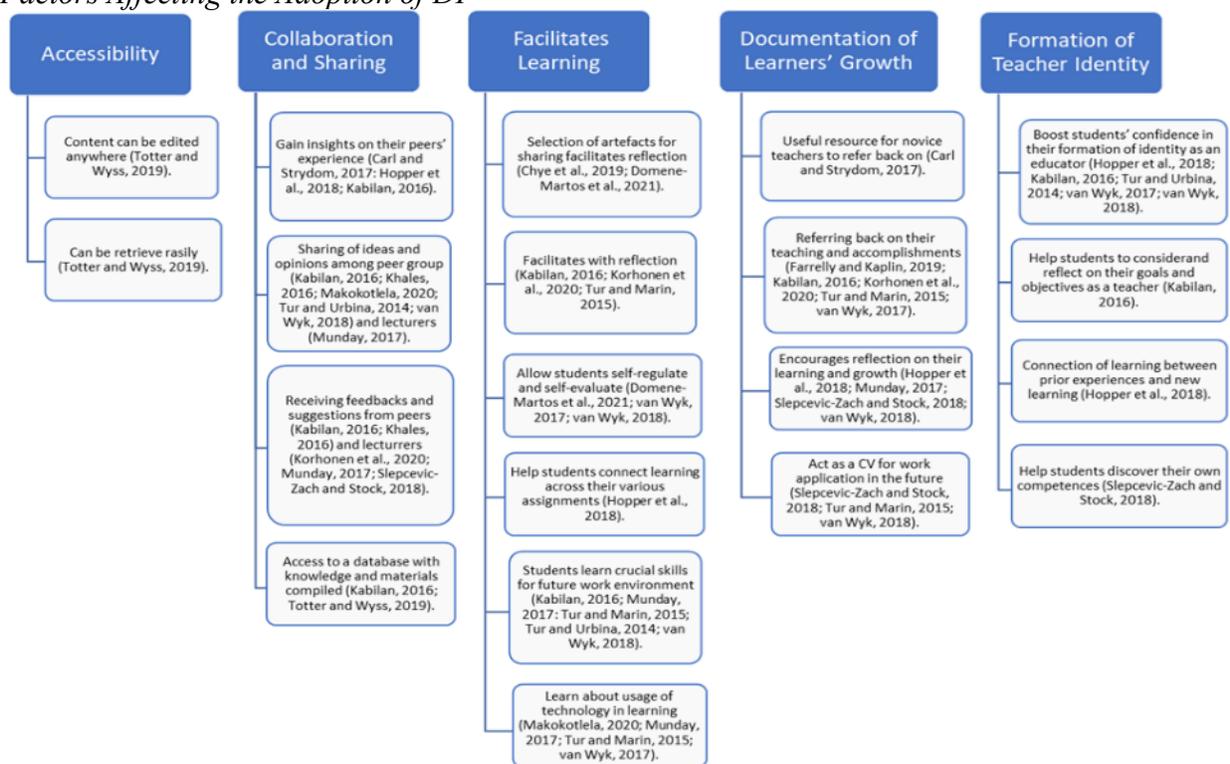
Accessibility

DPs are more accessible and organized form of portfolios compared to physical ones, as they can be edited and retrieved anywhere without the need for a physical document (Totter & Wyss, 2019; Korhonen et al., 2020). Accessibility pertains to the level of ease with which users can access and employ e-portfolios. This has a direct effect on the perceived ease of use (PEOU). When a DP system is created to be user-friendly and compatible with different devices, it improves users' perception of its simplicity, hence increasing their probability of adopting the technology. Studies suggest that systems that are viewed as user-friendly are more likely to be embraced by users, supporting the idea that accessibility can improve both perceived ease of use (PEOU) and perceived usefulness (PU) (Shroff et al., 2011). However, some studies have received negative feedback from student teachers, who believe other mediums can achieve similar results and require

less effort (Chye et al., 2019). Students tend to prefer physical portfolios due to their offline nature (Totter & Wyss, 2019). DPs are also more time-consuming during the development and evaluation stage (Domene-Martos et al., 2021). The platform used for DPs also plays a significant role in improving accessibility, with Facebook being perceived as ineffective by students (Kabilan, 2016).

