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Digital teaching portfolio in higher education: Examining colleagues' perceptions to inform implementation strategies

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ABSTRACT

This paper examined the perceptions of academic and teaching staff about digital teaching portfolio to inform how implementation strategies in higher education can be made more effective. In light of the Technology Acceptance Model (TAM), a 38-item scale was adapted to tap into eight dimensions of their perceptions toward digital teaching portfolio, namely, Perceived Usefulness for Personal Benefit, Perceived Usefulness for Social Benefit, Ease of Use, Issues of Concern about Time, Issues of Concern about Technology and Support, Intention to Use Portfolio, and Computer Efficacy in using digital teaching portfolio by Self-Exploration, and Computer Efficacy in using digital teaching portfolio with Professional Guidance. A total of 132 teaching staff from two tertiary institutions from Hong Kong and Taiwan completed the questionnaire. The findings offer insights into how strategies for implementing digital teaching portfolio can be made more effective when the target users' perceptions are taken into account. Implications regarding how buy-in can be established and how institutional policies and culture can play a role in facilitating the outcomes of the implementation would be discussed.

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1. Introduction

Using teaching portfolio as an instrument for staff to engage in professional learning and enhance their teaching effectiveness has been of growing interest in higher education (Baume & Yorke, 2002; De Rijdt, Tiquet, Dochy, & Devolder, 2006; Klenowski, Askew, & Carnell, 2006; Seldin, 1997; Wolf, 1991; Wright, Knight, & Pomerleau, 1999). In general, a teaching portfolio refers to "a purposeful collection of evidence, consisting of descriptions, documents and examples of what is good teaching…" (De Rijdt et al., 2006). The selective collection of artefacts offers teaching staff a tool to self-actualize personally and professionally, as well as to showcase their professional capacity and potentials for appraisal, tenure and promotion (Barrett & Carney, 2005; Wright et al., 1999). In the higher education context, many researchers believe that through documenting evidence of good teaching practices, professional growth, and reflections about one's teaching competences, teaching staff would be able to enhance their teaching effectiveness over time (De Rijdt et al., 2006; Klenowski et al., 2006; Wright et al., 1999).

In this paper, we focused on digital teaching portfolio given the emergence of educational technologies in tertiary institutions around the world. In addition to what paper teaching portfolio can contribute

to one's teaching profession, digital teaching portfolio frees users from the traditional geographical and time constraints. It appears to be a useful tool for promoting professional learning and thereby has the potential to contribute to teaching effectiveness in higher education, however, implementation has been problematic (Barrett & Carney, 2005; Schneckenberg, 2009; Van Tartwijk, Driessen, Van Der Vleuten, & Stokking, 2007).

Besides the ever-increasing workload and administrative issues that may have discouraged teaching staff to use digital teaching portfolio, where technological innovation is concerned, establishing user acceptance is another big challenge (Schneckenberg, 2009; Van Tartwijk et al., 2007). A plethora of research on technology adoption suggests that user perceptions, such as perceived usefulness and perceived ease of use, are keys to inducing user buy-in (Ajzen, 1991; Chartrand & Bargh, 1999; Davis, 1993; Mathieson, 1991; Roca, Chiu, & Martínez, 2006; Shroff, Deneen, & Ng, 2011; Venkatesh & Morris, 2000; Yuen & Ma, 2002). In the case of implementing digital teaching portfolio, understanding how teaching staff perceive digital teaching portfolio, and how the different perceptions relate to one another to motivate or de-motivate usage intention could be the first step to devising strategies for implementing digital teaching portfolio in tertiary institutions/universities. Despite the decades of research on digital teaching portfolio, very few of the existing studies have specifically looked into the perceptions of teaching staff and how these perceptions are associated with their intentions to use digital teaching

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portfolio in the higher education context. This study is therefore designed to fill in the information gap for more effective planning of implementation strategies.

2. Digital teaching portfolio for teaching in higher education

It is to general consensus that tertiary institutions are responsible for providing quality teaching to enable quality student learning. However, Pratt (1997) pointed out that the conventional conception of teaching centers on the set of generic skills or actions undertaken by teaching staff, which is limited and has neglected the importance of intentions and underlying beliefs. Healey (2000) remarked that teaching staff "need to learn how to adopt a scholarly approach to teaching and how to collect and present rigorous evidence of their effectiveness as teaching staff. This involves reflection, inquiry, evaluating, documenting and communicating about teaching". Notably, digital teaching portfolio is a tool that allows teaching staff to engage in all these procedures of developing their teaching effectiveness (Baume & Yorke, 2002; De Rijdt et al., 2006; Klenowski et al., 2006; Seldin, 1997; Wolf, 1991; Wright et al., 1999).

At an individual level, digital teaching portfolio offers a context for articulating one's teaching philosophy, reflecting upon one's teaching, documenting evidence of teaching accomplishments for present and future employers, and through which, one's pride and esteem for teaching, as well as teaching practices could be enhanced (De Rijdt et al., 2006; Wright et al., 1999). At the community level, teaching portfolio encourages inquiry-based dialogues on teaching, facilitates the process of mentoring junior teaching staff and offers resources which helps develop effective criteria for teaching in a tertiary institution (Quinlan, 2002; Wolf, 1991; Wright et al., 1999). Although the strengths of (digital) teaching portfolio could be limited by such concerns and contextual factors as time constraints (De Rijdt et al., 2006; Taylor, 1997; Wright et al., 1999), the marginalized status of teaching (Pratt, 1997), and resistance from tenured staff (De Rijdt et al., 2006), the portfolio is nevertheless an instrument of great potential for professional development in higher education, both for individual staff members and the collective community.

