ARTICLE

From Portafoglio to Eportfolio: The Evolution of Portfolio in Higher Education

Orna Farrell

This article traces the evolution of the concept of portfolio from the Renaissance to the present day. Over time the meaning of portfolio has evolved from its origins as a case for holding loose papers to other contexts such as finance, government and education. Portfolios have evolved from paper to electronic, from local networks to the world wide web. The decade from 2000–2010 was a period when technology became part of mainstream society and educational technology become part of mainstream higher education, and portfolios spread around the world. A shift in focus has occurred in eportfolio research and practice in the last decade, there has been more emphasis on pedagogy and student learning and less focus on digital technology as it has become ubiquitous. One of the key takeaways from the story of eportfolio adoption is that educators and institutions should adopt a critical perspective to new educational technologies and approaches. Finally, the history of portfolio in higher education shows that the higher education system will continue to gradually evolve, incorporating concepts, technology and approaches that are compatible rather than transformative.

Introduction

In this article, the evolution of the concept of portfolio from the Renaissance to the present day is analysed. It examines how portfolios have changed from a folder containing an artist's showcase of work to a form of higher education assessment and it considers how technology has shaped and influenced the purpose, use of and engagement with electronic portfolios in the late twentieth and early twenty first centuries. The article aims to systematically analyse the history of portfolio in higher education, and assess the theoretical, educational and technological patterns that emerge through a consideration of the deeper historical context.

There is a dearth of literature on the history of portfolio in higher education - electronic or paper based, with the exception of nominal contextual paragraphs in journal articles such as Lorenzo and Ittelson (2005) and Bryant and Chittum (2013) and a short background chapter in Lam's (2018) book about writing portfolio assessment. Very little consideration has been given to the theoretical, pedagogical, technological and educational origins of portfolio nor how it has evolved and changed over time. This is indicative of a general pattern in the educational technology literature which Weller (2018: 34) describes as "amid this breathless attempt to keep abreast of new

developments, the edtech field is remarkably poor at recording its own history or reflecting critically on its development".

The methodology of this article follows an historical analysis approach drawing on primary documentary sources and secondary literature sources (Tosh 2010). The literature review follows a hybrid approach incorporating aspects of traditional, systematic and historical approaches to research. The analysis follows a chronological narrative bounded by the time period 1400 to 2020, and structured into four time periods. The study is guided by the following research question:

How has the concept of portfolio in higher education evolved over time?

In the literature, there are many related terms for portfolio, therefore the following search terms were adopted for this study, see **Table 1**.

The databases used to conduct the literature search were: Proquest, British Education Index, Education research complete, Sage journals, Scopus, JSTOR, ERIC, Google Scholar, and The PEARL eportfolio database http://eportfolio.aacu.org/. As not all relevant results were necessarily picked up by electronic databases, pearl growing and manual searching of key journals such as the International Journal of Eportfolio were also employed (EPPI-Centre 2010).

Each study was assessed by reading the title and abstract for relevance to the inclusion criteria and to the guiding question for the literature review.

Dublin City University, IE
orna.farrell@dcu.ie

Inclusion:

· Primary sources: document, image, first person account
· Peer reviewed-journal article
· Available full-text
· Academic texts
· After 1970, higher education focused

Exclusion:

· Not in English or translated
· Full text unavailable
· Secondary sources-not peer reviewed
· After 1990 other education contexts

The article is structured in five parts, starting with the origins and etymology of portfolio during the 15th to 19th centuries, then progressing to the 1970s, when portfolio transitioned into higher education, and then in the 1990s the advent of electronic portfolios, which became mainstream in the 2000s. The article concludes with a critical analysis of how portfolios have evolved over the last five hundred years.

Origins and Etymology

The word portfolio's etymology derives from the Italian word *portafoglio.* This was a case or folder for carrying loose papers or pictures. *Porta* means to carry and *folio* means loose sheet of paper (Oxford English Dictionary 2006; Lam 2018). The portfolio concept has its origins in Renaissance Italy, where artists and architects collated examples of their work (Goldthwaite 1980; Dorn, Sabol, & Madeja 2013). For architects, they were a means to submit

Table 1: Search terms.

Search Terms
Electronic portfolio
Virtual portfolio
Web portfolio
E-folio
E-portfolio
Personal learning environment
Virtual portfolio
Web portfolio
Webfolio
Portfolio
Eportfolio
ePortfolio
Digital portfolio
Learning portfolio
Teaching portfolio
Portfolio assessment

designs to clients. For example, in Montepulciano in 1440, the architect Michellozzo submitted a portfolio of designs for a new hospital to the city for approval (Goldthwaite 1980). Since the Renaissance, artists have used portfolios to showcase their work and document their ideas. The notebooks of Leonardo da Vinci which were loose folios bound together after his death are an interesting example of a historical portfolio collection (Dorn et al. 2013). Da Vinci kept notes and drawings of his studies, ideas and inventions on loose folios of which over 7,000 pages still exist, see **Figure 1** below which shows a folio from one of Leonardo's notebooks called the Codex Arundel, produced around 1500 (Da Vinci n.d.).

During the 18th and 19th centuries portfolios became more commonplace, particularly in the context of art (Oxford English Dictionary 2006). This is evident in both written and visual sources from the period. For example, in Jonathan Richardson's (1722: 13) book "An account of some of the statues, bas-reliefs, drawings and pictures in Italy, &c. with remarks" from, he mentions "another porto folio, all of Raffaele", see **Figure 2** below.

Visual sources from the 18th and 19th centuries indicate that portfolios were entering into popular culture as a fashion accessory. This is evident in **Figure 3** which shows a painting by an unknown British artist from the early 18th century called "A Man with a Portfolio, Taking Snuff".

French fashion plates from 1800–1830 produced in the fashion magazine *Le Journal des Dames et des Modes,* demonstrate how the portfolio had become a mainstream fashion accessory, see **Figure 4**. (Bibliothèque des Arts Décoratifs n.d.).

Over time the meaning of portfolio evolved from its origins as a case for holding loose papers for use in other contexts such as finance, government and education. In the context of art, portfolios were a means of showcasing a selection of an artist's best work curated for a particular audience. In the next section, this article examines how portfolios evolved from the world of art to that of education.

Portfolios and Higher Education: 1970–1989

Portfolios crossed over from art to higher education during the early 1970s. There were a number of drivers for the introduction of portfolios into higher education, such as a move away from standardised testing, increased focus on quality assurance, and new research and theories of learning (Farrell 2018).