Collaboration and Sharing

The use of DPS can foster collaboration and sharing among learners (Ngui et al., 2020). PSTs have found that DPs provide valuable insights based on their peers' experiences during teaching practice, allowing them to learn about different teaching and learning contexts (Carl & Strydom, 2017; Hopper et al., 2018; Kabilan, 2016). DPs also encourage the sharing of ideas and opinions among peers, leading to a sense of community and positive relationships (Hopper et al., 2018; Kabilan, 2016; Khales, 2016; Makokotlela, 2020; Munday, 2017; Tur & Urbina, 2014; van Wyk, 2018). Students can receive feedback and suggestions from peers and lecturers (Kabilan, 2016; Khales, 2016), which helps them view their assignments and lessons from a different perspective, increasing the quality and creativity of their work (Kabilan, 2016; Khales, 2016) as well as lecturers (Korhonen et al., 2020; Munday, 2017). Additionally, DPs can be compiled into databases with valuable knowledge and materials for students to access when needed (Kabilan, 2016; Totter & Wyss, 2019). These features improve the perceived utility (PU) of the system by showcasing its capability to promote communication and collaborative learning. Research has demonstrated that individuals are more likely to embrace technologies that offer chances for social connection, as this enhances their perception of the tool's worth in assisting their educational objectives (Liao et.al., 2022; Shroff et al., 2011). However, some studies have raised concerns about the effectiveness of DPs in enhancing collaboration and learning. For instance, a study by Tur and Marin (2015) found that students disagreed with the DPs' ability to enhance sharing and learning, while another study found that sharing DPs publicly caused anxiety and competitiveness among students (Tur & Urbina, 2014). Additionally, students noted confusion in ongoing discussions with different topics (Kabilan, 2016).

Facilitates Learning

DPs are a valuable tool for facilitating learning in PSTs by providing a structured way for students to reflect on their experiences and track their progress (Chye et al., 2019; Domene-Martos et al., 2021; Hopper et al., 2018). Students are required to select, upload, and organize relevant artifacts onto their DPs, which helps them reflect on their lessons and work (Chye et al., 2019; Domene-Martos et al., 2021). DPs also encourage self-regulation and self-evaluation of learning (Domene-Martos et al., 2021; Kabilan, 2016; van Wyk, 2017, 2018), allowing students to personalize their materials and monitor their progress (Domene-Martos et al., 2021; Korhonen et al., 2020; Tur & Marin, 2015). Engaging with DPs enhances teaching philosophies and teacher identity (van Wyk, 2017, 2018). Students gain essential skills, such as teaching, organization, technological, reflective, collaborative, and critical thinking skills (Kabilan, 2016; Makokotlela, 2020; Munday, 2017: Tur & Marin, 2015; Tur & Urbina, 2014; van Wyk, 2017, 2018). The use of DPs encourages students to engage with multiple digital tools, inspiring them to apply technology in their classrooms (Kabilan, 2016; Makokotlela, 2020; Munday, 2017). However, some studies suggest that DPs can be used as a platform for students to store assignments and display their work to employers, classmates, and lecturers (Farelly & Kaplin, 2019). A study by Michos et al. (2021)

found that the use of a mobile portfolio during teaching practicum did not affect student teachers' overall teaching enthusiasm and self-efficacy, suggesting that the facilitation of learning could vary across different contexts where DPs are used. Overall, DPs can be a valuable tool for enhancing learning for PSTs, but their full potential remains to be realized.

Documentation of Learners' Growth

DPs (Digital Projects) allow students to access their work online anytime, allowing them to document their learning growth and engage in reflections on their experiences (Carl & Strydom, 2017; Farrelly & Kaplin, 2019; Hopper et al., 2018; Kabilan, 2016; Tur & Marin, 2015; van Wyk, 2018). This platform also helps students connect across different modules throughout the semester (Hopper et al., 2018), although some students may feel disconnected from different topics (Farrelly & Kaplin, 2019). DPs are particularly helpful for novice teachers who can learn from sharing experiences and referring to other DPs (Carl & Strydom, 2017; Munday, 2017). DPs can also serve as a resume for employers when PSTs apply for jobs, as they represent their teacher identity and help employers gauge their ability and required knowledge (Farrelly & Kaplin, 2019; Slepcevic-Zach & Stock, 2018; Tur & Marin, 2015). In a study by Slepcevic-Zach and Stock (2018), 56% of participants mentioned using DPs for job applications as helpful. Documenting and showcasing personal growth through an e-portfolio enhances its perceived usefulness (PU). Users value systems that allow them to reflect on and present their achievements, which can be particularly motivating in educational contexts. This documentation aspect serves as a record of learning and a tool for self-assessment, aligning with users' goals and increasing their intention to use the e-portfolio (Shroff et al., 2011).

