

ePortfolio Effectiveness: A(n Ill-Fated) Search for Empirical Support

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ePortfolio has become ubiquitous in higher education over the course of the last decade, with faculty and institutions devoting both time and monetary resources to its use. Given this trend, the purpose of this study was to investigate the landscape of ePortfolio research to determine what evidence exists for ePortfolio's impact on student outcomes. We identified four trends in the research: articles making theory-based arguments for the use of ePortfolio or providing a descriptive account of a single instance of use; articles presenting original data on users' feelings and opinions of ePortfolio; articles presenting original data on student outcomes resulting from ePortfolio use; and finally, articles focused on the technological vehicles of ePortfolio. Through our analysis of the literature it became evident that an increased focus in the research is necessary with regard to collecting and presenting original data on student outcomes and investigations of the most effective and usable platforms designed for ePortfolio.

The Emergence of ePortfolios in Education

Over the past decade, the use of ePortfolios in an educational context has flourished. From ePortfolio's paper-based origins in the realms of fine arts, music, creative writing, and architecture, the word *portfolio* was initially defined as a portable case for carrying a loose collection of papers and materials (Avraamidou & Zembal-Saul, 2002; Meeus, Questier, & Derks, 2006). Portfolios are intended to contain samples of an individual's "best work," presented as a testament to the individual's abilities (Avraamidou & Zembal-Saul, 2002). Today, an electronic portfolio, or *ePortfolio*, is defined as "a digitized collection of artifacts, including demonstrations, resources and accomplishments that represent an individual, group, organization, or institution" (Lorenzo & Ittelson, 2005, p. 2) and involves situating a portfolio within a web-based interface. The use of a web-based interface makes the portfolio process more flexible and dynamic and allows individuals to contribute to and alter their ePortfolios in a way that is immediately accessible to employers or instructors. The word *artifacts* can indicate text-based work, reflections, video demonstrations, and other multimedia elements, such as blogs and wikis that are included in the ePortfolio to both promote and demonstrate learning (Brandes & Boskic, 2008).

According to Alvarez and Moxley (2004), ePortfolios are "process, product, and tool," meaning that ePortfolios should be viewed as a mechanism for both formative and summative assessment. ePortfolios are now being widely used to showcase student growth over time and to assess learning outcomes (Lombardi, 2008). Instructors are incorporating ePortfolios in their classrooms from the primary level up through post-secondary education. Many universities are currently developing institution-wide ePortfolio programs that are intended to encompass the entirety of a student's college career. As

ePortfolios become more prevalent at multiple levels of education, it is wise to assess what we know of this pedagogical tool in order to answer the ultimate question: Does the evidence truly support the theoretical connections between ePortfolio and student outcomes? We address in this question academic learning outcomes in addition to other outcomes that may lead to increased learning. In order to answer this question, a wealth of empirical evidence, or evidence presenting original data, is necessary. It is the aim of this paper to take a quick snapshot of the ePortfolio literary landscape to determine whether this empirical evidence is being produced, or whether the research tends to focus more on arguing for the use of ePortfolios and describing their use without presenting data.

ePortfolios and Human Learning

The eventual adoption of ePortfolio in the realm of education makes theoretical sense, given what we know of human learning. Theoretical arguments for the use of ePortfolios have cited improved reflection, increased student engagement, improved learning outcomes, and increased integration of knowledge (e.g., Acosta & Liu, 2006; Doig, Illsley, McLuckie, & Parsons, 2006; Hartnell-Young, 2006; Heinrich, Bhattacharya, & Rayudu, 2007; Jenson, 2011; O'Brien, 2006; Peet et al., 2011; Riedinger, 2006; Sherman, 2006). The electronic nature of ePortfolios allows even greater flexibility and fluidity than their traditional paper-based counterpart, which opens the door for a more streamlined, iterative reflective process. Students can easily document their reflective process and witness their growth over time (Doig et al., 2006; Riedinger, 2006). Reflection can also be encouraged through a specific ePortfolio interface, which can be designed to address the reflective needs of the students according to their experience level and academic domain (Doig et al., 2006). Instructors can

use ePortfolios to shift the locus of control from teacher to student, thereby nurturing student engagement (Acosta & Liu, 2006). When students incorporate artifacts from multiple disciplines and are asked to synthesize and reflect on them, ePortfolios can become a vehicle for developing integrative knowledge skills (Peet et al., 2011). When combined, all of these factors can provide students with a method for constructing their own knowledge and skills, which is likely to lead to deeper levels of understanding and improved learning outcomes (O'Brien, 2006).

Although the theoretical foundation for ePortfolio use is strong, it is not sufficient to justify widespread use. As ePortfolio use continues to grow and valuable time and resources are being invested in this fairly new pedagogical tool, it becomes even more important that we have empirically-based evidence for its adoption. In this paper, we present an overview of the current ePortfolio research and the methodology employed within it to discuss whether the necessary evidence exists to make an informed judgment on this tool.