In the literature, the earliest references found in chronological searches of the databases ERIC, Google Scholar, Education Research Complete and JSTOR were to an article written by Ford and Larkin (1978) "The Portfolio System: An End to Backsliding Writing Standards". English writing composition educators such as Ford and Larkin (1978) were early adopters of portfolio assessment, they reported that portfolio assessment was introduced in their general education English writing classes at Brigham Young University in 1970. The use and definition of portfolio assessment described by Ford and Larkin is still quite similar to its original artistic purpose, "the portfolio
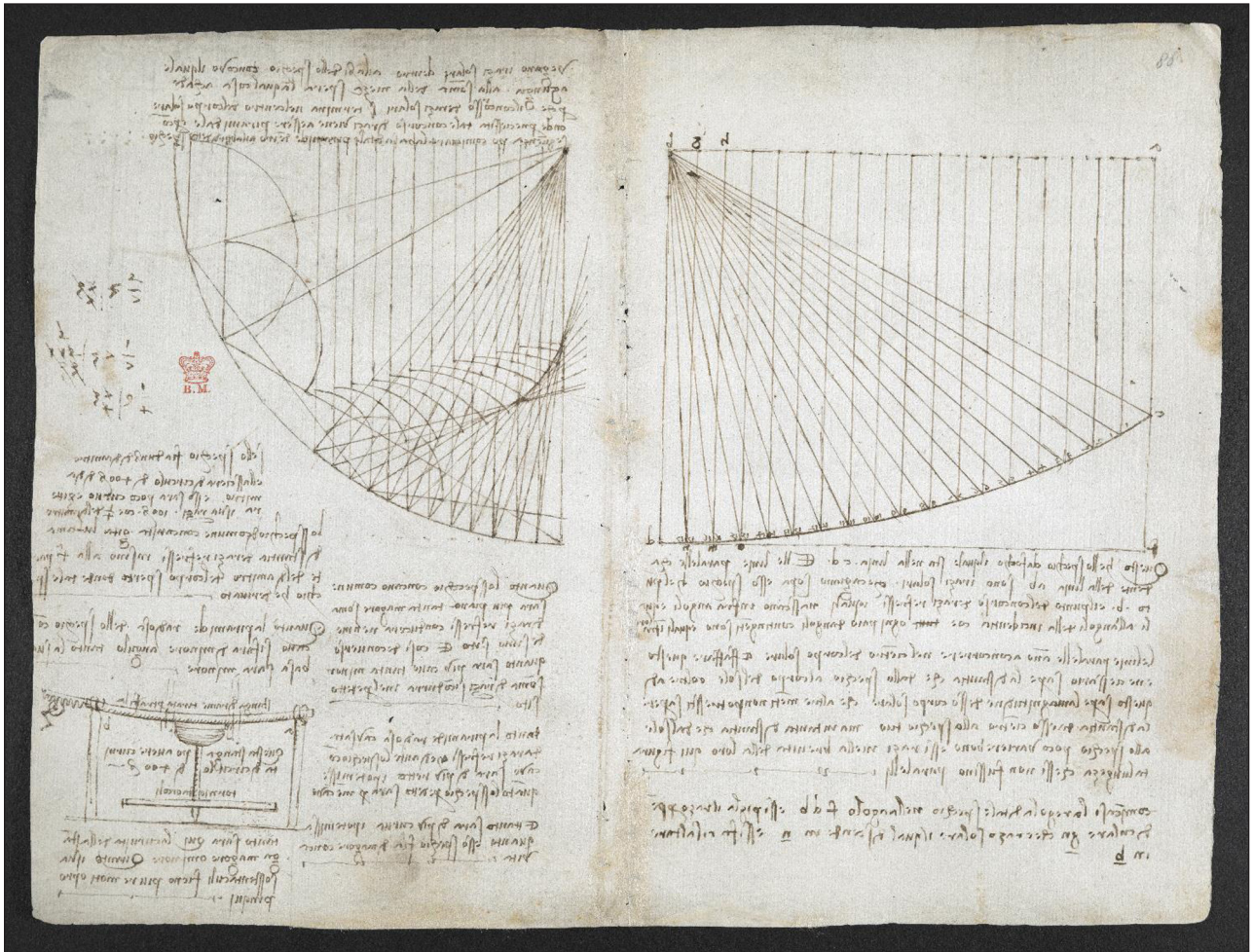
Figure 1: Folio from Da Vinci Codex Arundel. Reproduced with permission from the British Library.

Figure 2: Richardson, (1722: 13) Reproduced with permission from The Getty Research Institute.

Figure 3: A Man with a Portfolio, Taking Snuff. Reproduced with permission from the Tate Modern.

system entails the disinterested judging of each student's work, collected, like the best representative work of an artist, into a "portfolio" (in this case a large manila envelope), which is read by at least one teacher besides the one from whom the student is taking the class" (1978: 951).

In the United States, one driver for the introduction of portfolio assessment in higher education stemmed from a sense of dissatisfaction with quantitative standardised testing. Therefore, portfolio assessment was seen as an alternative to the testing tradition (Habib & Wittek 2007; Lam 2018). According to Elbow and Belanoff (1997: 21), this was as a result of the "greater than usual pressure for testing and bottom line, single dimensional numbers was the matrix for a greater than usual hunger for

an alternative way to assess student writing and learning". Similarly, in the UK writing portfolio assessment was introduced to replace the written exam component of the General Certificate of Education during the 1970s (Lam 2018). Portfolios were introduced into teacher education in the United States from 1986–1990 through the work of Lee Shulman on the Stanford Teacher Assessment Project (Haertel 1991).

The theoretical underpinnings of portfolio assessment arise from two different theoretical traditions: the first, a behaviourist competency based approach and the second a constructivist one (Habib & Wittek 2007). These different theoretical traditions have led to the development of a wide range of purposes and practices for portfolios in
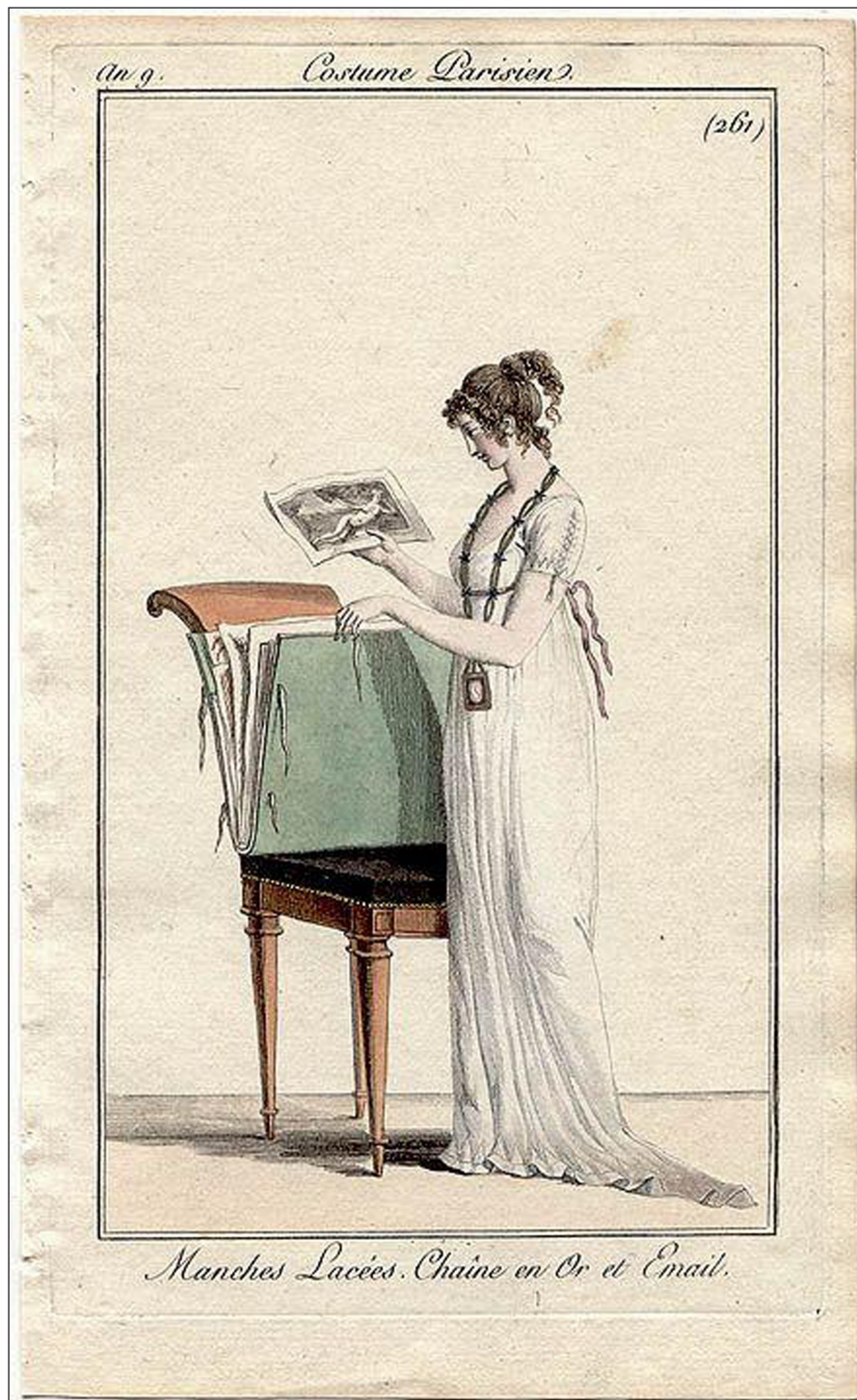
An 9.   *Costume Parisien.*

(261)

Manches Lacées. Chaîne en Or et Email.