Formation of Teacher Identity

Studies suggest that the use of DPs in PSTs significantly influences their teacher identity (Tur & Urbina, 2014; Hopper et al., 2018; Kabilan, 2016; van Wyk, 2017, 2018), particularly in developing their teaching philosophy and techniques (van Wyk, 2017, 2018). Reflecting on their growth and progress during the intervention improved their self-confidence in professional education (Slepcevic-Zach & Stock, 2017). The process of reflection helped students understand themselves and their competencies, which was not known before using DPs (Hopper et al., 2018). This led to a better understanding of their goals and objectives for future educators, a crucial element for their growth (Kabilan, 2016). This factor contributes to both PU and PEOU, as users who see the e-portfolio as a means to articulate and develop their identity are more likely to perceive it as useful and easy to use. The integration of personal identity into the learning process can enhance motivation and engagement, which are critical for technology adoption (Liao et.al., 2022).

Methodology

Research Design

The study used both quantitative and qualitative data. Both quantitative and qualitative analyses were conducted using TAM variables. The study aimed to provide a comprehensive understanding of the factors that affect the adoption of the DP as an innovative feature in teaching

practice (TP) in the School of Education. Data was collected through online surveys and interviews.

Table 1

Research Questions and Instruments

	Research Questions	Instruments
1	What is the (i) perceived usefulness; (ii) perceived ease of use; (iii) attitude towards the usage of DP, and (iv) intention to use DP among PST at a private British university in Malaysia?	TAM Questionnaire (Digital survey via Microsoft Forms Quantitative data - Descriptive statistics (mean, SD)
2	What are the factors that influence the pre-service teachers' adoption of DPs during their TP?	Focus-group interview Qualitative data - Thematic analysis - Themes

Participants

The research was conducted at a private British university in Malaysia and involved 19 pre-service English teachers who were required to create and maintain DPs as part of their teaching practicum. The study used convenience sampling, with 73% of the population completing the online survey. Sixteen participants (26.3%) participated in a focus group interview, categorizing them based on their prior use of DPs. The 32 interviews, focusing on data quality over quantity, provided rich and nuanced insights into the subject matter.

Instrument

The study used a modified version of Davis's TAM questionnaire, which includes questions evaluating attitudes towards usage and intention to use from Van De Bogart and Wichadee (2015), and Rigopoulos et al. (2008). The study's validity is supported by its peer-reviewed publication and higher impact factors. The questionnaire consists of two parts, evaluating respondents' overall profile and their agreement with the statement in the second section. A seven-point Likert scale is used to assess respondents' agreement. A pilot test was conducted before full implementation, and the study's acceptability was established by Cronbach's Alpha results, which showed positive internal consistency across all items at 0.82. Aron and Aron (2003) state that in the social and behavioural sciences, a Cronbach's alpha of between 0.6 and 0.7, and ideally closer to 0.9, is regarded as valuable. The study's validity is bolstered by its alignment with the TAM concepts and tenets.

Data Collection and Data Analysis of Quantitative Data

Table 2
Details of the survey

Perceived Usefulness	
PU1	Using DP enables me to attain the learning outcome more quickly during TP.
PU2	Using DP would improve my job performance during TP.
PU3	Using DP increases my productivity during TP.
PU4	Using DP would enhance my effectiveness during TP,
PU5	Using DP would make it easier to learn things during my TP.
PU6	I would find DP useful in learning during TP
Perceived Ease of Use	
PEU1	Learning to use DP would be easy for me.
PEU2	I would find the easy-to-get DP to do what I wanted it to do.
PEU3	My interaction with DP would be clear and understandable.
PEU4	I would find DP to be flexible to interact with.
PEU5	It would be easy for me to become skilful at using DP.
PEU6	I would find DP easy to use.
Attitude Towards Usage	
ATU1	I think DP makes learning easier.
ATU2	I have a generally favorable attitude towards using DP.
ATU3	Using DP brings a lot of enjoyment in learning.
Intention to Use	
ITU1	I think that using DP in learning is a good idea.
ITU2	I intend to use DP in the future.
ITU3	I intend to sign up for courses that use DP.