Methodology

ePortfolio Research Sample

Data collection. In an effort to outline the current landscape of ePortfolio research, we reviewed a sample of 118 peer-reviewed journal articles on ePortfolios. We limited our search to peer-reviewed publications (i.e., refereed journal articles). Other sources (e.g., books, book chapters, conference presentations, white papers) were excluded from this search in an attempt to restrict the sample to publications subjected to a more rigorous review process.

Articles for this review were located first through keyword searches (e.g., e-portfolio, ePortfolio, electronic portfolio, e-folio, folio thinking, digital portfolio), second through citations of previously located articles and well-known books, and third by locating and retrieving articles from an ePortfolio-themed journal launched in 2011. Articles representing the last two years of ePortfolio research were pulled from this journal, one of the first peer-reviewed journals dedicated to this particular topic and therefore an important inclusion in the sample. Databases such as EBSCO Host, ERIC, Google Scholar, and a university online library search tool (i.e., "Summon") aided our search. We included every peer-reviewed article located through these searches, unless full-text articles were unavailable either through our universities or general online accessibility, which was infrequent. In order to ensure that we procured as accurate a sample as possible, we abandoned database keyword searches once the results

consistently duplicated articles already obtained and contained only irrelevant resources. Our access to full-text publications via our university libraries' subscriptions is extensive, as both are Research I institutions. Thus, we believe that limiting our search in this way would portray more accurately the manner of peer-reviewed publications available to interested researchers and practitioners. Several articles located through database searches and article and book citations were unavailable, and occasionally difficult to locate even for purchase.

Finally, because the sampling process did not render as many publications by several of the more well-known ePortfolio researchers as was expected, we also searched by author using advanced options. However, this specialized search rendered only eight additional peer-reviewed publications, as many of the oft-cited sources by these authors are books, book chapters, and conference presentations. Our search process took place over two years and several iterations, and although we do not propose that our sample includes every peer-reviewed article on ePortfolio, we do argue that it illustrates what other researchers and practitioners are likely to be able to find and access in their own searches for empirical evidence of ePortfolio.

Organization of the sample. Once we located a sample of peer-reviewed ePortfolio research in the form of journal articles, we classified each article into one of the following four categories:

1. *Descriptive*: An argument for the use of ePortfolio, often citing learning theory: may present data from other findings, but does not present original data; may present an example of ePortfolios in use for a specific program or course, but these examples are descriptive and do not present data.
2. *Empirical, affective*: Presents original data, but these data address the participants' feelings and opinions about ePortfolios and do not examine their impact on student outcomes.
3. *Empirical, outcomes*: Presents original data, qualitative or quantitative, on student outcomes.
4. *Technological*: Presents data and models on the structure and usability of ePortfolio platforms, or provides description of a platform.

Both authors participated in the classification process in order to maintain reliability. When a questionable item arose, we consulted until consensus was reached. The above definitions were also revised and/or developed anew as need arose. The forth classification (i.e., technological) was developed as a new pattern in the

data formed and became consistent. Once the new classification was developed, we reviewed all former articles and reclassified as needed.

Results

Of the total number of articles located, 58 were empirical in nature (49% of the sample), meaning that original data on the use of ePortfolios in a specific context was collected and presented. Of these empirical articles, we classified 40 (69% of the empirical articles) as empirical, affective and 18 (31% of the empirical articles) as empirical, outcomes.

Fifty of the articles (42% of the sample) were descriptive in nature, or practice-oriented. These articles focused on arguing for the use of ePortfolios in education or describing a specific instance of ePortfolio use, often including suggestions for the successful development and implementation of an ePortfolio program at either the classroom or university level. We classified 10 (9% of the total sample) as technological,

which were either empirical in nature (presented data and models on ePortfolio platform structure and usability) or descriptive in nature, offering examination of a particular platform. Table 1 displays our findings regarding distribution of the descriptive and empirical articles in our sample, and Figures 1 and 2 depict the distribution by category.

Dates of publication ranged from 1996 to 2012, with the bulk of the research published in 2012 (30%), followed by 2008 (14%), and 2011 (12%). As Figure 3 suggests, an increase in ePortfolio publications is evident, with the peak occurring in 2012. Table 2 displays the distribution of articles in our sample per year, including the percent of the sample each year comprised. The majority (72%) of the articles were published during the latter five years included in the sample (i.e., between 2008 and 2012). The drastic increase in ePortfolio articles over time and especially in 2012 is, in part, explained by the launch of a peer-reviewed journal dedicated to the study of ePortfolio, the *International Journal of ePortfolio*. As it is one of the

Table 1
ePortfolio Research Distribution Based on Classification

Years	Article Type	N	% of Total Sample	% of Type (e.g., empirical)
1996-2012	Descriptive	50	42	—
	Empirical	58	49	—
	Affective	40	34	69
	Outcomes	18	15	31
	Technological	10	9	—
	Total	118	—	—