Figure 4: French fashion plate. Reproduced with permission Bibliothèque des Arts Décoratifs.

higher education (Zeichner & Wray 2001). Over the course of the 1980s, the nature of portfolio use and purpose evolved from its original artistic conception as a method of showcasing a selection of best work for a specific audience to an educational approach to documenting student progress, process, competency and achievement over time.

In the competency based approach, the portfolio is a means for students to document their competency in a subject or skill and it becomes like an expanded CV to present to prospective employers (Habib & Wittek 2007). Constructivist portfolio practice drew on several theories of learning such as Dewey's reflective learning and Schon's reflective practitioner, Meizrow's theory of transformational learning, Kolb's experiential learning, Flavell's metacognition and Lave's theory of situated learning (Batson 2011; Eynon & Gambino 2017; Penny Light, Chen, & Ittleson 2012; Reynolds & Patton 2014). The focus in constructivist approaches to portfolio is on the developmental process of learning and the act of reflection on learning through the creation of a portfolio.

By the start of the 1990s, there was a "portfolio explosion" in higher education, portfolio assessment expanded from the disciplines of education and English into nursing,

engineering, medicine, and science (Elbow & Belanoff 1997: 21). The purposes and aims of portfolio assessment had evolved from its original inception in higher education. By the early 1990s, portfolio assessment was used to improve university teaching, measure teacher candidates' readiness to teach, document student learning, growth, and development over time, promote reflective practice, employability, and professional certification (Lam 2018; Wray 2007; Zeichner & Wray 2001). Over the course of the 1990s, portfolio assessment based in higher education spread around the world, to Australia (Loughran & Corrigan 1995), to Finland (Jarvinen & Kohonen 1995), to Norway (Dysthe & Engelsen 2004), and to Ireland (Wolf 1998). In the next section, the impact of technology and its influence on portfolio assessment during the 1990s is examined.

Electronic Portfolios: 1989–1999

Educational technology had featured in the higher education landscape since the 1950s, with Skinner's teaching machines, the UK Open University's use of television and radio in the 1970s, the University of Illinois' PLATO computer assisted instruction system, and the use of CoSy discussion boards in the 1980s by the UK Open University and the University of Guelph (Bates 2019). It wasn't until the mid-1990s, after the birth of the web in 1991, that educational technology had reached a mainstream level of awareness (Weller 2018). The discourse of the 1990s surrounding technology and education was a mixture of hyperbolic enthusiasm about the possibilities for disruption, transformation and democratization of higher education and puzzlement or dismissiveness of another educational fad (Weller 2018; Selwyn 2014). Within the historical and social context of the 1990s, electronic portfolios emerged as part of the Web 1.0 digital revolution (Eynon & Gambino 2017).

The early conceptions of electronic portfolios envisaged digital versions of the paper based portfolios from the 1980s. The research from the 1990s on electronic portfolios focuses on the digital tools, platforms and technology for enacting electronic portfolios and captures the experiences of early adopters experimenting with a new paradigm (Yancey 1996).

The first electronic portfolios were created using computer intranets such as the Apple II, document exchange servers and a software called Storyspace (Campbell, 1996; Purves 1996; Wall & Peltier 1996). For example, Wall and Peltier (1996) described using a university intranet with folders based on Mac called Docex for their class electronic portfolio, see **Figure 5**. They essentially replicated
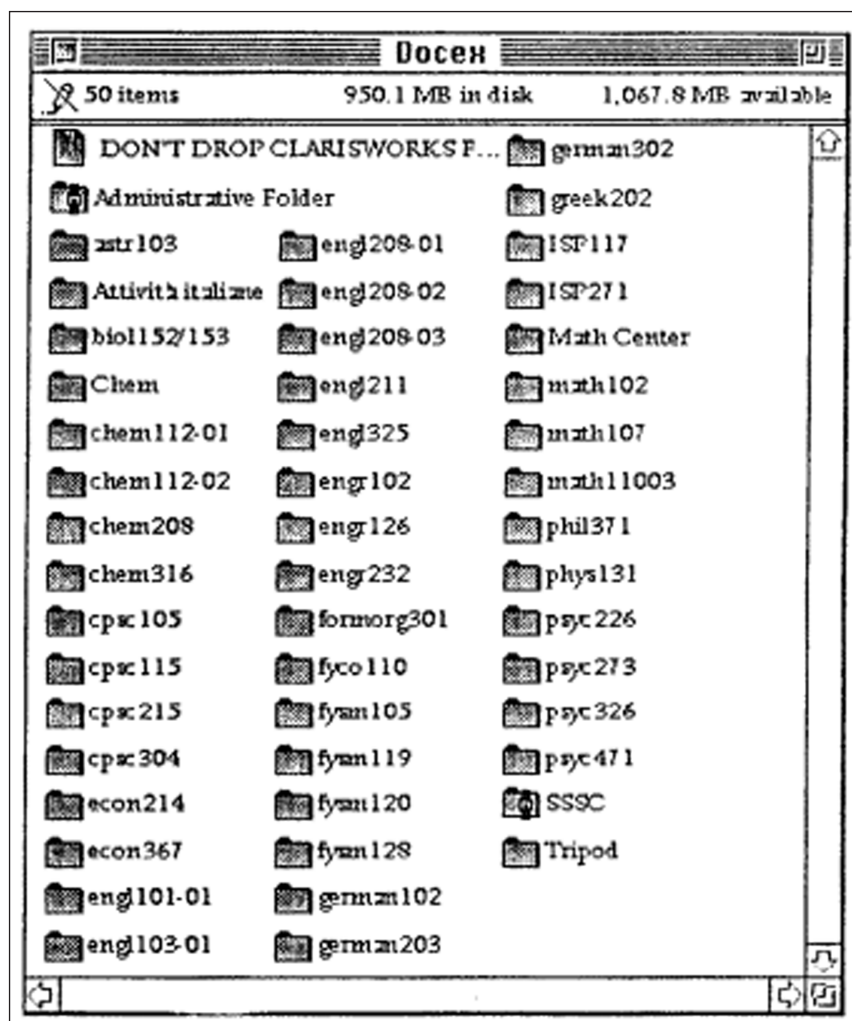
Figure 5: Docex electronic portfolio system (Wall & Peltier 1996: 208).

a previous paper based system with an electronic one, "I began to use the Docex file-sharing system in 1993; at first, I saw it only as an electronic correlative to the manila folders I had been using" (Wall & Peltier 1996).

The first reference to electronic portfolios in the literature was to the year 1989 by Campbell (1996), who reported starting to use electronic portfolios in 1989 in an elementary school in Wyoming to create a historical compilation of student work. She described their approach as an "electronic portfolio system - essentially, an archival data bank on holistic student growth - to store both two-dimensional information, such as writing and drawing, and full motion video sequences for each student. Technology assistants or teachers use a combination of flatbed scanner, video camera, computer, and software to create the digitized data stored in each portfolio" (Campbell 1996: 185). This approach is similar to the competency based approaches from the 1980s, using the portfolio to document and record student progress and achievement over time.

One of the pioneers in the development of electronic portfolios in higher education was Helen Barrett. In her 1994 article "Technology-Supported Portfolio Assessment", she outlines her vision of electronic portfolios as a form of alternative assessment which could enable "teachers, parents and students … [to] have immediate access to many examples of student work throughout that student's school years" (Barrett 1994). Although much of the article focuses on how to technically create and store an electronic portfolio using CDs and video compression technology, Barrett proposes an interesting pedagogical conception of two types of student portfolio: a working portfolio to gather ongoing progress and a formal portfolio comprised of a selection of their best work over a year (Barrett 1994). With this idea of the working portfolio and the formal portfolio, Barrett was continuing the conceptualisation of portfolios as both a process and a product from the 1980s. Barrett unified the two theoretical conceptions of portfolios from the 1980s, the working portfolio capturing the emphasis on progress from the constructivist approach and the formal portfolio, showcasing student achievement from the competency based approach.