The survey items are listed in Table 2. The study invited Year 4 PSTs to participate in an online survey, requiring informed consent before completing the questionnaire. Participants were briefed on the research purpose and confidentiality measures. Descriptive statistics were employed to analyse the data, with SPSS 28th edition tabulating frequency, mean, and standard deviation. This provided a preliminary understanding of how the learners perceived the technology for learning, while standard deviation helped determine the variability level of the data, and the diversity level from the perspective of the learners. To interpret the mean of each item, scale range for the interval data and its agreement and explanation/classification terms are used (as shown in Table 3).

Table 3
Interpretation of Mean Score

Score	Scale Range	Agreement	Explanation/ Classification
7	6.16-7.00	Strong Agree	Very Strong
6	5.30-6.15	Moderately Agree	Moderately Strong
5	4.44-5.29	Agree	Slightly Strong
4	3.58-4.43	Neutral	Moderate
3	2.72-3.57	Slightly Disagree	Slightly Weak
2	1.86-2.71	Disagree	Moderately Weak
1	1.00-1.85	Strong Disagree	Vert Weak

Qualitative Data

Qualitative data, such as semi-structured interviews, allow PSTs to articulate their personal experiences, feelings, and reflections regarding DP. This narrative approach captures the complexity of their learning processes and the emotions involved, which quantitative data cannot fully convey. The semi-structured interview approach was used to provide additional avenues for communication and insight-gathering to uncover factors affecting the adoption of the DP during the implementation in their TP (RQ2). The procedures established serve as evidence of the dependability and validity of the qualitative approach. To find and record the categories and themes that emerged from the interviews, this study employed thematic analysis. Thematic analysis is a method for analysing qualitative data that involves looking through a data set for recurring patterns and analysing, reporting, and identifying them (Braun & Clarke, 2006). All participant names were replaced with pseudonyms after the transcription was completed to safeguard the participants' privacy. By closely examining the text and continuously comparing it to other similar texts, relevant categories were found using inductive content analysis (Zhang & Wildemuth, 2009). More significant categories called "themes" were created by grouping the refined codes.

In conclusion, the integration of quantitative and qualitative data in a mixed methods study improves validity through the facilitation of triangulation, the provision of completeness, the explanation of unexpected findings, and the illustration of the findings (Hands, 2022). Thus, a more solid, nuanced, and legitimate knowledge of the research problem results from the integration of various data kinds and methodologies

Results and Discussion

In what follows, the findings are presented according to the research questions formulated:

RQ1: What is the (i) perceived usefulness; (ii) perceived ease of use; (iii) attitude towards the usage of digital portfolios and, (iv) intention to use DPs among PSTs at a private British university in Malaysia?

RQ1.1 - What is the (i) perceived usefulness (PU) of the DP among the PST at a private British university in Malaysia?

As indicated in Table 4, the mean score of Perceived Usefulness is considered moderate to moderately strong (M = 3.263 - 5.158, SD = 1.3572 – 4.8001). There is a moderately strong indication that *DP enables them to enhance effectiveness during TP* (M = 5.158, SD = 4.3750).

There are moderately strong indications that *DP would improve their performance during TP* (M = 4.526, SD = 4.8001); *that DP can improve their performance during TP* (M = 4.526 - 4.8001); and that *DP is useful in learning during TP* (M = 4.368, SD = 2.0605). However, there are moderate to moderately weak indications that DP can help them attain the learning outcome more quickly during TP (M = 3.789, SD = 1.3572) and DP would make it easier to learn things during my TP (M = 3.263. SD = 1.6614)

Table 4
Perceived Usefulness (PU)of DP

	Perceived Usefulness	N	Mean	SD	Kurtosis
PU1	Using DP in learning enables me to attain the learning outcome more quickly during TP	19	3.789	1.3572	1.867
PU2	Using DP in learning would improve my performance during TP	19	4.526	4.8001	13.512
PU3	Using DP in learning would increase my productivity during my TP	19	4.053	1.8401	-1.184
PU4	Using DP would enhance my effectiveness during TP	19	5.158	4.3750	13.560
PU5	Using DP would make it easier to learn things during my TP	19	3.263	1.6614	-0.083
PU6	I would find DP useful in learning during TP	19	4.368	2.0605	-1.741

RQ1.2 -What is the (ii) Perceived ease of use (PEU) of the DP among the PST at a private British university in Malaysia?