Figure 1
Distribution of Descriptive and Empirical Articles

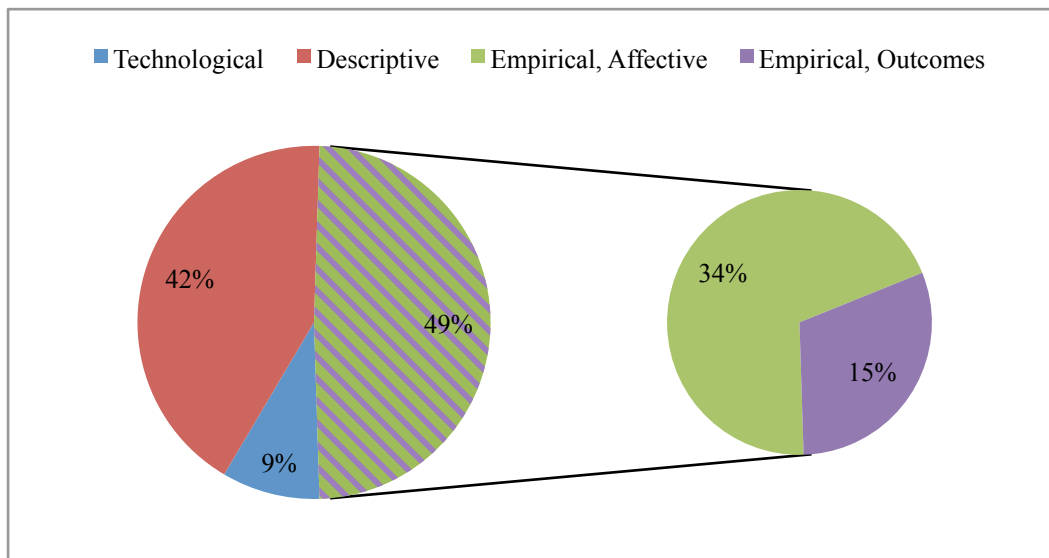


Figure 2
Distribution of Categories within the Total Sample

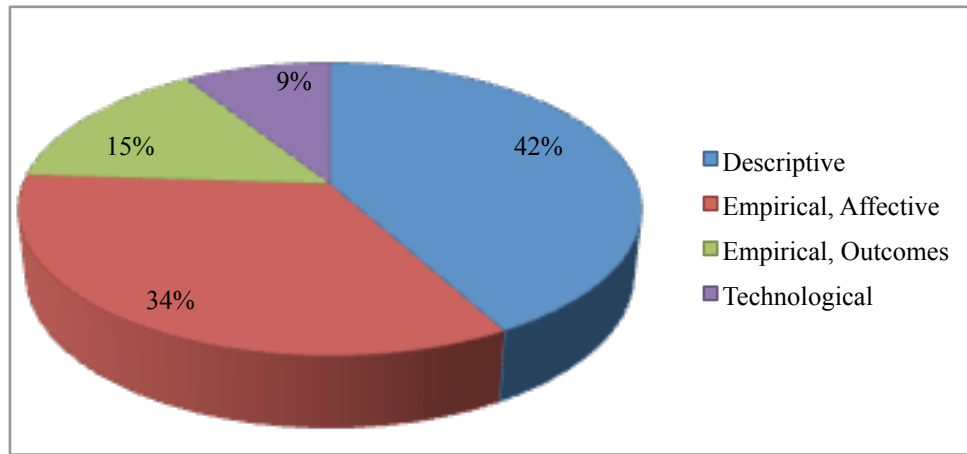
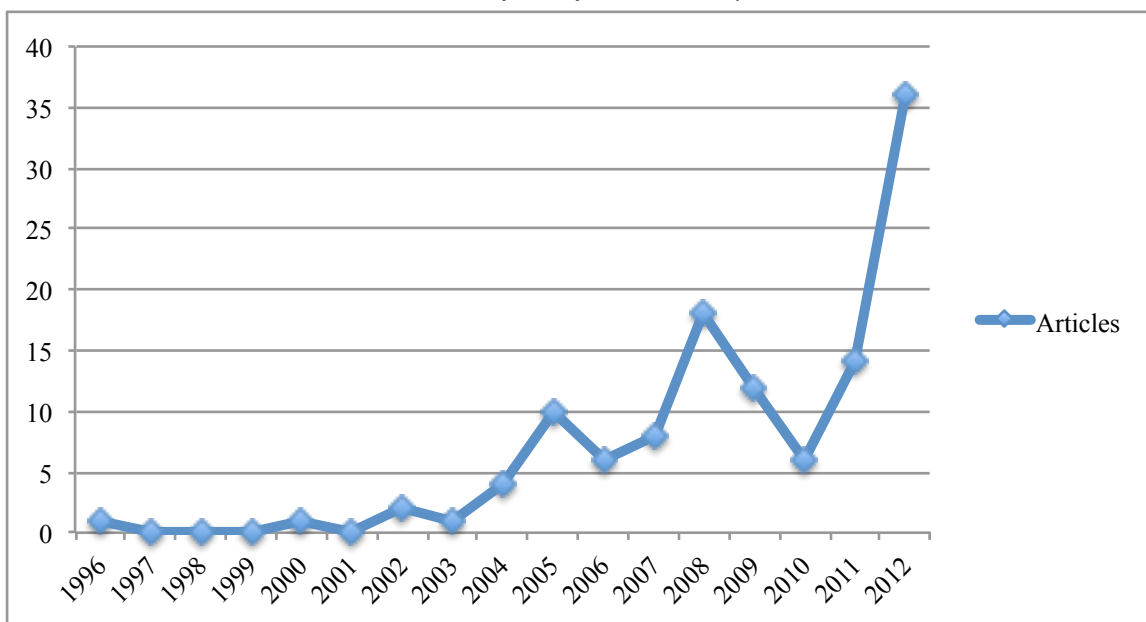