3. Digital teaching portfolio in Hong Kong and Taiwan

The past two decades have witnessed tremendous changes in the role of educational technologies in the higher education landscape in Asia. Like those in western countries, tertiary institutions in Asia, are increasingly aware of the need to engage in pedagogical innovations and the opportunities that educational technologies can offer to the teaching and learning effectiveness. To these ends, tertiary institutions in Hong Kong and Taiwan, for instance, are gradually introducing digital portfolio as a learning and assessment tool for academic and teaching staff, as well as for students (Chau, 2007; Fisher et al., 2011; Shroff et al., 2011; Yueh & Wang, 2000). However, documentation is scarce and limited reference could be drawn upon to inform and refine implementation strategies.

In a series of 10 case studies carried out by a tertiary institution in Hong Kong (Fisher et al., 2011), digital portfolio was used for four purposes: 1) for institutional enhancement—to collect evidence for quality assurance; 2) for enhancement of learning and teaching—to allow both staff and students to set goals, reflect and manage their learning experiences as a learning community; 3) for employment and professional development—to promote reflective practices, articulation of expertise, evidence-based career planning for tenure review, awards and promotion; and 4) for academic advising—to promote self-awareness and facilitate the effectiveness of guidance provisions. The series of studies showed that staff's perceptions toward digital portfolio were mixed. Similar to the findings yielded in western countries (De Rijdt et al., 2006; Taylor, 1997; Wright et al., 1999), while some academic and teaching staff reported positive

feedback, others expressed concerns about the amount of time they had to spare for this "unnecessary addition" to their usual teaching practices (Fisher et al., 2011; Yueh & Wang, 2000).

In Taiwan, the use of portfolio as a formative learning tool could at least be traced back to Yang (2002) which looked into students' reactions toward the use of portfolio in a language learning context. Although teaching portfolio, in particular, has been regarded as one of the major means for developing the pedagogical practices of teaching staff (Yueh, 2000), most of the studies were based in primary and secondary contexts. Involving five tertiary institutions and 403 undergraduate students, Lin and Lin (2011) carried out an 8-week investigation on students' acceptance of a digital teaching portfolio system. In that system, academic and teaching staff from the participating institutions used digital teaching portfolio for collecting information, course planning, engaging in professional dialogues with their fellow colleagues and students, managing and innovating from their acquired knowledge. The study showed that students were generally positive about the use of digital teaching portfolio, but the study did not attend to how the users, i.e. the teaching staff, perceived the experience. In fact, few tertiary institutions have disclosed the status of how digital portfolio is implemented. The dearth of documentation makes comparison, and thus, effective enhancement of implementation strategies difficult, if not impossible (Luo & Huang, 2010). More research effort is warranted to better understand and consolidate the associations between users' perceptions and acceptance of digital portfolio to capture the benefits that this new tool can possibly offer to enhance teaching and learning in higher education.

4. Perceptions and technology acceptance

One common issue that many tertiary institutions face when implementing educational technologies, such as digital teaching portfolio, is to establish usage intention and behavior. To date, the most widely used model of user acceptance and usage behavior is the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh & Davis, 2000). Developed based on the Theory of Reasoned Action (Ajzen & Fishbein, 1980), the model posits that users' perceived ease of use (process expectancy) and perceived usefulness (outcome expectancy) are the key indicators of usage intention and behavior (Davis, 1989; Venkatesh, 2000; Venkatesh & Davis, 2000). Individuals are more likely to use a newly-introduced system when they find it easy to use. The more they think that the system is easy to use, the more they will tend to find it useful, and accordingly, the more they are likely to use it in the end. Given that users' ease of use and perceived usefulness of a new system are the keys to encouraging usage intention and behavior, the question then is how these two key perceptions can be induced in the target users.

Stemming from the TAM (Davis, 1989), Venkatesh and Davis (1996) investigated the antecedents of users' perceived ease of use. They found that perceived ease of use is hinged upon one's general computer self-efficacy. If the target users perceive low computer self-efficacy, it is less likely that they will find the new technology easy to use. Further, Venkatesh (2000) showed that the antecedents can be classified into two categories, the anchors, i.e. general beliefs that individuals hold regarding computers and computer usage; and the adjustments, i.e. specific beliefs formed based on individuals' direct experience with the system concerned. More specifically, the anchors include computer self-efficacy, perceptions of external control (facilitating conditions), computer anxiety and computer playfulness (the openness to the process of using the system); while the adjustments are perceived enjoyment and objective usability. Together, the anchors and adjustments influence individuals' perceived ease of use, and eventually, their perceived usefulness and usage intention. In light of the model, it was suggested that user acceptance could be encouraged through the provision of training that focuses on

increasing computer awareness, enhancing computer self-efficacy and reducing computer anxiety.