There are 6 items tested for perceived ease of use (see Table 5). The overall indication is there is a slightly weak to moderate perception towards ease of use (M = 2.842 – 3.895, SD =1.5121 – 1.8872) of DP. Learners generally perceived using DP would be *moderately easy for them* (M = 3.895, SD = 1.6632) and *moderately easy to use* (M = 3.842, SD = 1.7405). The respondents also moderately perceived that DP *to be flexible to interact with* (M = 3.684, SD = 1.8872); *to do what they wanted it to do* (M = 3.211, SD =1.5121). However, learners have indicated that it is *difficult for them to become skillful at using DP* (M = 2.842, SD = 1.8032

Table 5
Perceived Ease of Use (PEU) of DP

	Perceived Ease of Use	N	Mean	SD	Kurtosis
PEU1	Learning to use DP would be easy for me	19	3.895	1.6632	-0.748
PEU2	I would find the easy-to-get DP to do what I wanted it to do	19	3.211	1.5121	3.043
PEU3	My interaction with DP would be clear and understandable	19	3.053	1.7151	1.440
PEU4	I would find DP to be flexible to interact with	19	3.684	1.8872	-1.161
PEU5	It would be easy for me to become skilful at using DP	19	2.842	1.8032	1.408
PEU6	I would find DP easy to use	19	3.842	1.7405	-1.095

RQ1.3 -What is the (iii) attitude towards the usage (ATU) of DP among the PST at a private British university in Malaysia?

There are 3 items tested for attitude towards the usage of DP (see Table 6). The overall indication of PSTs' attitude towards usage of DP is slightly weak to moderate (M = 2.737 – 4.105, SD – 1.6004 – 1.8810). There is a moderately favourable *attitude towards using DP* (M = 4.105, SD = 2.1575) and that it *brings a lot of enjoyment in learning* (M = 3.316, SD = 1.6004). However, there is a lukewarm attitude towards DP making learning easier (M =2.737, SD = 1.8810).

Table 6
Attitude towards Usage (ATU) of DP

	Attitude Towards Usage	N	Mean	SD	Kurtosis
ATU1	I think DP makes learning easier	19	2.737	1.8810	0.338
ATU2	I have generally favourable attitude towards using DP	19	4.105	2.1575	-1.577
ATU3	Using DP brings a lot of enjoyment in learning	19	3.316	1.6004	0.398

RQ1.4 - What is (iv) the intention (ITU) to use DP among the PST at a private British university in Malaysia?

There are three items tested for Intention to Use DP (see Table 7). The overall indication is one that is slightly weak to moderate intention to use DP for learning (3.316 – 3.579; SD – 1.4550 – 1.920). The respondents expressed moderate intention *to use DP in learning in the future* (M = 3.842, SD = 1.6077); that *using DP in learning is a good idea* (M = 3.579, SD = 1.9240), and moderate *intention to sign up for courses that use DP* (M = 3.316, SD = 1.4550).

Table 7
Intention to Use (ITU) DP

	Intention to Use	N	Mean	SD	Kurtosis
ITU1	I think using DP in learning is a good idea	19	3.579	1.9240	-0.874
ITU2	I intend to use DP for learning in the future	19	3.842	1.6077	0.355
ITU3	I intend to sign up for courses that use DP	19	3.316	1.4550	-0.595

In general, the students thought that DP was a reasonably helpful teaching tool as shown in Table 7. Perceived usefulness ratings are higher (M = 3.263 - 5.158) than perceived ease of use scores (M = 2.842 – 3.895). In essence, the PSTs thought that DP was more beneficial than simple to use. Regarding the usage of DP, a moderate to slightly weak attitude has been noted, as well as a moderate to slightly weak intention to apply it in learning in the future.

RQ2: What are the factors that influence the PSTs adoption of DPs during their TP?

There are a total of eight factors developed in terms of themes related to opportunities, specifically as seen from the TAM's construct of "Perceived Usefulness" (see Table 8 below). Five of these—collaboration and sharing (5), facilitating learning (5), documenting learners' growth (3), and identity formation (3)—are connected to the concepts of opportunities and affordances. When the factors are tabulated, the number in parenthesis represents the frequency count.