Figure 3
Distribution of ePortfolio Articles by Year



first journals of its kind, this represents rapid growth as the journal fulfilled an existing need. This growth signals an increased interest in publishing ePortfolio-related literature and, in turn, general popularity of the tool.

The Current State of ePortfolio Research

Descriptive articles. Many of the descriptive/practice articles from the sample gave detailed accounts of the experiences of individuals or institutions when implementing ePortfolio programs.

They were directed at practitioners interested in experimenting with ePortfolios and looking for specific examples of how others have undertaken such a task. These articles often highlighted the successes and pitfalls of these experiences so that readers can create a smoother transition into ePortfolio use for themselves. Also included in this category were the articles that made structural or theoretical arguments for ePortfolios. Many cited the need to develop new methods of assessment, address decreasing levels of student engagement, and help students become adaptive

Table 2
Distribution of ePortfolio Articles by Year

Year(s)	No. of Articles	% of Sample
1996	1	1
1997-1999	0	0
2000	1	1
2001	1	1
2002	2	2
2003	1	1
2004	4	3
2005	9	8
2006	6	5
2007	8	7
2008	17	14
2009	13	11
2010	6	5
2011	14	12
2012 & in press	35	30

problem-solvers. As noted previously, we classified 50 of the articles in this category. Thus, the descriptive papers were the largest category, comprising 42% of the total sample.

Empirical articles. The empirical articles we reviewed in this sample generally fell into two categories: those assessing attitudes and perceptions (40 articles), and those assessing student outcomes (18 articles).

The first category, containing empirical, affective articles, formed 69% of the empirical articles and 34% of the total sample. The majority of the articles in the first category used surveys, open-ended response items, and interviews to collect information on instructors' and students' experiences with ePortfolio. Case studies and focus groups were used less frequently. Twelve of the articles included measures of student perceptions of their own learning as a result of their experiences with ePortfolios. Together with the aforementioned descriptive papers, 76% of the sample was either non-empirical in nature or more informally assessed perceptions and feelings, as opposed to more robust findings involving student outcomes and impact on learning.

The second category, empirical articles measuring student outcomes, comprised 31% of the empirical articles and only 15% of the total sample. Outcomes-based research of ePortfolio did not appear in our sample until 2006. Although our objective during the initial search concentrated on articles measuring the impact of ePortfolio usage on participants' learning, we generalized the third category description to include student outcomes reaching beyond academic learning (e.g., motivation, reflective practice, self-regulatory strategy use) as we encountered an array of outcomes-based research. As noted above, learning theory

suggests that improved outcomes in areas such as personal reflection and academic motivation can lead to learning gains. We discuss academic learning outcomes, in addition to other student outcomes, both in combination and separately during our analysis.

Within this category, researchers investigated a variety of outcomes in the context of ePortfolio use, including students' writing ability, reflective ability, motivation, critical thinking, self-regulation, knowledge attainment and integration, and engagement. Compared to the attitudes and perceptions category, a wider range of methods were used to collect and analyze the data, such as rubrics, case studies, questionnaires, and interviews. In one study, researchers used a Likert-scale system to rate students' final written work, then used *t* tests to determine whether the ePortfolio project had improved the students' writing abilities (Acker & Halasek, 2008).

However, of the articles, few directly assessed student outcomes empirically (i.e., using a control or comparison group and reliable and valid assessment of student learning). Of the 18 empirical, outcomes articles, only nine assessed ePortfolio's effect on student learning outcomes (8% of total sample), while eight assessed ePortfolio's effect on non-academic learning outcomes (7% of total sample). It is important to note that one article (Abrami et al., 2008) included several instruments, which measured both academic and non-academic outcomes. Only two articles incorporated a comparison group, both of which also examined learning/academic outcomes (Desmet, Miller, Griffin, & Balthazor, 2008; Fiella et al., 2012). Desmet et al. (2008) examined the effect on writing quality, and Filella et al. (2012) academic performance in general. Of our sample of 118, two articles (1.7%) empirically evaluated student outcomes utilizing valid and reliable measures in addition to a comparison/control group. Table 3 displays these and additional themes related to the empirical, outcomes category.