Over the course of the decade, Barrett continued to develop her conceptions of electronic portfolio, in a later article she proposes one of the earliest definitions that "electronic portfolios … digitize and store collections of artefacts from student portfolios using a range of technologies and multimedia elements" (Barrett 1998). In 1998, Barrett started a Listserv about electronic portfolios with the aim of creating a community of educators to share ideas, approaches and research (Barrett n.d.).

One indication that electronic portfolios were moving into mainstream American higher education discourse was a special issue of the journal "Computers and Composition" about electronic portfolios published in 1996. This special issue was a valuable source because many of the themes discussed, such as digital literacy, student ownership, electronic portfolios as a record of student achievement, the idea that an electronic portfolio is both personal and public, and the challenges of evaluating

portfolios, are still being discussed twenty-five years later (Yancey 1996). In the special issue, an article by Purves (1996) discusses the idea of a portfolio as a hypertext. The idea of a linked network of documents which in 2020 is so ubiquitous was in 1996 perceived as a radical shift, "A portfolio is a hypertext. It comprises a number of text or artefact spaces created and arranged by the author. In education, the author is usually the student. The student creates a network among the artefacts" (Purves 1996).

This concept of the portfolio as hypertext is further evolved by Watkins (1996: 219), he sees his portfolio as both personal and public and defines his approach as "an electronic portfolio may be defined as a student's hyper textually linked set of electronic texts that have been created for and placed on the World Wide Web (WWW) by the student, oriented toward specific Internet audiences as well as toward the portfolio evaluator." Watkin's (1996) web based portfolio is the earliest reference in the literature to an electronic portfolio located on a website, see **Figure 6**.

During the 1990s, portfolios evolved from paper to electronic, from local networks to the world wide web. The affordance of technology to create electronic portfolios which were more accessible, contained multimedia and hypertext was viewed by some practitioners (Barrett 1996) with enthusiasm but there was awareness that "working in the electronic medium, we are being shaped in ways no one fully understands". (Yancey 1996). The implications of this new electronic medium for teachers and students was the need to become literate in new, challenging, and complex ways". By the end of the decade there were small pockets of adoption in higher education in the areas of writing composition and teacher education. In the next section, the normalisation of educational technology and mainstreaming of electronic portfolios in higher education during the years 2000–2010 is examined.

Eportfolios Go Mainstream: 2000–2010

The decade from 2000–2010 was a period when technology became part of mainstream society and educational technology become part of mainstream higher education, as Selwyn (2014: 7) contends that

> "digital technologies are now an accepted and expected feature of higher education - part of the everyday furniture of universities rather than an exotic novelty. However, it's important to remember that this state of apparent normalisation was not always the case".

Over the course of the decade, universities and their staff and students adopted elearning, virtual learning environments (VLE), virtual worlds, video, blogs, open educational resources (OER), social media and e-portfolio into the higher education teaching and learning ecosystem (Weller 2018).

Drivers of adoption

Within the context of this 'golden age of elearning' (Weller 2018), e-portfolio entered the mainstream higher educa-
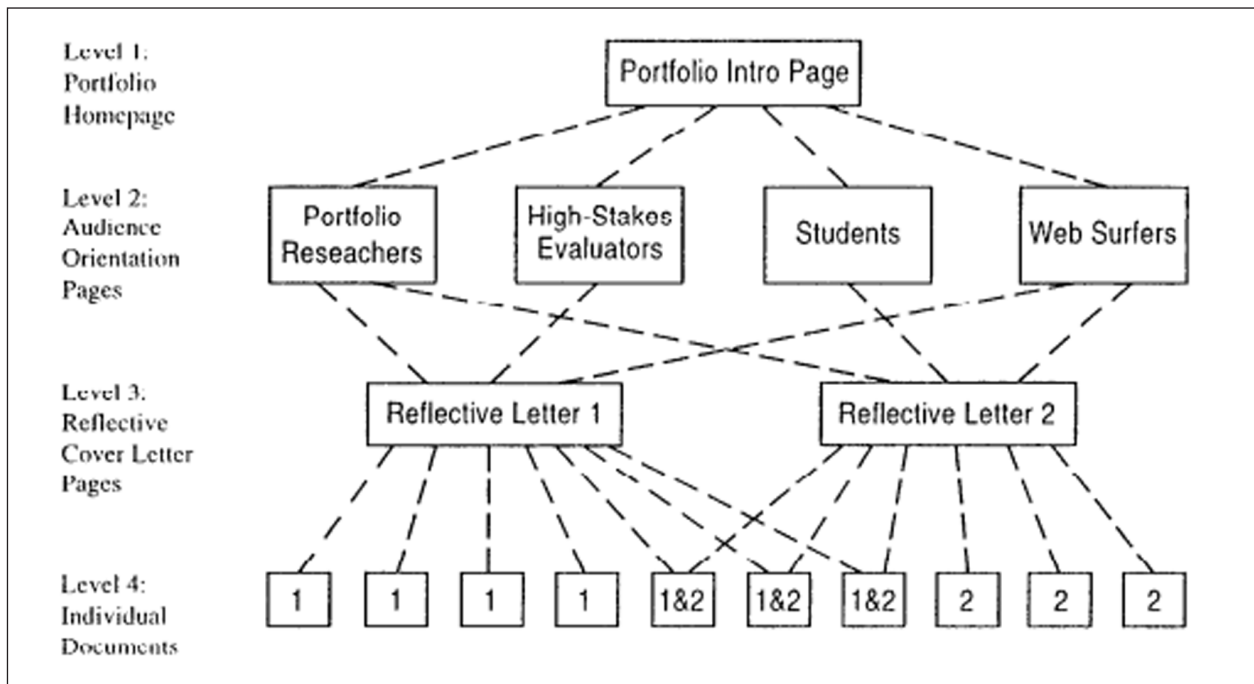
Figure 6: Conception of a portfolio on the world wide web, Watkins (1996: 224).

tion discourse and was received with hyperbolic enthusiasm.

> "Eportfolios might be the biggest thing in technology innovation on campus. Electronic portfolios have a greater potential to alter higher education at its very core than any other technology application we've known thus far" (Batson 2002).

During the 2000s, there was a proliferation of eportfolio platforms and solutions which leveraged the affordances of Web 2.0. By 2005, there were institutional home-grown web based eportfolio platforms such as the Denver University Portfolio Community system, open-source platforms such as Sakai and commercial packages such as Taskstream and Chalk & Wire (Lorenzo & Ittleson 2005; Batson 2002).

There were three additional drivers of eportfolio adoption in higher education during the 2000s: government policy; communities of practice; and funding for research. These drivers are present in all of the countries, such as the USA, UK, Australia and New Zealand, where eportfolio was adopted at scale (Farrell 2018).

Government policy can impact eportfolio adoption; for example, in 2006 in New Zealand, motivated by the dual policy aims of promoting lifelong learning and developing open source platforms, the Tertiary Education Commission funded through its elearning Collaboration Development Fund the creation of an eportfolio platform for the tertiary sector (Maher & Gerbic 2009). The result of this project was the platform Mahara, an open source eportfolio platform, which remains one of the most utilised eportfolio platforms globally. Using the Mahara platform, every educational institution in New Zealand has an eportfolio called MyPortfolio.