Nevertheless, researchers, such as Davis, Bagozzi, and Warshaw (1989) and Legris, Ingham, and Collerette (2003), pointed out that the TAM has yet to capture a full picture of the key determinants of technology adoption. For many years, researchers attempt to refine the TAM (Davis, 1989) from different perspectives. For instance, integrating the TAM (Davis, 1989), the Theory of Planned Behavior (Mathieson, 1991; Taylor & Todd, 1995), and the Social Cognitive Theory (Bandura, 1986), Compeau, Higgins, and Huff (1999) found that self-efficacy could reliably predict the users' affect, anxiety and usage behavior even after a 1-year time interval. Moreover, the users' personal outcome expectations had a negative effect on their usage behavior. It was speculated that users who bear unrealistic expectations of how using the technology could benefit them personally would gradually feel frustrated with the technology as they engaged in more realistic evaluation along the course. In Hong Kong, based on the TAM (Davis, 1989), Hu, Clark, and Ma (2003) looked into the technology acceptance of school teachers. The study found that job relevance was a prominent predictor of perceived usefulness. In addition, Lee (2000) remarked that the users' perceived practicality, perceived support, and their concerns in relation to the innovation would impact on the extent to which they intend to adopt curriculum change. In this connection, Ngai, Poon, and Chan (2007) examined how technical support plays a role in the adoption of WebCT among 1400 university students from seven universities in Hong Kong. They found that technical support directly impacted on perceived usefulness and ease of use, which were the dominant factors influencing users' attitude and eventually their usage of the system. Similarly, later research suggested that offering hands-on experience for users to explore and get familiarize with the technology is of paramount importance to successful implementation (Fleming, Motamedi, & May, 2007; Yuen & Ma, 2008; Yunus, 2007). On the other hand, a search of literature reveals that while concern about time is often reported as a hindrance to implementing portfolios in higher education (e.g. Fisher et al., 2011; Taylor, 1997; Wright et al., 1999), neither the TAM (Davis, 1989; Venkatesh & Davis, 2000) nor the existing literature has spared much attention to address this time issue. Further investigations into how implementation strategies could be enhanced are warranted.

On many fronts, the TAM (Davis, 1989; Venkatesh & Davis, 2000) offers a framework that sheds lights on the strategic planning of system implementation, and in this case, the implementation of digital teaching portfolio. With these in mind, we designed this study to examine how academic and teaching staff from two tertiary institutions in Hong Kong and Taiwan would perceive using digital teaching portfolio in their professional routines.

5. The setting

The two tertiary institutions involved in this study are located in Hong Kong and Taiwan. They specialize in teacher education and are dedicated to offering programs for both pre-service and in-service teachers. Apart from the shared specialization in education and teacher training, academic and teaching staff from the two tertiary institutions are subject to similar challenges and share similar influences of Confucian Heritage Cultures which may shape the way they would pursue advancement in teaching and learning.

5.1. The challenges

The first challenge is the recent global trend whereby the conventional reward structure and institutional policies prompt a pressing need for faculties, including teaching staff, to devote efforts to research for tenure and promotion (Pratt, 1997). In this connection, the two teacher education focused tertiary institutions participated in this study, like many others around the world, are grappling with the tension between research and teaching innovations (Ministry of Education in Taiwan, 2012; University Grants Committee, 2010). Notably, such tension is particularly strong for education institutions whose mission is to prepare future education professionals who in turn, teach younger students through using innovative education technologies. That being said, devoting continuous effort to enhancing teaching effectiveness is indeed indispensable, yet challenging.

The second challenge they face is the changing mode of teaching and learning across the entire higher education sector. With the emergence of educational technologies, teaching and learning are becoming more seamless, multidisciplinary and interactive than ever. The anticipated outcomes are desirable, but lying before the goal line are hurdles, such as motivation, computer self-efficacy and habits of faculty, as well as the long-standing tradition of content-oriented expository teaching, which remain hindrances to the implementation of any technology-enhanced innovations, such as digital teaching portfolio, in many tertiary institutions (Kagima & Hausafus, 2001; Schneckenberg, 2010).

5.2. The shared cultural root and technology adoption

In addition to the challenges, the cultural values and beliefs prominent in a society may also have vast influence on technology adoption (Herbig & Dunphy, 1998), in this case, the staff's willingness to use digital teaching portfolio. While Venkatesh and Davis (2000) suggested that social influence in terms of subjective norm impacts considerably on technology usage intention and behavior, the pragmatic orientation to learning in the Chinese culture may hinder the implementation of digital teaching portfolio among the teaching staff in the two participating tertiary institutions (Hu et al., 2003). Fan (2000) summarized a list of key cultural values that Chinese in different geographical areas, including those in Mainland China, Hong Kong and Taiwan, would generally share. These values are believed to be originated from the Confucian teachings that have governed or fundamentally influenced the ethics and behaviors in countries such as China, Japan and Korea for centuries (Tweed & Lehman, 2002). Among the list of key values is pragmatism or "to suit a situation" (Fan, 2000). By the Confucian tradition, one shall not learn simply for the sake of learning, but with a goal to self-improve, and eventually contribute to society (Lee, 1996; Tweed & Lehman, 2002; Watson, 2007). Knowledge is meaningless if one is unable to apply it in the social context. As posited in the Analects of Confucius (Watson, 2007),

> If a man who knows the three hundred Odes by heart fails when given administrative responsibilities and proves incapable of exercising his own initiative when sent to foreign states, then what use are the Odes to him, however many he may have learnt? (13:5)

Given this pragmatic orientation to learning, implementation of digital teaching portfolio would seem problematic unless its purposes and the opportunities it bring are clearly articulated. Taken together the pragmatic orientation to learning and the implication from the TAM (Venkatesh & Davis, 2000), it is reasonable to anticipate that the extent to which teaching staff can perceive the usefulness of digital teaching portfolio in relation to their professional capacity, alongside other perceptions about the instrumental values and practicality of digital teaching portfolio, are integral to understanding how implementation can be enhanced. As a result, in light of the above research literature, this study attempted to enhance implementation strategies in the long run by addressing the following two questions:

1. How do teaching staff perceive digital teaching portfolio?
2. How do staff's teaching experience, prior knowledge, and prior experience relate to their perceptions about digital teaching portfolio?