Technological articles. Even though our initial intent was to investigate evidence of student outcomes related to ePortfolio, a fourth category became necessary as we consistently found publications that were best classified as technological papers. This category, accounting for 9% of the total sample, includes both empirical and descriptive articles that either presented data and models on the structure and usability of ePortfolio platforms or offered descriptive examination of particular platforms. Technological articles, first appearing in 2005, were a minority in our sample and represent an emerging trend in ePortfolio research. Despite aligning only indirectly with the purpose of this paper, discussions of the importance of coordinating desired student outcomes with appropriate platforms made it clear that this budding trend in the research deserved recognition.

Table 3
Themes in the Empirical, Outcomes Articles

Research Purpose	<i>n</i> *	Methods	<i>n</i> *
Assessed ePortfolio's effect on student learning outcomes using reliable and valid measures	9	Used comparison/control group	2
		Used reliable tool to assess learning (e.g., rubric)	4
		Used self-report measure and/or observation (e.g., questionnaire, Likert scale, open-ended questions, interview)	7
Assessed ePortfolio's effect on outcomes other than learning (e.g., motivation, self-regulation, reflective practice)	8	Used comparison/control group	0
		Used reliable tool to assess learning (e.g., rubric)	2
		Used self-report measure and/or observation (e.g., questionnaire, Likert scale, open-ended questions, interview)	8
Assessed outcomes unrelated to ePortfolio's effect on student outcomes.	2		

Note. * Some overlap exists when multiple methods were used in single publications.

Various ePortfolio platforms were presented, assessed, and/or explored in these articles, some original and others adapted from existing interfaces (e.g., utilizing Web 2.0 technologies [Zhang, Olfman, & Ractham, 2007] and modifying Microsoft FrontPage-developed prototype websites using Microsoft Word [Lyons, 2008]). Searches for platform issues, developing prototypes to tackle a specific need or pedagogy, integration of new or existing technologies, and usability were common threads of discussion. Of the 10 articles within this category, the following trends emerged: three presented case studies of ePortfolio platforms; four were entirely descriptive in nature, describing a particular platform or need; and three utilized subjective measures, such as observation and notes, in addition to assessments of student/user perceptions via surveys, questionnaires, and feedback sessions. A variety of disciplines were included, ranging from social work education to second language instruction to both the professional and educational spheres of medicine.

Discussion

The Next Phase of ePortfolio Research

Descriptions of individual or particular experiences with a specific pedagogical tool, in this case ePortfolio, serve an important function in the literature. Arguably, in many cases where a new technology or tool is beginning to emerge, these articles are usually the seed from which more rigorous research germinates; as these articles make ePortfolios more prevalent, other researchers undertake the more demanding task of

presenting data on ePortfolio and desired outcomes. They do not illustrate whether the theoretical underpinnings of ePortfolio use are sound. For this, a shift in the research must take place.

It is promising that such a high percentage of the located articles discussed data that was collected first-hand. This review suggests that ePortfolio research has made the shift successfully from a focus on descriptions of practice and theoretical arguments to a focus on data collection and presentation. Despite making this crucial step, however, within the realm of empirical articles, the focus remains on the attitudes and perceptions of the instructors and students using ePortfolios. This is especially problematic for several reasons. First, students do not always prefer the instructional methods that result in the greatest learning gains (Milheim, 1989; Morrison, Ross, & Baldwin, 1992; Ross, Morrison, & O'Dell, 1989; Steinberg, 1989). Even if students do not have highly positive attitudes towards ePortfolio, it is possible that they are still beneficial to the students' learning experiences. Second, many of the studies in our sample that measured students' perceptions of their own learning; this was often after using ePortfolio for the first time in a class where the instructor had recently adopted the tool (e.g., Bartlett & Sherry, 2006; Blair & Godsall, 2006; Bollinger & Shepherd, 2010; Gardner & Aleksejuniene, 2008; Wickersham & Chambers, 2006). Limited information can be gleaned from students' perceptions of their own learning; this is essentially a more roundabout way to assess students' attitudes toward ePortfolio. It is difficult to know whether those that had negative perceptions of an ePortfolio's impact on their learning felt that way because the tool itself was flawed, or

because there were flaws in its implementation. Possible implementation issues could include unclear guidelines and expectations for the ePortfolio, student difficulties adjusting to the interface, and choice of improper/poor software platforms. In fact, it has been suggested that many of the current options for software platforms are too standardized: students paste text and other artifacts into a pre-determined structure (Clark & Eynon, 2009). By taking the organization and structural decisions out of students' hands, these software platforms fail to align the pedagogical goals of ePortfolio that stress reflection, self-reflection, and engagement (Clark & Eynon, 2009). Thus, there is a clear need for increased research into the technological platforms used in ePortfolio.