Communities of practice and a whole sectoral approach to eportfolio leads to more successful implementation (Hallam & Creagh 2010). In countries where strong vibrant communities have developed, there is a clear link to widespread eportfolio practice. An example of a thriving eportfolio community based in the USA and Canada is the Association for Authentic Experiential and Evidence Based Learning (AAEEBL) founded in 2009 which has hundreds of members based in higher education. AAEEBL holds several annual conferences and publishes a journal; The International Journal of Eportfolio (AAEEBL 2018). The AAEEBL community is very active and promotes evidence-based approaches to eportfolio practice which focus on pedagogy.

Government funding for research enabled broader higher education engagement with new forms of assessment such as eportfolio. This is evident in Australia where the Australian Eportfolio Project (AeP) 2007–2010 was funded by the government through the Carrick Institute for Learning and Teaching in Higher Education (Hallam & Creagh 2010). This research study investigated approaches of eportfolio use by students in Australian universities in relation to the scope, penetration, reasons for use and implementation of eportfolio (Hallam & Creagh 2010). The project provided a snapshot of eportfolio use in Australia at the time and identified policies and standards to foster eportfolio use in higher education (Hallam and Creagh 2010). As part of the project, an eportfolio community was founded and an annual conference established, both of which have been critical to the fostering of a vibrant eportfolio community in Australia.

Definitions

As eportfolios became more widespread, educators began to define, theorise, develop pedagogy and research eportfolio assessment in higher education. In the literature,

seventeen different definitions of eportfolio were found for the period 2000–2010. The four most commonly cited definitions of eportfolio by JISC (2008), Abrami and Barrett (2005), Lorenzo and Ittleson (2005) and Hartnell-Young (2007) permeate the literature on eportfolio, see **Table 2** below.

As definitions, they are quite techno centric, focusing on the tool rather than the affordances of the tool for learning and do not emphasise developmental learning processes sufficiently. However, by 2010 a more nuanced and pedagogical understanding of eportfolio had developed, this is evident in Chen and Black's (2010: 1) definition, they argue that "the concept of an e-portfolio is multifaceted — it is a technology, a pedagogical approach, and a process, as well as a product".

Theoretical approaches

In this section, the evolution of theoretical approaches to eportfolio from 2000–2010 is examined. One of the most common themes in the eportfolio theoretical literature from this decade is the centrality of reflection to learning with an eportfolio (Barrett 2007; Brandes & Boskic 2008; Yancey 2009; Zubizarreta 2008). Several empirical studies investigated reflection in eportfolio and its impact on student learning. Yancey (2009) reported on five iterations of research carried out by the Inter/National Coalition for Electronic Portfolio Research. Their findings were that across institutions, eportfolio fostered and supported reflection, that reflection happens in context, portfolio structure shapes the nature of student reflection, reflection is an iterative process, and that reflection in portfolios is a knowledge making activity.

The purpose of the eportfolio shapes how it should be used in higher education. Abrami and Barrett (2005: 2) argued that eportfolios have "three broad purposes: process, showcase and assessment." Whereas, the purpose of a process portfolio is developmental, showing a student's progress over time, a showcase portfolio aims to demonstrate a student's competencies and achievements and

finally an assessment portfolio is focused on evaluation (Abrami & Barrett 2005; Barrett 2007).

With a focus on learning, Zubizarreta's (2008, 2009) learning portfolio model has three components: reflection, documentation and collaboration. He argues that deeper learning for the student occurs when the three components come together at the centre of the design of the portfolio. He maintains that "a sound learning portfolio involves a concise reflective narrative, plus selective evidence…the role of the collaborative mentor is to help the writer keep the portfolio manageable, current, accurate, organised and relevant" (Zubizarreta 2008: 1).

Similarly, Chen and Penny Light (2010: 18) argue that the "value of eportfolio lies not in the specific tool itself but in the processes and in the ways in which the concept and related activities and practices are introduced to students." This is further evident in their pedagogical approach to eportfolio practice called *Folio Thinking*, which offers a framework of eportfolio activities designed to enable students to reflect on their learning, personalise their experience using multimedia and present to a variety of audiences (Penny Light et al. 2012).

Practice

In higher education practice during the 2000s, eportfolios were used for: assessment, developmental, and placement (Farrell 2018).

Eportfolios became a common form of summative assessment across all disciplines in higher education (Lowenthal, White & Cooley 2011). The rationale for adopting eportfolios for assessment was as an authentic student-centred form of assessment because they captured evidence of student learning in context and over time (Buyarski & Landis 2014; Eynon & Gambino 2017).

Klenowski, Askew and Carnell (2006) argued that there has been a shift from the traditional view of a portfolio as a collection of work to a learning portfolio which focuses on learning. Two types of eportfolio specifically have development as their purpose: the learning or process portfolio

Table 2: Definitions of eportfolio: most commonly cited.

Definitions of eportfolio: most commonly cited
"An e-portfolio is a digitized collection of artefacts including demonstrations, resources, and accomplishments that represent an individual, group, or institution. This collection can be comprised of text-based, graphic, or multimedia elements archived on a Web site or on other electronic media such as a CD-ROM or DVD. An e-portfolio is more than a simple collection—it can also serve as an administrative tool to manage and organize work created with different applications and to control who can see the work. E-portfolios encourage personal reflection and often involve the exchange of ideas and feedback" (Lorenzo & Ittleson 2005).
"An eportfolio is a digital container capable of storing visual and auditory content including text, images, video and sound. Eportfolio may also be software tools not only because they organize content but also because they are designed to support a variety of pedagogical processes and assessment purposes" (Abrami & Barrett 2005).
"An eportfolio is the product, created by the learner, a collection of digital artefacts articulating experiences, achievements and learning. Behind any product, or presentation, lie rich and complex processes of planning, synthesising, sharing, discussing, reflecting, giving, receiving and responding to feedback" (JISC 2008).
"Broadly, the product eportfolio is a purposeful selection of items (evidence) chosen at a point in time from a repository or archive, with a particular audience in mind. The processes that are required to create eportfolio – for any purpose – include capturing and ongoing storage of material, selection, reflection and presentation" (Hartnell-Young 2007).

and a personal development portfolio (PDP). Although they share the common purpose of development, they have different aims. The process portfolio focuses on learning and the documenting of the process of learning, while a personal development portfolio focuses on planning and goal setting (Farrell & Seery 2019).

Using an eportfolio to document student experience while on a placement, practice, or practicum is one of the most common purposes of eportfolio in a higher education context. Disciplines where placement are central to student learning such as teacher education and health and medical sciences have been early adopters of eportfolio (Parker, Ndoye & Ritzhaupt 2012).

Research
As the theory and practice of eportfolio developed, research did not keep pace. According to Wray (2007: 50) "While theoretical support regarding the benefits of portfolios is strong, scant empirical support is available". Bryant and Chittum (2013) systematically reviewed eportfolio research since 1996, and they found that the majority of the research on eportfolios consisted of theory based arguments for the use of eportfolio and practitioner descriptive accounts whilst a minority of articles were empirical studies. They argue that "empirical evidence for the adoption of eportfolio grounded in learning theory, becomes increasingly important as the use continues to grow" (Bryant & Chittum 2013: 195).

In the next decade 2010–2020, eportfolio researchers heeded the advice of Bryant and Chittum (2013) and an increased focus on gathering empirical data on the impact of eportfolio on student learning is evident. A shift in focus occurs in eportfolio research and practice during the next decade, there was more emphasis on pedagogy and student learning and less focus on digital technology as it became ubiquitous and "deeply [woven] into the fabric of university teaching and learning" (Selwyn 2016).

Mature Eportfolio 2010–2020
There are two distinct patterns in the evolution of portfolio during the final decade considered in this article: firstly, a growing empirical evidence base on the impact of eportfolio on student learning. Secondly, another wave of interest in the affordance of portfolios paired with emerging edtech such as digital badges, block chain and massive open online courses (MOOCS).