There are four additional factors that are related to challenges: lack of time (1), frustration with technical issues (4), and unfamiliarity with the tool (1).

Table 8
Factors that Relate to the Themes of Opportunities and Challenges Based on PU

Themes	Frequency	Factors	Frequency
Opportunities/ Affordances	16	Collaboration and sharing	5
		Facilitates Learning	5
		Documentation of Learner's growth	3
		Formation of Teacher Identity	3
		Easy & convenient	
Challenges	9	Unfamiliarity with the tool	4
		Frustrated with technical issues	4
		Lack of time	1

Some common factors, excerpts, and literature support are summarised below:

Collaboration and sharing

Based on the factor of collaboration and sharing, the following excerpt best encapsulates the factor:

"DP allows me to have a peek at my classmates' writing and reflections in their schools."

This is corroborated by studies carried out by Carl and Strydom (2017) and Hopper et al., (2018) where they argue that doing so allows them opportunities to gain insights on their peers' experience. Khales et al. (2016) study also concurs that the sharing of ideas and reflection pieces via DP opportunities to gain insights into their peers' learning experiences.

Facilitating Learning

On the factor of facilitating learning, the following excerpts best encapsulate the factor:

"Selection of artefacts for sharing facilitates reflection"

This is corroborated by studies carried out by Chye et al., (2019) and Domene-Martos et al., (2021)
"Allow us as students to self-regulate and self-evaluate"
This is corroborated by a study carried out by Domene-Martos et al., (2021)

Documentation of Learner's growth

On the factor of documentation of learner's growth, the following excerpts best encapsulate the factor:

"Useful resource for us as novice teachers to refer to."
This is corroborated by a study carried out by Carl and Strydom (2017)
"Allow us to refer back on our teaching and accomplishments."
This is reported in a similar study carried out by Farrelly and Kaplin (2019)
"Encourages reflection on our learning and growth"
Likewise, this is similar to the findings reported in a study carried out by Hopper et al. (2018)

Formation of Teacher Identity

On the formation of teacher identity, the following excerpts best encapsulate the factors related to opportunities:

"Boost our confidence in helping us form our of identity as an educator. "

This is corroborated by a study carried out by Hopper et al. (2018).

"Allows connection of learning between prior experiences and new learning."
This is similar to the findings reported in a study carried out by (Hopper et al., 2018)
In terms of factors that relate to the theme of challenges, there are three factors generated:
"Unfamiliarity with DP as a tool"(4)
"Difficulty with technical issues relating to DP" (4)
"Lack of time" (1)

These challenges are similar to findings found by Alshawi and Alshumaimeri (2017); Carl and Strydom (2017); and Domene-Martos et al. (2021) in their studies.

Based on TAM's second construct of "Perceived Ease of Use (PEU)," a mixed finding was obtained. Some of the factors categorised under the theme of opportunity and challenges include the following:

Opportunities

Most students found the switch to the digital format to be relatively easy (Carl & Strydom, 2017). The digital format is preferred by many over the earlier hardcopy version. Even though they had some initial difficulties, the PSTs were confident in their abilities to upload assignments to the DP (Brightspace) format (Farrelly & Kaplin, 2019). Following their first instruction from our service providers, the PSTs uploaded their assignments with greater assurance.

Difficulties

Regarding difficulties, as previously said, the PSTs had confusion when utilising DP as a result of the tool's novelty and unfamiliarity (Alshawi & Alshumaimeri, 2017; Carl & Strydom, 2017; Domene-Martos et al., 2021). They were also irritated by the technical problems that arose when using DP (Farrelly & Kaplin, 2019).

In terms of "Attitude towards Usage (ATU)", the following factors were mentioned:

- PSTs understood the importance of DP in their learning and their future career.
- Viewed DP as having more advantages than disadvantages

Both these factors were similar to the findings of Ciesielkiewicz (2019) and Domene-Martos et al. (2021) respectively.

As for challenges, one student expressed negative views toward the implementation of DP
- prefer the usage of other platforms for assignments and
- discussions rarely engage in DP during TP as required

Both these factors were similar to the findings of Roberts (2018) and Chye et al. (2019) respectively.

As for "Intention to use (ITU) DP," the following factors were expressed:

- Documenting and collecting evidence of their work
- A tool for reflection
- Peer sharing of DPs

These factors were similar to the findings obtained in the studies by Munday (2017), and Roberts and Kirk (2019).