Empirical evidence for the adoption of ePortfolio, grounded in learning theory, becomes increasingly important as use continues to grow. Evidence suggests that ePortfolio use at the post-secondary level has tripled since 2003, and a little more than 50% of public colleges and public and private universities make some use of ePortfolios (Clark & Eynon, 2009). The same growth is evident in our sample, in which 72% was published between 2008 and 2012 (see Figure 3 and Table 2). Another shift in the research is required: from data focused on attitudes and perceptions to investigating the link between ePortfolio and student outcomes, especially learning. Some have already begun this work: Brandes and Boskic (2008) used a qualitative analysis to explore students' reflective work and levels of learning within their ePortfolios. Others have used rubrics as a way to gain a more reliable assessment of student learning outcomes with ePortfolios (Abrami et al., 2008; Acker & Halasek, 2008; Cooper, 2008; Desmet et al., 2008; Diller & Phelps, 2008), or have examined the change in students' reflective abilities over time (Cheng & Chau, 2009; Jenson, 2011; Ring & Foti, 2006). Future studies should continue to examine students' development of reflective skills, critical thinking skills, deeper levels of learning, and student engagement in the context of ePortfolio. However, analysis of our sample suggests that more information is needed regarding ePortfolio's impact on integration of knowledge and metacognitive awareness.

One glaring issue with what we evaluated of the current literature is that there is rarely a comparison or control group; as a result, it is difficult to determine whether learning or positive growth in other realms occurred because of the ePortfolios or because of the general structure of the course. Researchers should begin to compare ePortfolio use to non-ePortfolio use within separate sections of the same course in order to parse out the specific contributions of the tool. Finally, the adoption of institution-wide ePortfolio systems that will follow students from their freshman year to

graduation provide a new opportunity for researchers: longitudinal studies that look at differences between ePortfolio and non-ePortfolio users over the course of several years could provide useful information on potential benefits once students become sufficiently acclimated to the ePortfolio process.

Limitations and Access to ePortfolio Research

Also deserving of discussion are the limitations of our sample and the barriers we encountered in accessing ePortfolio research. As stated previously, our sampling of ePortfolio peer-reviewed journal articles took place over two years and multiple iterations; however, this does not mean that our sample addresses all possible pieces on ePortfolio research. One issue we encountered while searching was accessing articles we found cited in other sources. A small number of these came from journals that were unavailable through our universities' subscriptions, and one in particular we could not even locate for purchase. Therefore, our sample is limited to those articles that we had access to through our university affiliations.

A second barrier we faced was in locating seminal sources of ePortfolio literature. We conducted specialized searches in an effort to include key figures in ePortfolio, yet these pursuits often led us away from peer-reviewed journals to sources that were outside of our methodology (and often less accessible), such as conference presentations, white papers, and book chapters. We find it important to note that many of the seminal pieces in the literature were difficult to access and did not manifest in the first few iterations of our search. These works, which have contributed substantially to the literature and shaped the collective conceptualization of ePortfolio, are unlikely to be readily accessible to others if we had difficulty locating them after extensive searching. This lack of access could have negative implications for the forward progression of ePortfolio as a pedagogical tool if key understandings of its use are unavailable to those who wish to study and employ it.

Conclusion

According to our sample, the current literature suggests that ePortfolio can plausibly make great contributions to student learning when properly implemented. However, there are still substantial gaps in the literature, and the adoption of ePortfolio continues to out-pace our knowledge of its effectiveness and appropriate use after over 10 years of research. Arguably, the field of education has a history with regard to adopting new approaches and technologies before the research has yielded more fine-grained understandings. Previous instances of

enthusiasm overstepping what is known about a concept can easily be found in education, where limited time and resources intensifies the allure of the quick fix or “silver bullet” (Watson, 2012), ultimately resulting in the wasting of precious time and resources. To avoid such undesired outcomes, it becomes even more important that ePortfolio be allowed to mature before it is packaged for broader consumption in the realm of practice.

Achieving this maturity is important, given the demonstrated potential of ePortfolios and the current educational climate. Students in all disciplines are being asked to master a set of new, demanding skills in order to be successful upon graduation. It is no longer enough for students to simply know their content; now they must also be creative, reflective, and communicative. As the K-12 system shifts toward a focus on “21st Century Skills,” the higher education system must follow. According to the Partnership for 21st Century Skills (2009), such skills include the ability to refine and evaluate one’s own creative efforts; incorporate input and feedback; view learning as a cycle, with failure being a part of that cycle; reflect critically on learning experiences; and use multiple forms of media and technology to organize, evaluate, and communicate information. Theoretical arguments and current research literature suggest that ePortfolio could serve as a useful tool for helping students master these skills in a wide range of disciplines (Acker & Halasek, 2008; Brandes & Boskic, 2008; Cheng & Chau, 2009; Cooper, 2008; Desmet et al., 2008; Diller & Phelps, 2008).