During this decade, there has been growing evidence of the impact of eportfolio practice on student learning in the higher education context. The research indicates that eportfolio based assessment enables students to integrate their learning and make connections between modules in an authentic and meaningful way (Buente et al. 2015; Eynon & Gambino 2017; Morreale et al. 2017). Further, the literature suggests that for online students, learning with an eportfolio can foster a sense of belonging to a community and peer collaboration (Bolliger & Shepherd 2010). Finally, studies suggest that eportfolios can enable students to develop critical thinking skills (Farrell & Seery 2019; Jenson 2011; Nguyen & Ikeda 2015).

An acknowledgement of this improved evidence base for eportfolio practice was the inclusion by the Association of American Colleges and Universities (AAC&U) of eportfolio as a high impact practice which "denote institutionally-structured student experiences inside or outside of the classroom that are associated with elevated performance across multiple engagement activities and desired outcomes" (Watson et al. 2016: 65).

From 2010–2020 there was a period of maturation for eportfolio in higher education, the technology and practice was tried and tested and eportfolio adoption was relatively widespread, with 57% of American colleges and 78% of UK universities using eportfolio (Eynon & Gambino 2017; UCISA 2014). Despite this scale of adoption, enthusiasm for eportfolio waned in about 2009, due to pedagogical, technical and quality assurance challenges (Weller 2018).

In higher education practice, the nature of eportfolio use broadened during this decade from a medium for assessment to a vehicle for documenting student non-formal learning such as study abroad experiences, to support academic advising and to collect evidence of graduate attributes (Farrell 2018). One of the emerging uses of eportfolio is to document the whole learning career of a student, including the co-curricular elements such as volunteering, involvement in student societies, sports, mentoring and study abroad experiences (Eynon & Gambino 2017). For example, at Guttman College, New York, eportfolios are used to document students' global learning experiences while studying abroad. Students critically reflected before, during and after their travel experience through journaling and photos which facilitated cross-cultural learning, self-awareness and cultural sensitivity. It also enabled academics at home to follow student experiences while abroad (Baines & Wilson 2018). In Ireland, similar student experience eportfolio practices are developing. Business students at Dublin City University (DCU) are documenting their Erasmus study abroad informal learning experiences through eportfolio practice (O'Reilly & Donaldson 2018). Specifically, an eportfolio programme has been designed to facilitate students studying abroad to reflect on their overseas experience and integrate it into a wider intercultural framework.

A greater linkage between eportfolio, graduate attributes and career planning is noticeable during this period. Two patterns have emerged with regard to professional or career eportfolio: firstly, to support students transitioning from higher education to the workplace and secondly, to document continuous professional development activities for those already in the workplace (Simatele 2015; Von Kronsky & Oliver 2012). Professionals are increasingly required by regulatory bodies to document their continuous professional development (CPD) via an eportfolio (Gordon & Campbell 2013).

From 2010–2020, the use of eportfolio as an assessment approach became more sophisticated, with an increased emphasis evident in the literature on the design and quality assurance aspects of eportfolio assessment (Baird, Gamble, & Sidebotham 2016; Buente et al. 2015).

The focus being on an integrated programmatic approach that should be thoughtfully woven throughout the curriculum, capturing the student learning experience over the duration of the degree (Clarke & Boud 2016; Shepherd & Bolliger 2014; Simatele 2015). One example of the evolution of eportfolio assessment is the idea of using an eportfolio assessment as a capstone project at the end of a degree. This eportfolio capstone assessment would serve as a culminating experience to integrate the theory, skills, knowledge and practice learned over the course of the degree together (Buente et al. 2015; Baird et al. 2016). A more robust approach to the marking and feedback of eportfolio assessment is also evident in the research from 2010–2020, both Yancey (2015) and Donato and Harris (2013) arguing for eportfolio to evaluation through the use of authentic and valid rubrics aligned with the learning outcomes.

A second wave of interest in eportfolio practice and research began in approximately 2014, when educators began to explore the intersection between MOOCs, digital badges and eportfolio (Ambrose 2014). This intersection between digital badges and eportfolio emerged from a Notre Dame pilot study which examined the design and implementation of digital badges in a MOOC environment (Ambrose, Anthony, & Clark 2016). One of the key outcomes of the study was the finding that if digital badges and eportfolios were paired correctly, they could "unlock the power of evidence behind the badge and optimize a student's ability to collect an available body of projects and the process to make and prove a competency claim" (Ambrose, Anthony, & Clark 2016:18). According to Eynon and Gambino (2017) the pairing of eportfolio and digital badges is a future direction for eportfolio research and practice. Similarly, using block chain to bring together eportfolio, digital badges and records of formal and informal learning in the form of a personal portable record is being explored (Weller 2018).

Another area which is emerging in relation to eportfolio are concerns about data ethics, ownership, and GDPR. According to Brown-Wilson et. al (2018: 115) "some unintended consequences around privacy, consent, and confidentiality have caused ethical dilemmas, particularly with vulnerable communities such as patients and children". These questions around privacy and data are linked to issues around the use of paid eportfolio platforms by universities. Is it ethical to ask students to pay for the right to retain access to their portfolios after graduation?

The results of these experiments with block chain, badges, eportfolio and MOOCs may radically transform the educational ecosystem or more likely the higher education system will continue to gradually evolve, incorporating concepts, technology and approaches that are compatible rather than transformative.

Concluding Thoughts

The American President Theodore Roosevelt said "I believe that the more you know about the past, the better you are prepared for the future" (Library of Congress 2020). The aim of this article was that through historically analysing the evolution of portfolio in higher education, a greater understanding of the patterns, pedagogy, practice and technology of portfolio would be achieved. This concluding section draws the article to a close through a consideration of the following questions:

1. How has the concept of portfolio in higher education evolved over time?
2. What lessons can be learned from the history of portfolio, that would prepare us for the future?

How has the concept of portfolio in higher education evolved over time?

Over time the meaning of portfolio evolved from its origins as a case for holding loose papers to other contexts such as finance, government and education. By the early 1990s, portfolio assessment was used to improve university teaching, measure teacher candidates' readiness to teach, document student learning, growth, and development over time, promote reflective practice, employability, and professional certification. Portfolios evolved from paper to electronic, from local network to the world wide web. The decade from 2000–2010 was a period when technology became part of mainstream society and educational technology become part of mainstream higher education, and portfolio spread around the world. As the theory and practice of eportfolio developed, research did not keep pace. In the final decade 2010–2020, eportfolio researchers heeded the advice of Bryant and Chittum (2013) and increasingly focused on gathering empirical data on the impact of eportfolio on student learning. A shift in focus occurred in eportfolio research and practice in the last decade, there was more emphasis on pedagogy and student learning and less focus on digital technology as it had become ubiquitous.

What lessons can be learned from the history of portfolio, that would prepare us for the future?

Portfolios are a good idea, but should not be made complicated. From the perspective of student learning, portfolio assessments which focus on development of knowledge and skills over time are preferable to traditional assessments such as exams. One of the key takeaways from the story of eportfolio adoption is that educators and institutions should adopt a critical perspective to new educational technologies and approaches. The history of portfolio in higher education shows that the higher education system will continue to gradually evolve, incorporating concepts, technology and approaches that are compatible rather than transformative. However, the pivot online due to the Covid-19 pandemic may interrupt this gradual evolution of the higher education system. Worldwide the impact of the pandemic has been enormous, with over one billion students unable to go to school or university (UNESCO 2020). The pandemic forced the higher education system to swiftly shift to remote emergency teaching online and to reimagine assessments such as campus based exams. Alternative assessment approaches such as eportfolio, blogs, online presentations, wikis, podcasts,

and videos became mainstream in the blink of an eye, as the sacred cow of campus based exams were not possible (Farrell 2020). Will this shift in higher education thinking towards alternative assessment such as eportfolio become permanent after the pandemic?

Competing Interests
The author has no competing interests to declare.

References

Abrami, PC and **Barrett, H.** 2005. Directions for research and development on electronic portfolios. *Canadian Journal of Learning and Technology*, 31(3). Available at https://www.cjlt.ca/index.php/cjlt/article/view/26487/19669. DOI: https://doi.org/10.21432/T2RK5K

Ambrose, AG. 2014. Campus Conversations: Alex Ambrose. *AAEEBL Learner Review, Fall.* Available at https://aaeebl.org/.