In conclusion, the aforementioned qualitative results showed how local cultural, institutional, or technological factors influence PSTs' perceptions DP, providing fresh insights into the effectiveness of DP in diverse contexts, even though they were similar to and consistent with many related studies mentioned. This study allows us to delve deeper into specific themes that have not been thoroughly explored before. Thus for example, if previous research highlighted general benefits of DP, this study investigated specific aspects such as emotional responses, peer collaboration, or the impact on self-efficacy in teaching. Finally, the emphasis on TESOL PSTs reveals unique perspectives and experiences that add to the corpus of current knowledge.

Implications

This investigation has produced a wealth of fresh knowledge and useful implications. First and foremost, while using digital pedagogy (DP), it is imperative to provide pupils with a defined objective. According to research studies by Roberts et al. (2016), Roberts (2018), Roberts and Kirk (2019), and Korhonen et al. (2020), it is crucial to provide students a clear purpose when utilising DP. If the aims and goals of DP are made clear, students will be able to appreciate the value and relevance of their participation in it more efficiently.

It is also essential to give instructors and learners plenty of support so that they feel competent and confident when using the DP tool. Korhonen et al. (2020), Oakley et al. (2014), and Roberts and Kirk (2019) highlight the importance of providing adequate support to facilitate the effective utilisation of DP. Workshops, training events, or online tutorials that lead users through the DP tool's features and functionalities can all be used as forms of support. Instructors and students can overcome any early challenges and maximise DP by offering a great deal of support.

It is essential to provide support and enough time for practice. Roberts and Kirk (2019) underscore how crucial it is to allow students ample opportunity to engage with DP. By researching and experimenting with the tool's features, students can get greater familiarity and understanding by having concentrated practice time. During this practice time, students become more at ease and confident while utilising DP, which enhances learning outcomes and student engagement.

To sum up, the provision of a compelling reason for students to engage with the programme, ample support for instructors and students, and sufficient practice time are essential elements of a well-executed design-based learning strategy. These recommendations aid in establishing a setting that is conducive to the effective integration of DP in educational contexts. Research from Oakley et al. (2014), Roberts (2018), Roberts and Kirk (2019), and Korhonen et al. (2020) corroborate them. By following these suggestions, educational institutions can maximise the benefits of DP while also enhancing the overall learning experience for students.

Limitation of the Study

One limitation of the study is that a large number of the respondents were using DPs for the first time. This suggests that the findings may not accurately capture their actual behaviours and experiences with DP. The respondents' initial perceptions and engagements with the DP tools and platforms may vary from those of individuals who have prior experience, due to their limited familiarity with them. Therefore, it is essential to bear in mind that the outcomes may not precisely depict any potential long-term effects or newly emerging behaviours. Another limitation is that the participants in the study were not familiar with the platforms and tools used to facilitate data processing, which is a disadvantage. Their involvement and interactions with DP may have been influenced by their lack of knowledge of the specific tools and platforms. The PSTs' experiences and results with DP may have been influenced by the learning curve associated with using novel tools and platforms. Therefore, it is crucial to acknowledge that the results may be influenced by the newness of the platforms and technologies used in the study. The study also highlights the absence of a precise delineation of the learning goals linked to DP, as well as the lack of explicit criteria for evaluating performance. The lack of explicit goals and assessment criteria may have affected the understanding of the expected outcomes by the PSTs and their ability to assess their progress. It is important to take into account the limitations of the study.

Conclusion

DPs offer a pragmatic, inclusive, and cohesive approach to assessing TP and enhancing the learning experiences of PSTs. By incorporating DP into TP assessments, educators can gain a comprehensive understanding of a PST's effectiveness by collecting diverse data points, including learning outcomes, instructional tactics, and student involvement. This evaluation allows educators to identify areas where students excel and develop, providing personalized feedback. DP also facilitates the seamless integration of diverse educational technology and resources, enabling PSTs to adapt to the digital era. However, implementing DP faces obstacles, conflicts, and problems, such as equal access to technology and digital resources for all PSTs and the need for different technological expertise levels. Providing support and training is crucial to address these challenges and improve DP implementation. Ultimately, addressing potential challenges, disputes, and downsides will enable a broader adoption of DP.

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