Although portfolios originated in the arts, music, and architecture, all disciplines stand to gain from the proper implementation of ePortfolio, as students are being required to provide more concrete evidence of their abilities to potential employers. Research has already begun to demonstrate the potential usefulness of ePortfolios in educational technology, general education (multi-disciplinary), writing and composition, information literacy, and foreign languages (Brandes & Boskic, 2008; Cheng & Chau, 2009; Cooper, 2008; Desmet et al., 2008; Diller & Phelps, 2008). Further research should expand our knowledge of the disciplinary appropriateness of ePortfolios, especially as colleges and universities implement system-wide ePortfolio programs for their incoming freshmen. Expansion should include a focused look at ePortfolios in the “hard science” disciplines, including engineering, physics, and mathematics, where the research is currently lacking. Here, where an ePortfolio program might arguably focus less on writing and more on innovative thought, rubrics or other qualitative measures may be useful in documenting students’ reflective and iterative thought processes in solving complex problems, in addition to quantitative measures of specific learning outcomes.

Although ePortfolio research is increasingly evident in the literature, a transition toward empirical assessment of their impact on student outcomes is needed. It is time for the research to make this crucial shift so that ePortfolios can either attain their full potential, or valuable time and resources can be allocated to a more worthy cause.

References

- Abrami, P. C., Wade, A., Pillay, V., Aslan, O., Bures, E. M., & Bentley, C. (2008). Encouraging self-regulated learning through electronic portfolios. *Canadian Journal of Learning and Technology*, 34(3). Retrieved from <http://cjlt.csj.ualberta.ca/index.php/cjlt/article/view/507/238>
- Acker, S., & Halasek, K. (2008). Preparing high school students for college-level writing: Using ePortfolio to support a successful transition. *Journal of General Education*, 57(1), 1-14.
- Acosta, T., & Liu, Y. (2006). ePortfolios: Beyond assessment. In A. Jafari & C. Kaufman (Eds.), *Handbook of research on ePortfolios* (pp. 15-23). Hershey, PA: Idea Group Reference.
- Alvarez, A., & Moxley, D. (2004). The student portfolio in social work education. *Journal of Teaching and Social Work*, 24(1/2), 87-103. doi:10.1300/J067v24n01_06
- Avraamidou, L., & Zembal-Saul, C. (2002). Making the case for the use of web-based portfolios in support of learning to teach. *Journal of Interactive Online Learning*, 1(2), 1-19.
- Bartlett, A., & Sherry, A. (2006). Two views of electronic portfolios in teacher education: Non-technology undergraduates and technology graduate students. *International Journal of Instructional Media*, 33(3), 245-253.
- Blair, R., & Godsall, L. (2006). One school’s experience in implementing e-portfolios: Lessons learned. *Quarterly Review of Distance Education*, 7(2), 145-154.
- Bolliger, D., & Shepherd, C. (2010). Student perceptions of ePortfolio integration in online courses. *Distance Education*, 31(3), 295-314. doi:10.1080/01587919.2010.513955
- Brandes, G., & Boskic, N. (2008). ePortfolios: From description to analysis. *International Review of Research in Open and Distance Learning*, 9(2), 1-17.
- Cheng, G., & Chau, J. (2009). Digital video for fostering self-reflection in an ePortfolio environment. *Learning, Media, and Technology*, 34(4), 337-350. doi:10.1080/17439880903338614
- Clark, J., & Eynon, B. (2009). E-portfolios at 2.0 – Surveying the field. *Peer Review*, 11(1), 18-23.