6. Methods

Guided by the relevant research literature and theoretical framework (i.e. the TAM), this study was executed to examine the perceptions of teaching staff in using digital teaching portfolio in an attempt to come up with suggestions for future implementation strategies.

6.1. Participants and procedures

The participants were 132 academic and teaching staff (56 participants from Hong Kong and 76 participants from Taiwan) recruited from two tertiary institutions, one in Hong Kong and the other in Taiwan on voluntary basis. Invitation letters were sent to the institutions via email, with information regarding the purpose and procedures of this study. Confidentiality and anonymity were clearly stated in the letters.

Participants completed a 38-item questionnaire. Background information, including years of teaching experience, prior knowledge of digital teaching portfolio, and prior experience with digital teaching portfolio, were collected as additional items in the questionnaire. Among the participants, 112 of them completed the online version of the questionnaire at their convenience and the remaining 20 participants completed the print version after a workshop held at the tertiary institution in Hong Kong.

6.2. Instrument

With reference to the TAM (Davis, 1989; Venkatesh & Davis, 2000) and the relevant research literature (Compeau et al., 1999; Hu et al., 2003; Lee, 2000; Legris et al., 2003), a 38-item scale was adapted to tap into the participants' perceptions about digital teaching portfolio. The original scale was written in English, but considering the bilingual context of the two participating tertiary institutions, the items were translated into Chinese by two research assistants. Feedback was collected from academics of various disciplines to ensure consistency between the two versions. Item responses were rated on a 7-point Likert-type scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Exploratory factor analysis (EFA) was employed to examine the factor structure and reliability analyses were conducted to determine the internal consistencies of the resulting factors.

We initially expected five factors to emerge, namely, the Perceived Usefulness (e.g. "Using digital portfolio could enhance my effectiveness in teaching."), Ease of Use (e.g. "Learning to operate digital portfolio is easy for me."), Intention to Use Portfolio (e.g. "To the extent possible, I would use digital portfolio to do different tasks related to teaching."), Issues of Concern about Using Portfolio, and Computer Efficacy. However, using principal components analysis for factor extraction and varimax rotation yielded eight factors with eigen values > 1. All the items loaded upon a relevant factor with substantial factor loadings (>.68) (see Table 1). With reference to the data collected, it was found that the three additional factors emerged from the Perceived Usefulness, Issues of Concern and the Computer Efficacy subscales. Upon discussing with academics from different disciplines, it was later agreed that the Perceived Usefulness subscale be split and renamed as Perceived Usefulness for Personal Benefit (e.g. "Using digital portfolio could help me develop my teaching techniques.") and Perceived Usefulness for Social Benefit (e.g. "Using digital portfolio could help me communicate better with colleagues."). Likewise, the Issues of Concern subscale was split and renamed as Concern about Time (e.g. "I am concerned that the introduction of digital portfolio will lead to less time being available for teaching.") and Concern about Technology and Support (e.g. "I am concerned about the support from technical expertise for using digital portfolio."); while the Computer Efficacy subscale was split and renamed as Efficacy in using Portfolio by Self-Exploration (e.g. "I could complete the job using the software even if there was no one around to

tell me what to do as I get on with the task.") and Efficacy in using Portfolio with Professional Guidance (e.g. "I could complete the job using the software if I could call someone for help if I got stuck."). Reliability analyses showed that internal consistencies of the scale and its subscales were high, with Cronbach's alpha coefficients ranging from .90 to .98 (see Table 1).

In addition to the scale, the questionnaire also tapped into participants' teaching experience in terms of the number of years, their prior knowledge of digital teaching portfolio via one item (i.e. "Have you ever heard of Digital Teaching Portfolio before this survey?"), and prior experience of using digital teaching portfolio via two items (e.g. "Have you used or created a Digital Teaching Portfolio before taking this survey?").

7. Results

To analyze the data, correlation and descriptive analyses were conducted on all the variables (see Tables 1 and 2). The means among the variables were compared using independent sample and one-sample t-tests, as well as one-way analyses of variance (ANOVA) depending on the type of data concerned (Table 3). In view of the scope of this study, we would only present the findings that are meaningful for planning implementation strategies.

7.1. Promoting potential benefits for initial user acceptance

For the participants' perceptions about digital teaching portfolio, results from the descriptive analysis suggested that our participants reported a higher mean score for the Personal Benefit subscale (mean = 5.21) than for the Social Benefit subscale (mean = 4.96) under Perceived Usefulness (see Table 2). However, further analysis using independent samples t-test showed that the difference in mean scores were insignificant.

Nevertheless, closer examination by employing independent samples t-test on the data collected from the Hong Kong and Taiwan sites separately showed results that may help explain the insignificant difference in the Perceived Usefulness of digital teaching portfolio between the two participant groups. Analyzing the data separately showed that the Taiwanese participants reported a significantly higher mean score for Personal Benefit (mean = 5.630) over Social Benefit (mean = 5.014) with a large effect (Cohen's d = .809); whereas no significant difference was found among the Hong Kong participants. The results indicated that only the Taiwanese teaching staff in our sample tended to perceive digital teaching portfolio as a tool that could yield them more personal benefits than social benefits. The large effect of such perception was however off set by that reported by the 56 participants (57.6% of the sample) from Hong Kong (See Table 3).

7.2. The importance of information dissemination and hands-on experience

To examine the associations of the participants' teaching experience, prior knowledge of digital teaching portfolio, and prior experience of using them with their perceptions toward digital teaching portfolio, correlation analysis, independent sample t-test and one-way ANOVA were employed.

