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Editorial: ePortfolios – The Eleventh High Impact Practice

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AAC&U has identified ePortfolios as an eleventh high impact practice. This inclusion is the result of the breadth and the strength of the evidence base in support of the effect of ePortfolios along a number of student success metrics. This recognition signals a new era for ePortfolios in higher education, and this editorial briefly explores the evidence behind this decision and charts a course for next steps and new domains for ePortfolios. The most promising of which may be coupling notions of Signature Work and a range of HIPs with ePortfolios.

The *International Journal of ePortfolio* includes an editorial on the occasion of a significant opportunity or event within the domain of ePortfolios, and this is indeed one such instance. The Association of American Colleges and Universities (AAC&U) has made the evidence-based decision to expand its set of ten high impact practices by one. The triangulation of the research from multiple sources has led to this decision, and the evidence in support of the efficacy of ePortfolios has been steadily, concertedly growing over the past decade. Key milestones leading to AAC&U's decision include the publication ten years ago of the *Handbook of Research on ePortfolios* (Jafari & Kaufman, 2006); research performed by many campuses through the Inter/National Coalition for Electronic Portfolio Research as well as associated publications (e.g., Cambridge, Cambridge, & Yancey, 2009); the launch in 2011 and the sustained publication since then of the peer-reviewed *International Journal of ePortfolio*; and in January 2017, we expect to see the publication of research resulting from the Connect to Learning (C2L) project (Eynon & Gambino, forthcoming). This sustained decade of effort leads us to this new ePortfolio era, an era where we will speak of ePortfolios and associated practices as having a high impact on student learning as well as other metrics of student success.

By way of general summary, ePortfolio pedagogy provides a set of practices that are platform agnostic and utilize a range of broadly available technologies. They are constructed within a framework for organizing learning, not as a prescription for a single end product, and they are designed to be owned and developed by the student learner with guidance from faculty and other educational professionals. Central to ePortfolio practice is active learner engagement and responsibility in their learning, along with learner reflection, upon not only the artifacts or instances of learning assembled in the ePortfolio, but also upon their process of learning that exhibits the desired outcomes at required levels of

competence. When performed well, based on best practices recommended from the research, this broad set of strategies has been found to have the desired impact on students. It is within this context that we look more closely at the evidence supporting AAC&U's decision.

Evidence of High Impact

The phrase, high-impact practices, was appropriated to denote institutionally-structured student experiences inside or outside of the classroom that are associated with elevated performance across multiple engagement activities and desired outcomes, such as deep learning, persistence, and satisfaction with college. While much of the initial body of evidence undergirding these observations was based on annual results from the National Survey of Student Engagement (NSSE) through 2007 (Kuh, 2008), additional confirming data soon began to accumulate from other studies (e.g., Brownell & Swaner, 2010; Hakel & Smith, 2009). Compared with their peers, undergraduates who participate in at least one of the high-impact practices (HIPs) "officially approved" by AAC&U generally devote more effort to such educationally purposeful activities as spending more time preparing for class and interacting more frequently with their instructors and other students about substantive matters. HIP participants also report getting more feedback about their performance and are more likely to apply and reflect on what they are learning, which tends to deepen and integrate their learning.

Equally important, HIPs have a cumulative effect, in that the more HIPs a student does during their studies, the more they benefit (Finley & McNair, 2013), and this realization contributes to the notion of Signature Work (described below), posited as a component of AAC&U's reaffirmation of the Liberal Education and America's Promise (LEAP) Challenge (AAC&U, 2015a). Further, HIPs are associated with compensatory effects, in that

student performance is greater than what otherwise might be expected, after controlling statistically for relevant student and institutional factors (Kuh, 2008; Kuh, O'Donnell, & Reed, 2013). The compensatory effects are particularly noticeable for students first in their family to attend college, those who were academically less well prepared when starting college, and those from historically underrepresented racial and ethnic groups (Finley & McNair, 2013). This pattern of findings holds across all institutional types -- community colleges, liberal arts colleges, urban universities, public comprehensive institutions, and research intensive universities.