- Cooper, G. (2008). Assessing international learning experiences: A multi-institutional collaboration. *Phi Kappa Phi Forum*, 88(1), 8-11.
- Desmet, C., Miller, D., Griffin, J., & Balthazor, R. (2008). Reflection, revision, and assessment in first-year composition ePortfolios. *Journal of General Education*, 57(1), 15-30.
- Diller, K., & Phelps, S. (2008). Learning outcomes, portfolios, and rubrics, oh my! Authentic assessment of an information literacy program. *Portal: Libraries and the Academy*, 8(1), 75-89. doi:10.1353/pla.2008.0000
- Doig, B., Illsley, B., McLuckie, J., & Parsons, R. (2006). Using eportfolios to enhance reflective learning and development. In A. Jafari & C. Kaufman (Eds.), *Handbook of research on eportfolios* (pp. 158-167). London, UK: Idea Group. doi:10.4018/978-1-59140-890-1.ch016
- Filella, G., Gine, F., Badia, F., Soldevila, A., Molto, M., & Del-Arco, I. (2012). Well-being e-portfolio: A methodology to supervise the final year engineering project. *International Journal of Engineering Education*, 28(1), 72-82. Retrieved from http://www.ijee.ie/latestissues/Vol28-1/08_ijee2435ns.pdf
- Fitch, D., Reed, B., Peet, M., & Tolman, R. (2008). The use of ePortfolios in evaluating the curriculum and student learning. *Journal of Social Work Education*, 44(3), 37-54. doi:10.5175/JSWE.2008.200700010
- Flower, M., & Rhodes, T. (2005). Integrative learning, e-portfolios, and the transfer student. *Peer Review*, 7(4), 21-23.
- Gardner, K. M., & Aleksejuniene, J. (2008). Quantitative and qualitative analysis of student feedback on ePortfolio learning. *Journal of Dental Education*, 72(11), 1324-1332.
- Hartnell-Young, E. (2006). ePortfolios in Australian schools: Supporting learners' self-esteem, multiliteracies, and reflection on learning. *Informatics Education – The Bridge Between Using and Understanding Computers*, 4226, 279-289. doi:10.1007/11915355_26
- Heinrich, E., Bhattacharya, M., & Rayudu, R. (2007). Preparation for lifelong learning using ePortfolios. *European Journal of Engineering Education*, 32(6), 653-663. doi:10.1080/03043790701520602
- Jenson, J. (2011). Promoting self-regulation and critical reflection through writing students' use of electronic portfolio. *International Journal of ePortfolio*, 1(1), 49-60. Retrieved from <http://www.theijep.com/pdf/IJEP19.pdf>
- Lombardi, J. (2008). To portfolio or not to portfolio: Helpful or hyped? *College Teaching*, 56(1), 7-10. doi:10.3200/CTCH.56.1.7-10
- Lorenzo, G., & Ittleson, J. (2005). An overview of e-portfolios. *EDUCAUSE Learning Initiative, Paper 1*. Retrieved from net.educause.edu/ir/library/pdf/eli3001.pdf
- Lyons, P. (2008). Student portfolio websites: Valuable communication aids to future employers. *Review of Business*, 28(3), 33-43.
- Meeus, W., Questier, F., & Derks, T. (2006). Open source ePortfolio: Development and implementation of an institution-wide electronic portfolio platform for students. *Educational Media International*, 43(2), 133-145. doi:10.1080/09523980600641148
- Milheim, W. D. (1989). Perceived attitudinal effects of various types of learner control in an interactive video session. *Proceedings of the Annual Meeting of the Association for Educational Communications and Technology, USA*, 301-318.
- Morrison, G., Ross, M., & Baldwin, W. (1992). Learner control of context and instructional support in learning elementary school mathematics. *Educational Technology Research and Development*, 40(1), 5-13. doi:10.1007/BF02296701
- O'Brien, K. (2006). ePortfolios as learning construction zones: Provost's perspective. In A. Jafari & C. Kaufman (Eds.), *Handbook of research on ePortfolios* (pp. 74-89). London, UK: Idea Group. doi:10.4018/978-1-59140-890-1.ch008
- Partnership for 21st Century Skills. (2009). *P21 framework definitions*. Retrieved from http://www.p21.org/storage/documents/P21_Framework_Definitions.pdf
- Peet, M., Lonn, S., Gurin, P., Boyer, K., Matney, M., Marra, T., . . . Daley, A. (2011). Fostering integrative knowledge through ePortfolios. *International Journal of ePortfolio*, 1(1), 11-31. Retrieved from <http://www.theijep.com/pdf/IJEP39.pdf>
- Riedinger, B. (2006). Mining for meaning: Teaching students how to reflect. In A. Jafari & C. Kaufman (Eds.), *Handbook of research on eportfolios* (pp. 90-101). London, UK: Idea Group. doi:10.4018/978-1-59140-890-1.ch010
- Ring, G., & Foti, S. (2006). Using ePortfolios to facilitate professional development among pre-service teachers. In A. Jafari & C. Kaufman (Eds.), *Handbook of research on eportfolios* (pp. 340-355). London, UK: Idea Group. doi:10.4018/978-1-59140-890-1.ch031
- Ross, S., Morrison, G., & O'Dell, J. (1989). Uses and effects of learner control of context and instructional support in computer-based instruction. *Educational Technology Research and Development*, 37(4), 29-39. doi:10.1007/BF02307719
- Sherman, G. (2006). Instructional roles of electronic portfolios. In A. Jafari & C. Kaufman (Eds.), *Handbook*

- of research on ePortfolios* (pp. 1-14). London, UK: Idea Group. doi:10.4018/978-1-59140-890-1.ch001
- Steinberg, E. (1989). Cognition and learner control: A literature review. *Journal of Computer-Based Instruction*, 16(4), 117-121.
- Watson, J. (2012). Soft teaching with silver bullets: Digital natives, learning styles, and the truth about best practices. *Proceedings of the 4th Annual Conference on Higher Education Pedagogy, USA*, 175-176. Retrieved from <http://www.cider.vt.edu/conference/proceedings/2012ConferenceProceedings.pdf>
- Wickersham, L. E., & Chambers, S. M. (2006). ePortfolios: Using technology to enhance and assess student learning. *Education*, 126(4), 738-746.
- Zhang, S., Olfman, L., & Ractham, P. (2007). Designing ePortfolio 2.0: Integrating and coordinating web 2.0 services with ePortfolio systems for enhancing users' learning. *Journal of Information Systems Education*, 18(2), 203-214.
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