Correlation analysis showed that all the pair-wise correlational relationships between participants' teaching experience and their perceptions toward digital teaching portfolio were insignificant. Hence, the number of years they had taught does not affect the way they perceived digital teaching portfolio.

For the participants' prior knowledge of digital teaching portfolio, independent samples t-tests was conducted to compare the perceptions about digital teaching portfolio between those who had heard of digital teaching portfolio and those who had not. Results showed that those who had heard of digital teaching portfolio perceived higher Ease of Use (Cohen's d = .636) and Efficacy in using digital

Table 1
Rotated factor matrix for perceptions about digital teaching portfolio ($N = 132$).

		Factor							
	Scale Items	1	2	3	4	5	6	7	8
1.	Using digital portfolio could help me articulate my teaching philosophy.	.778							
2.	Using digital portfolio could help me develop my teaching techniques.	.863							
3.	Using digital portfolio could improve the quality of my teaching.	.890							
4.	Using digital portfolio could enhance my effectiveness in teaching.	.852							
5.	Using digital portfolio could enhance my course development.	.819							
6.	Using digital portfolio could enable me to undertake/have innovative teaching practices.	.798							
7.	Overall, I find the digital portfolio useful in my teaching.	.894							
8.	Using digital portfolio could provide opportunities for cooperation with colleagues.		.869						
9.	Using digital portfolio could help build a professional learning community.		.813						
10.	Using digital portfolio could help me communicate better with colleagues.		.929						
11.	Learning to operate digital portfolio is easy for me.			.904					
12.	I find it easy to get the digital portfolio to do what I want to do.			.872					
13.	It is easy for me to remember how to perform tasks using the digital portfolio.			.912					
14.	My interaction with the digital portfolio is clear and understandable.			.790					
15.	Overall, I find the digital portfolio easy to use.			.921					
16.	I am concerned that the implementation of digital portfolio will increase my workload significantly.				.914				
17.	I am concerned that using digital portfolio may be time-consuming.				.922				
18.	I am concerned that the introduction of digital portfolio will lead to less time being available for teaching.				.829				
19.	The staff's internet knowledge and technology skills are causing me concern about the use of digital portfolio in the institute.					.680			
20.	I am concerned about the uncertainty regarding the purpose of digital portfolio.					.689			
21.	I am concerned about the limited knowledge I have on the content and organizational strategy or skills of using digital portfolio.					.698			
22.	I am concerned about the support from technical expertise for using digital portfolio.					.826			
23.	I am concerned about the support from peers for using digital portfolio.					.864			
24.	I am concerned about the support from administrative structures for using digital portfolio.					.868			
25.	I am concerned about the resources available for the implementation of digital portfolio (such as materials, software, hardware, funding, etc.).					.851			
26.	Whenever possible, I intend to use digital portfolio in my teaching.						.951		
27.	To the extent possible, I would use digital portfolio to do different tasks related to teaching.						.905		
28.	I am going to use digital portfolio in the near academic year/semester.						.959		
29.	I will use digital portfolio as often as possible.						.956		
30.	I expect that I will use digital portfolio in the future.						.914		
31.	I could complete the job using the software even if there was no one around to tell me what to do as I get on with the task.							.909	
32.	I could complete the job using the software even if I had never used a package like it before.							.960	
33.	I could complete the job using the software even if I had only the software manuals for reference.							.909	
34.	I could complete the job using the software if I could call someone for help if I got stuck.								.834
35.	I could complete the job using the software if someone else had helped me get started.								.942
36.	I could complete the job using the software if I had a lot of time to complete the job for which the software was provided.								.831
37.	I could complete the job using the software if someone showed me how to do it first.								.946
38.	I could complete the job using the software if I had used similar packages before this one to do the same job.								.869

	Factor correlation matrix							
	1	2	3	4	5	6	7	8
Factor 1 (Perceived Usefulness for Personal Benefit)	–							
Factor 2 (Perceived Usefulness for Social Benefit)	0.578	–						
Factor 3 (Ease of Use)	0.565	0.238	–					
Factor 4 (Concern about Time)	−0.456	−0.233	−0.554	–				
Factor 5 (Concern about Technology and Support)	−0.523	−0.166	−0.586	0.541	–			
Factor 6 (Intention to Use Portfolio)	0.705	0.335	0.681	−0.539	−0.629	–		
Factor 7 (Efficacy in using DTP by Self-Exploration)	0.307	0.038	0.563	−0.366	−0.447	0.465	–	
Factor 8 (Efficacy in using DTP with Professional Guidance)	0.337	0.062	0.263	−0.143	−0.195	0.356	0.347	–
Cronbach's alpha coefficients (Subscales)	.95	.90	.93	.91	.92	.97	.93	.94
Cronbach's alpha coefficient (Overall)	.92							

Table 2
Descriptive statistics.