Ambrose, AG, Anthony, E and **Clark, GC.** 2016. Digital badging in the MOOC space. Educause Review, Nov.

Association for Authentic, Experiential, and Evidence-Based Learning. 2018. About. Available at: https://aaeebl.org/about/.

Baines, K and **Wilson, K.** 2018. From Berlin to Belize. In: Eynon, B and Gambino, L (eds.), *Catalyst in action.* Stylus, Virginia.

Baird, K, Gamble, J and **Sidebotham, M.** 2016. Assessment of the quality and applicability of an eportfolio capstone assessment item with a bachelor of midwifery program. *Nurse Education in Practice*, 20: 11–16. DOI: https://doi.org/10.1016/j.nepr.2016.06.007

Barrett, H. 1996. Technology-supported portfolio assessment. *The Computing Teacher.* Available at https://electronicportfolios.org/.

Barrett, H. 1998. Strategic questions. *Learning & Leading with Technology.* Available at https://electronicportfolios.org/.

Barrett, HC. 2007. Researching electronic portfolios and learner engagement: The REFLECT initiative. *Journal of Adolescent & Adult Literacy*, 50(6): 436–449. DOI: https://doi.org/10.1598/JAAL.50.6.2

Barrett, H. n.d. *Electronic Portfolios.* Available at https://electronicportfolios.org/.

Bates, T. 2019. *Teaching in a digital age.* British Columbia: BC Campus.

Batson, T. 2002. The electronic portfolio boom: What's it all about? *Syllabus: Technology for Higher Education.*

Batson, T. 2011. Situated learning: A theoretical frame to guide transformational change using electronic portfolio technology. *International Journal of Eportfolio*, 1(1): 107–114. Available at http://www.theijep.com/.

Bibliothèque des Arts Décoratifs. n.d. French Fashion Plates. Available at http://artsdecoratifs.e-sezhame.fr/revues-de-mode.

Bolliger, DU and **Shepherd, CE.** 2010. Student perceptions of eportfolio integration in online courses. *Distance Education*, 31(3): 295–314. DOI: https://doi.org/10.1080/01587919.2010.513955

Brandes, GM and **Boskic, N.** 2008. Eportfolio: From description to analysis. *International Review of Research in Open and Distance Learning*, 9(2): 1–17. DOI: https://doi.org/10.19173/irrodl.v9i2.502

Brown-Wilson, C, Slade, C, Kirby, M, Downer, T, Fisher, M and **Nuessler, S.** 2018. Digital ethics and the use of eportfolio: A scoping review of the literature. *International Journal of ePortfolio*, 8(2): 115–125.

Bryant, L and **Chittum, J.** 2013. ePortfolio effectiveness: A(n ill-fated) search for empirical support. *International Journal of ePortfolio*, 3(2): 189–198.

Buente, W, Winter, JS, Kramer, H, Dalisay, F, Hill, YZ and **Buskirk, PA.** 2015. Program based assessment of capstone eportfolios for a communication BA curriculum. *International Journal of ePortfolio*, 5(2): 169–179.

Buyarski, CA and **Landis, CM.** 2014. Using an eportfolio to assess the outcomes of a first year seminar: Student narrative and authentic assessment. *International Journal of ePortfolio*, 4(1): 49–60.

Campbell, J. 1996. Electronic portfolios: A five-year history. *Computers and Composition*, 13(2): 185–194. DOI: https://doi.org/10.1016/S8755-4615(96)90008-0

Chen, HL and **Black, T.** 2010. Using eportfolio to support an undergraduate learning career: An experiment with academic advising. *Educause Review.* Available at https://er.educause.edu/.

Chen, HL and **Penny Light, T.** 2010. *Electronic portfolios and student success: Effectiveness, efficiency, and learning.* Washington: Association of American Colleges and Universities.

Clarke, J and **Boud, D.** 2016. Refocusing portfolio assessment: Curating for feedback and portrayal. *Innovations in Education and Teaching International*, 1–8. DOI: https://doi.org/10.1080/14703297.2016.1250664

Da Vinci, L. n.d. Codex Arundel. Available at the British Library https://www.bl.uk/collection-items/leonardo-da-vinci-notebook).

Donato, A and **Harris, I.** 2013. Use of portfolios for assessment of resident teaching skills. *Journal of Graduate Medical Education*, Sept. Available at http://www.jgme.org. DOI: https://doi.org/10.4300/JGME-D-12-00309.1

Dorn, CM, Sabol, SS and **Madeja, F.** 2013. *Assessing expressive learning.* London: Routledge. DOI: https://doi.org/10.4324/9781410608970

Dysthe, O and **Engelsen, K.** 2004. Portfolios and assessment in teacher education in Norway: A theory-based discussion of different models in two sites. *Assessment & Evaluation in Higher Education*, 29(2): 239–258. DOI: https://doi.org/10.1080/0260293042000188500

Elbow, P and **Belanoff, P.** 1997. Reflections on an explosion: Portfolios in the 90s and beyond. In: Yancey, K and Weiser, I (eds.), *Situating portfolios: Four perspectives.* Logan, UT: Utah State University Press. pp. 21–33. DOI: https://doi.org/10.2307/j.ctt46nxw3.4

EPPI. 2010. Methods for conducting systematic reviews. Available at https://eppi.ioe.ac.uk.

Eynon, B and **Gambino, L.** 2017. *High impact eportfolio practice.* Sterling, VA: Stylus.

Farrell, O. 2018. Failure to launch: The unfulfilled promise of eportfolios in Irish higher education: An opinion piece. *DBS Business Review*, 2. DOI: https://doi.org/10.22375/dbr.v2i0.30

Farrell, O and **Seery, A.** 2019. "I am not simply learning and regurgitating information, I am also learning about myself": Learning portfolio practice and online distance students. *Distance Education*, 40(1). DOI: https://doi.org/10.1080/01587919.2018.1553565

Farrell, O. 2020 "Out of intense complexities, intense simplicities emerge": Assessment and the pivot online. *NIDL Blog.* Available at https://nidl.blog/2020/05/03/out-of-intense-complexities-intense-simplicities-emerge-assessment-and-the-pivot-online/.

Ford, J and **Larkin, G.** 1978. The portfolio system: An end to backsliding writing standards. *College English*, 39(8): 950–955. DOI: https://doi.org/10.2307/376206

Goldthwaite, RA. 1980. *The building of Renaissance Florence.* London: Johns Hopkins University Press.

Gordon, JA and **Campbell, CM.** 2013. The role of ePortfolios in supporting continuing professional development in practice. *Medical Teacher*, 35(4): 287–294. DOI: https://doi.org/10.3109/0142159X.2013.773395

Habib, L and **Wittek, L.** 2007. The portfolio as artifact and actor. *Mind, Culture, and Activity*, 14(4): 266–282. DOI: https://doi.org/10.1080/10749030701623763

Haertel, E. 1991. New forms of teacher assessment. *Review of Research in Education*, 17: 3–29. DOI: https://doi.org/10.2307/1167328

Hallam, G and **Creagh, T.** 2010. ePortfolio use by university students in Australia: A review of the Australian ePortfolio project. *Higher Education Research & Development*, 29(2): 179–193. DOI: https://doi.org/10.1080/07294360903510582

Hartnell-Young, E. 2007. Impact study of ePortfolio on learning. Becta. Available at http://dera.ioe.ac.uk/1469/7/becta_2007_eportfolio_report_Redacted.pdf (Last accessed 11 March 2012).

Jarvinen, A and **Kohonen, V.** 1995. Promoting professional development in higher education through portfolio assessment. *Assessment & Evaluation in Higher Education*, 20(1): 25–36. DOI: https://doi.org/10.1080/0260293950200104

Jenson, J. 2011. Promoting self-regulation and critical reflection through writing students' use of electronic portfolio. *International Journal of Eportfolio*, 1(1): 49–60. Available at http://www.theijep.com/.