Factor	HK (n = 56)		Taiwan (n = 76)		All (n = 132)	
	Mean	SD	Mean	SD	Mean	SD
Usefulness (Personal Benefits)	4.776	1.097	5.531	1.146	5.212	1.182
Usefulness (Social Benefits)	4.914	1.256	4.986	1.231	4.956	1.237
Ease of Use	4.068	1.243	4.912	1.018	4.557	1.190
Concern (Time)	5.070	1.441	4.128	1.340	4.533	1.456
Concern (Technology & Support)	4.782	1.143	3.400	1.241	3.993	1.379
Intention	4.392	1.327	5.720	1.077	5.168	1.352
Efficacy (Self-Exploration)	3.741	1.652	5.023	1.398	4.478	1.634
Efficacy (Professional Guidance)	5.357	1.182	5.859	1.037	5.646	1.124

teaching portfolio by Self-Exploration (Cohen's d = .622) (see Table 3). Further, results from one-way ANOVA showed that participants with prior experience of using digital teaching portfolio reported higher Perceived Usefulness for Personal Benefit, Ease of Use, Intention to Use Portfolio and Efficacy in using digital teaching portfolio by Self-Exploration (see Table 3). In other words, participants who had heard of digital teaching portfolio were likely to be more confident in using it by themselves at greater ease without much professional guidance. Likewise, those who had more experience of using digital teaching portfolio before tended to find it easier to use and more useful for personal benefits. They felt more competent in using it by self-exploration and were more willing to use it.

Table 3
t-Tests and ANOVA.

Factor	Class	N	Mean	SD	t	Effect size
Independent-sample t-test						
	Institution					Cohen's d
Usefulness	HK	52	4.745	1.101	−4.39***	0.809
(Personal Benefits)	Taiwan	68	5.630	1.090		
Usefulness	HK	54	4.914	1.256	−0.45*	–
(Social Benefits)	Taiwan	72	5.014	1.236		
	Prior Knowledge					
Ease of Use	No	30	3.993	0.876	3.55**	0.636
	Yes	89	4.726	1.229		
Efficacy	No	31	3.720	1.635	−3.00**	0.622
(Self-Exploration)	Yes	93	4.728	1.614		
One-Sample t-Test						
Efficacy	–	124	4.476	1.671	29.83***	0.823
(Self-Exploration)						
Efficacy	–	123	5.650	1.134	55.27***	
(Professional Guidance)						
ANOVA						
	Prior Experience					F	η²
Usefulness	No	46	4.732	0.846	7.723***	0.166
(Personal Benefits)	Low	32	5.196	1.285		
	Moderate	31	5.830	0.911		
	High	11	5.896	1.696		
Ease of Use	No	50	3.860	0.881	18.010***	0.320
	Low	30	4.640	1.243		
	Moderate	29	5.124	0.908		
	High	10	5.960	0.937		
Intention	No	50	4.320	1.037	23.299***	0.368
	Low	32	5.163	1.306		
	Moderate	30	6.007	1.080		
	High	12	6.650	0.592		
Efficacy	No	50	3.980	1.650	4.718**	0.106
(Self-Exploration)	Low	32	4.354	1.540		
	Moderate	30	4.967	1.552		
	High	12	5.639	1.660		

* −p < 0.05.
** −p < 0.01.
*** −p < 0.001.

7.3. Perceived usefulness, accessibility of support and desirable user behavior

The correlational relationships among all the variables were assessed (see Table 1). Results from correlation analysis suggested that the participants' Perceived Usefulness (Personal Benefits) was moderately and negatively associated with their concern about time and concern about technology and support. In other words, the more they believed using digital teaching portfolio can benefit them, the less they were concerned about time constraints and the amount of technological support available. Moreover, their Perceived Usefulness (Personal Benefits) was highly and positively correlated with their Intention of using digital teaching portfolio. Results from one-sample t-test revealed that they reported significantly higher scores for their Efficacy in using digital teaching portfolio with Professional Guidance than that by Self-Exploration, with a large effect size (Cohen's d = .823) (see Table 3). This indicated that the participants felt more confident in using digital teaching portfolio with professional support rather than exploring the system on their own.

8. Discussion and implications

In view of the challenges involved in promoting the use of digital teaching portfolio in tertiary institutions, this study examined the perceptions of teaching staff toward digital teaching portfolio in an attempt to tease out the important issues to attend to in planning for an implementation. In theory, this study have contributed to the TAM (Davis, 1989; Venkatesh & Davis, 2000) in that we have taken into account users' concerns about the lack of time and support,

which few previous studies have considered. Although our finding suggested that concerns about time and supporting resources could be alleviated if academic and teaching staff find the technology, i.e. digital teaching portfolio, useful, it is noteworthy that these concerns may considerably influence their usage intention until their perceived usefulness toward digital teaching portfolio is strong enough to miti-gate the de-motivating effect attributed to these concerns (Yuen & Ma, 2008). That being said, further investigation is needed to verify our finding and to examine the extent to which users' concerns about time and supporting resources would impact on technology ac-ceptance in light of the TAM (Davis, 1989; Venkatesh & Davis, 2000). Attempts could be made to assess how well these concern factors can fit into the TAM, for instance, via structural equation modeling (SEM). Apart from adding to the existing literature, the findings we yielded in this study carry practical implications which would inform the im-plementation of digital teaching portfolio in tertiary institutions.

8.1. Buy-in: how do we establish buy-in?

Successful implementation is about establishing buy-in. To this end, positive perceptions about digital teaching portfolio have to be cultivated among the target users. While previous findings implied that teaching staff's perceptions about digital teaching portfolio, such as ease of use and perceived usefulness, are integral to their in-tention of using the new tool (Davis, 1989; Venkatesh & Davis, 2000; Yuen & Ma, 2002), our findings reflected that their prior knowledge of digital teaching portfolio plays an influential role in shaping their per-ceptions, in this case, their perceived ease of use and efficacy in using the tool by self-exploration. This implies a need to make the available

resources that support the use of digital teaching portfolio known and accessible to the target users. Strategic planning could focus on two directions—1) promotional activities, and 2) services and training—which should be in place simultaneously.

In light of our findings, promotional activities should aim to demonstrate and underscore three issues: 1) the usefulness of digital teaching portfolio; 2) the potential personal benefits involved; and 3) the accessibility of professional services and training resources. What matters is not only what is available, but also people's awareness of the available resources and support. Our findings alongside previous findings showed that equipping potential users with knowledge of digital teaching portfolio, particularly in terms of its usefulness, and addressing their common concerns in promotional activities may alleviate the concerns of teaching staff and promote their intention to begin developing their own digital portfolio (De Rijdt et al., 2006; Fisher et al., 2011; Taylor, 1997; Van Tartwijk et al., 2007; Wright et al., 1999; Yueh & Wang, 2000).

In this connection, the next big question is how the perceived usefulness of potential users can be induced or fostered to eventually establish buy-in. In line with the implications from previous studies, (Fleming et al., 2007; Yuen & Ma, 2008; Yunus, 2007), our study underscored the importance of providing opportunities for staff to gain initial hands-on experience, for instance, via workshops or pilot projects, would serve both promotional and professional training purposes. Such events help introduce and internalize the usefulness of digital teaching portfolio to the target users, and enhance their ease of use under professional supervision. The group setting involved may also help establish a subjective norm in support of using the new tool. Implementation would not be successful unless the teaching staff advocate the value of the new approach and assume ownership of it (Van Tartwijk et al., 2007). Hence, as Yuen and Ma's (2008) suggested, exposing teaching staff to digital teaching portfolio as early in their career as possible would be helpful for building and reinforcing their awareness and knowledge of the tool. They would also be allowed more time and opportunities to master the relevant skills and gradually integrate this educational technology into their professional routines.

Further, providing accessible services and training to equip staff with the essential computer skills, and at the same time, developing their computer efficacy are pivotal to establishing buy-in (Ngai et al., 2007). In this study, the preference for professional guidance and the efficacy-boosting effect of prior experience with digital teaching portfolio imply that services and training should strive to cater to individual needs, and they should be interactive and easily accessible so that potential users could gain hands-on experience and confidence in using the new tool under professional supervision.

8.2. Regional culture and progress of development: how do sociocultural contexts play a role?

Culture has long been known as an influential factor for differences in technology acceptance. Success of innovations is subject to how well it can be related to the existing norm in a particular culture (Fox & Henri, 2005; Herbig & Dunphy, 1998; Yuen & Ma, 2008). Corresponding to the Chinese pragmatic orientation to learning, previous studies based in Chinese communities have shown how job relevance and perceived usefulness are relatively more important to technology acceptance than they are in the Western contexts (e.g., Hu et al., 2003). In this study, while we anticipated that participants from both institutions were likely to be more pragmatic and concerned about the usefulness of digital teaching portfolio in light of the Confucian Heritage Culture (Fan, 2000; Mao & Palvia, 2006), the varied progress of educational technology integration in the respective higher education context should also be taken into account when considering the difference we found.

Indeed, although both Hong Kong and Taiwan began promoting teaching excellence in higher education in the 1990s, looking at their respective development and milestones for educational technologies may offer us some clues as to how the difference in perceiving digital teaching portfolio comes about. Notably, in support of the Information Education Infrastructure Program launched in Taiwan in 1997, staff in tertiary institutions began investigating how educational technologies could be infused into teaching and learning. Later in 2002, the Taiwanese government rolled out an array of national projects to promote the use of educational technologies in tertiary education, as well as in 13 other sectors in the country (e.g. health and culture affairs). The initiatives strive to improve national competitiveness by strengthening the effectiveness of teaching (or training) and learning in different sectors with the aid of educational technologies (Chang, Wang, & Chen, 2009). In addition, the Program for Promoting Teaching Excellence of University was also launched in 2004 to underscore the importance of teaching effectiveness in tertiary education (Ministry of Education in Taiwan, 2012). Tseng, Chang, Tutwiler, Lin, and Barufaldi (2013) reviewed 70000 publications between 1990 and 2011 on Web of Science and concluded that the use of educational technologies in teaching and learning is one of the fastest growing and most productive fields of research in Taiwan in light of the various national research projects.

On the other hand, in Hong Kong, although initiatives for promoting teaching excellence in higher education (e.g. the Teaching Development Grant scheme) could be traced back to 1994 (University Grants Committee, 2000), it was not until 2002 that the University Grants Committee (2002) urged to embrace technology as a tool for enhancing the teaching and learning effectiveness of tertiary institutions in an attempt to develop international competitiveness in the decade to come. It should be noted that the nationwide devotion of efforts and resources to using educational technologies in Taiwan did not only take place 5 years earlier than similar initiatives were in place in Hong Kong, but the projects launched in Taiwan have also spanned across sectors. Hence, it would be reasonable for us to conjecture that the social norm or culture of using educational technologies (e.g. digital teaching portfolio) for personal or professional development is relatively more mature among Taiwanese academic and teaching staff than that among their Hong Kong counterparts. Moreover, considering the differences we found in terms of Perceived Usefulness of digital teaching portfolio and the descriptive statistics (see Table 1), further investigation is nevertheless needed to delineate how the differences in sociocultural contexts could influence the perception and acceptance of digital teaching portfolio although we considered Hong Kong and Taiwan together as Chinese communities under the influence of Confucian Heritage Cultures in this study.