JISC. 2008. *Effective practice with e-portfolios.* Available at http://www.ssphplus.info/files/effective_practice_e-portfolios.pdf (Last accessed 13 April 2019).

Klenowski, V, Askew, S and **Carnell, E.** 2006. Portfolios for learning, assessment and professional development in higher education. *Assessment & Evaluation in Higher Education*, 31(3): 267–286. DOI: https://doi.org/10.1080/02602930500352816

Nguyen, LT and **Ikeda, M.** 2015. The effects of eportfolio-based learning model on student self-regulated learning. *Active Learning in Higher Education*, 16(3): 197–209. DOI: https://doi.org/10.1177/1469787415589532

Lam, R. 2018. Background of portfolio assessment. In*: Portfolio Assessment for the Teaching and Learning of Writing.* Singapore: Springer Briefs in Education. DOI: https://doi.org/10.1007/978-981-13-1174-1_1

Library of Congress. 2020. Theodore Roosevelt. Available at https://www.loc.gov/.

Lorenzo, G and **Ittelson, J.** 2005. An overview of e-Portfolios. *Educause review.* Available at https://www.educause.edu/.

Loughran, J and **Corrigan, D.** 1995. Teaching portfolios: A strategy for developing learning and teaching in preservice education. *Teaching and Teacher Education*, 11(6): 565–577. DOI: https://doi.org/10.1016/0742-051X(95)00012-9

Lowenthal, P, White, JW and **Cooley, K.** 2011. Remake/remodel: Using ePortfolio and a system of gates to improve student assessment and program evaluation. *International Journal of Eportfolio*, 1(1): 61–70.

Maher, M and **Gerbic, P.** 2009. E-portfolios as a pedagogical device in primary teacher education: The AUT university experience. *Australian Journal of Teacher Education*, 34(5). DOI: https://doi.org/10.14221/ajte.2009v34n5.4

Morreale, C, Van Zile-Tamsen, C, Emerson, CA and **Herzog, M.** 2017. Thinking skills by design: A capstone eportfolio to promote reflection, critical thinking and curriculum integration. *International Journal of Eportfolio*, 7(1): 13–28.

O'Reilly, N and **Donaldson, L.** 2018. Thank you, dear diary, for giving me this space: The use of e-portfolios to develop reflective practice during a study abroad year. *EdTech 2018, TEL Quality Matters – People, Policies and Practices, Annual Conference of the Irish Learning Technology Association*, Carlow, 1 June 2018.

Oxford English Dictionary. 2006. Portfolio. Available at https://www.oed.com/.

Parker, M, Ndoye, A and **Ritzhaupt, AD.** 2012. Qualitative analysis of student perceptions of e-portfolio in a teacher education program. *Journal of Digital Learning in Teacher Education*, 28(3): 99–107. DOI: https://doi.org/10.1080/21532974.2012.10784687

Penny Light, T, Chen, HL and **Ittelson, JC.** 2012. *Documenting learning with an Eportfolio.* San Francisco: Jossey-Bass.

Purves, A. 1996. Electronic portfolios. *Computers and Composition*, 13(2): 135–146. DOI: https://doi.org/10.1016/S8755-4615(96)90004-3

Reynolds, C and **Patton, J.** 2014. Leveraging the eportfolio for integrative learning. Sterling, VA: Stylus.

Richardson, J. 1722. An account of some of the statues, bas-reliefs, drawings and pictures in Italy. Available at https://catalog.hathitrust.org/Record/100240209.

Selwyn, N. 2014. Digital technology and the contemporary university: Degrees of digitization. London: Routledge. DOI: https://doi.org/10.4324/9781315768656

Selwyn, N. 2016. *Is technology good for education?* Cambridge: Polity.

Shepherd, C and **Bolliger, D.** 2014 Managing communication and professional development in online gradu-

ate programs with electronic portfolios. *Online Journal of Distance Learning Administration*, 17(2). DOI: https://doi.org/10.1111/bjet.12316

Simatele, M. 2015. Enhancing the portability of employability skills using Eportfolio. *Journal of Further and Higher Education*, 39(6): 862–874. DOI: https://doi.org/10.1080/0309877X.2014.953461

Tate Modern. n.d. A man with a portfolio, taking snuff. Available at https://www.tate.org.uk/art/artworks/british-school-18th-century-a-man-with-a-portfolio-taking-snuff-verso-beginning-of-a-girls-t10106.

Tosh, J. 2010. *The pursuit of history*. Edinburgh: Pearson.

UCISA: Universities and Colleges Information Systems Association. 2014. 2014 Survey of technology enhanced learning for higher education in the UK [online]. Available at: http://www.ucisa.ac.uk/~/media/groups/dsdg/Tel 2014 Final 18 August.ashx (Last accessed: 9 June 2019).

UNESCO. 2020. COVID-19 educational disruption and response. Available at https://en.unesco.org/covid19/educationresponse.

Von Kronsky, BR and **Oliver, B.** 2012. The iPortfolio: Measuring uptake and effective use of an institutional electronic portfolio in higher education. *Australasian Journal of Educational Technology*, 28(1): 67–90. DOI: https://doi.org/10.14742/ajet.884

Wall, BC and **Peltier, RF.** 1996. "Going public" with electronic portfolios: Audience, community, and the terms of student ownership. *Computers and Composition*, 13(2): 207–217. DOI: https://doi.org/10.1016/S8755-4615(96)90010-9

Watkins, S. 1996. World wide web authoring in the portfolio-assessed, (inter)networked composition course. *Computers and Composition*, 13(2): 219–230. DOI: https://doi.org/10.1016/S8755-4615(96)90011-0

Watson, CE, Kuh, G, Rhodes, T, Penny Light, T and **Chen, H.** 2016. Editorial: ePortfolios – The eleventh high impact practice. *International Journal of Eportfolio*, 6(2): 65–68.

Weller, M. 2018. Twenty years of Edtech. *Educause Review*, 53(4): 34–48. Available at https://www.educause.edu/.

Wolf, A. 1998. Portfolio assessment as national policy: The National Council for Vocational Qualifications and its quest for a pedagogical revolution. *Assessment in Education: Principles, Policy & Practice*, 5(3): 413–445. DOI: https://doi.org/10.1080/0969595980050306

Wray, S. 2007. Electronic portfolios in a teacher education program. *E-Learning and Digital Media*, 4(1): 40–51. DOI: https://doi.org/10.2304/elea.2007.4.1.40

Yancey, K. 1996. Portfolio, electronic, and the links between. *Computers and Composition*, 13(2): 129–133. DOI: https://doi.org/10.1016/S8755-4615(96)90003-1

Yancey, KB. 1996. The electronic portfolio: Shifting paradigms. *Computers and Composition*, 13(2): 259–262. DOI: https://doi.org/10.1016/S8755-4615(96)90014-6

Yancey, K. 2009. Reflection and electronic portfolios. In: Cambridge, D, Cambridge, B and Yancey, K (eds.), *Electronic Portfolios 2.0*. Stirling, VA: Stylus. pp. 5–17.

Yancey, K. 2015. Grading eportfolio: Tracing two approaches, their advantages and their disadvantages. *Theory into Practice*, 54: 301–308. DOI: https://doi.org/10.1080/00405841.2015.1076693

Zeichner, K and **Wray, S.** 2001. The teaching portfolio in US teacher education programs: What we know and what we need to know, *Teaching and Teacher Education*, 17(5): 613–621. DOI: https://doi.org/10.1016/S0742-051X(01)00017-8

Zubizarreta, J. 2008. *The learning portfolio: A powerful idea for significant learning*. Idea Paper #44.

Zubizarreta, J. 2009. *The learning portfolio: Reflective practice for improving student learning*. (2nd ed.) San Francisco, CA: Jossey-Bass.