8.3. Institutional policies and culture: what can we think of in this aspect?

Institutional policies and cultural shift within the tertiary institution should be inextricably linked in the promotion of digital teaching portfolio as a useful professional tool. As Cook, Ley, Crawford, and Warner (2009) remarked, promoting faculty involvement in technology-enhanced innovations requires "a well-balanced combination of intrinsic and extrinsic motivators". While our findings suggest that promotional strategies, as well as the provisions of support services and hands-on opportunities, may serve as intrinsic motivators for teaching staff, previous studies noted that the integration of technology would be successful only if it is considered an essential component of the wider institutional strategies for educational innovations (Bates, 2000; Buckridge, 2008; Collis & Wende, 2002; Schneckenberg, 2010). Institutional incentives which correspond to the strategic targets of the respective tertiary institution would be one of the direct extrinsic motivators, and would hence contribute to the perceived usefulness of educational innovations. In particular, recalling the Chinese

pragmatic orientation to learning (Fan, 2000; Watson, 2007), engaging leadership commitment would be vital to the promotion of digital teaching portfolio, for instance, by allocating resources to projects and by implementing adoption incentives such as award schemes for innovative staff (Schneckenberg, 2010; Van Tartwijk et al., 2007).

Notably, implementation of digital teaching portfolio in higher education is considerably hindered by the increasingly marginal position of teaching in recent decades. With the rising status of research activities in the reward structures of tenure and promotion in higher education, resources and attention tend to divert from the scholarship of teaching even among non-research and teaching institutions (Brew, 2006; Elton, 2001; Marsh & Hattie, 2002; Pratt, 1997). Pratt (1997) urged that evaluations of the quality of teaching should focus more on asking "why" and "how" than simply registering the surface features. These could be articulated through digital teaching portfolio. But revisiting the reward structures for tenure and promotion to underscore the importance of teaching would be crucial in this regard. Although rewards for good teaching practices may already be in place in some tertiary institutions, corresponding changes in institutional policies is indispensable to complement a cultural shift toward enhancing teaching effectiveness, for instance, through maintaining digital teaching portfolio.

Institutional incentives which celebrate research outputs have steered academic and teaching staff in tertiary institutions to focus on individual learning and competition in research innovations rather than collaborative development toward teaching excellence (Cortese, 2003). We could see traces of this emphasis on individual learning and competition in our finding in that our Taiwanese participants could relate digital teaching portfolio to personal benefits more than social benefits. Such resistance against collaborative learning and development challenges the effectiveness of implementing digital teaching portfolio and many other professional development initiatives in higher education. In the light of the present findings and the existing literature, cultivating a process-oriented culture of reflection and continuous learning among the staff at individual level could be a critical starting point for aspiring innovators to eventually enhance the overall teaching effectiveness via the means of digital teaching portfolio. Again, institutional policies alongside the involvement of management leaders would be pivotal to shaping a reflective and collaborative culture in the higher education context, and thus a culture ready for maximizing the potentials of digital teaching portfolio (Schneckenberg, 2010; Van Tartwijk et al., 2007).

9. Conclusion

In sum, this study presented how teaching staff perceive the potentials of digital teaching portfolio in their professional development, particularly in enhancing their teaching effectiveness. Through which, we revealed the crucial factors that are associated with their intention to use the new tool. The findings are meaningful as they help define the roadmap for planning how digital teaching portfolio can be better implemented in tertiary institutions.

Nevertheless, the study was bound to several limitations which could be attended to in future research. First, while the present findings offer a preliminary picture of how teaching staff perceive digital teaching portfolio, the generalizability of our findings are limited by the rather small sample size and the sole reliance on self-report measures in this study. Future studies should revisit the instrument and the issues concerned by employing such multiple research methods as interviews and observations with a larger sample of teaching staff. Further, with a larger sample, more advanced data analyses (e.g. structural equation modeling) could be conducted to verify statistically the causal relationships among Perceived Usefulness, Ease of Use and other variables that would impact on the teaching staff's intention to use digital teaching portfolio.

Second, recalling that the Taiwanese participants tended to view digital teaching portfolio as a tool for personal benefits; whereas their Hong Kong counterparts reported comparable viewpoints between the benefits (personal vs. social) that digital teaching portfolio can possibly bring to them, the difference in perceiving digital teaching portfolio could be attributed to contextual factors. But since we have based the study primarily on the TAM (Davis, 1989; Venkatesh & Davis, 2000), we do not have sufficient data on contextual factors to explain for this difference. Could the varied advancement in ICT integration between Taiwan and Hong Kong contribute to the difference in viewing digital teaching portfolio as a tool? How does the staff's subjective norm play a role in the perceived usefulness of digital teaching portfolio in these two Chinese professional communities? To what extent does pragmatism influence their perceptions about digital teaching portfolio? There are still plenty to unfold once sociocultural characteristics are taken into account. Future studies could attempt to unravel the contextual factors that influence the perceptions about digital teaching portfolio among teaching staff of different Chinese or Asian descents, especially in communities that are influenced by the Confucian Culture Heritage.

Lastly, although one of the major functions of digital teaching portfolio is to encourage professional reflection, we did not attend to the role of reflection in the acceptance of using digital teaching portfolio as a formative tool. It may be interesting for future studies to examine how the value of reflection is internalized in teaching staff and whether such perceived value will influence their perceived usefulness of digital teaching portfolio. We, however, have to bear in mind that the extent to which educational technologies are applicable varies across disciplines (Fox, 2007), introducing technologies to teaching staff would only be meaningful if it enhances the way teaching and learning takes place. Failing to consider individual disciplinary needs in planning implementation strategies may only result in an inefficient blanket approach to promoting digital teaching portfolio.

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