The warrant for *declaring* ePortfolio practice a high-impact activity is that, on average, students who have a well-structured ePortfolio experience exhibit a similar desirable pattern of positive benefits associated with other HIPs. In Chapter 8 of their forthcoming book, Eynon and Gambino report a body of compelling results about the benefits of ePortfolio practice drawing on the data collected over four years from the 24 colleges and universities participating in the C2L project. For example:

- Average grades for students taking the required first semester “mission” course at the Rutgers University Douglass Residential College improved from 3.2 to 3.5 after nine semesters of ePortfolio practice.
- At the San Francisco State University Metro Health Academy, a learning community for high-risk students, ePortfolio practice was linked to a ten percent bump in the four-year graduation rate.
- Students in the required First Year Academies (thematic learning community) at CUNY’s Queensborough Community College using ePortfolio had a 98% first-to-second year persistence rate, compared with 88% for other First Year Academy students, and much greater than the 65% overall Queensborough persistence rate.
- At Pace University, the persistence rate for ePortfolio users was 87% compared with 74% for non-users (Eynon & Gambino, forthcoming).

As with some other HIPs, the self-report data from students using ePortfolios also are quite positive, both from the C2L project and other sources (e.g., Bowman, Lowe, Sabourin, & Sweet, 2016; Cambridge, Cambridge, & Yancey, 2009; Eynon, Gambino, & Török, 2014), including individual student testimonies (e.g., <http://oreneportfoliopsu.weebly.com/>). Finally, Eynon and Gambino (forthcoming) and others (Hubert, Pickavance, & Hyberger, 2015; Kahn, 2014) propose

that when linked to one or more of the ten HIPs on the AAC&U list, ePortfolio practice has accentuating effects, invoking the notion that ePortfolio might be considered a meta-high impact practice – when done well.

Eleventh High Impact Practice

It is exactly the evidence cited above, emerging in the pages of the *International Journal of ePortfolio* (IJeP), and other sources, that has led AAC&U to add ePortfolios as the eleventh high impact practice. As described in the research, HIPs effect enhanced student learning and success by bringing to the teaching and learning process the intentional and integrative characteristics associated with how humans learn; not just in the moment but for sustained use and transferability from one instance to different instances of practice and application. In short, all of the HIPs are HIPs not because they carry the label but because, when done well and with considered thought and implementation, they lead to deeper student learning, especially for traditionally under-served populations of learners (Finley & McNair, 2013).

AAC&U’s Centennial Year called for a renewed emphasis among its member institutions on strengthening student learning – the LEAP Challenge. This LEAP Challenge calls on colleges and universities to engage students in Signature Work that will prepare them to integrate and apply their learning to a significant project with meaning to the student and to society. The LEAP Challenge responds to the changing demands of the twenty-first century – demands for more college-educated workers and more engaged and informed citizens. College graduates need higher levels of learning and knowledge as well as strong intellectual and practical skills to navigate this more demanding environment successfully and responsibly. LEAP challenges the traditional practice of providing liberal education to some students and narrow training to others. The LEAP Challenge is designed to flexibly allow all students—whatever their institution or chosen field—to leverage this blended model of liberal education and the outcomes so important for success and well-being in today’s world.

In essence, Signature Work encompasses the characteristics that underlie the definition of all High Impact Practices - Proficiency; Agency and Self-Direction; Integrative Learning and Problem-Based Inquiry; Equity; and Transparency and Assessment – the key elements that promote a more intentional, integrated, and inquiry-centered undergraduate experience. (AAC&U, 2015b). ePortfolios are the most pervasive framework across higher education that clearly supports the concept of student Signature Work. ePortfolios allow students to capture and demonstrate their learning from the varied sites in which such

learning occurs. This includes the multiple modes and mediums through which the learning is manifested and through the learner's necessary ability to make meaning and sense of the learning for themselves, their programs of study, and the broader society in which they live. This learning, fostered through well done ePortfolio practice, as well as the evidence supporting these practices, led to AAC&U's adoption of ePortfolios as their eleventh high impact practice.

Institutional Change

The keys to employing ePortfolio as a HIP, though, are effective implementation and integration. While there is efficacious research from the C2L project, IJeP, and elsewhere about the cumulative effects of ePortfolio as a stand-alone practice and when paired with other HIPs, one aspect of ePortfolio implementation that is essential to its success is the ability to embrace and devote resources to the ePortfolio as an engaging pedagogy across a campus.

The role of institutional leadership in mobilizing campuses is central to scaling up ePortfolio initiatives as well as broadening adoption of the widely-recognized well-established HIPs. Such work not only lends credibility but also bolsters the arguments made by ePortfolio advocates through research and examples of practice. By implementing ePortfolio, campuses can also continue the collection of authentic evidence of learning that documents the ways that they are living out their institutional mission and values (Penny Light, 2016). This is increasingly important for accreditation efforts as well as for recruitment and retention.

Teaching and learning centers are critical in supporting integrated efforts to implement ePortfolios. Educational developers within colleges and universities are best positioned to assist in the design of curricula that fosters integrative learning (Huber & Hutchings, 2004) through professional development initiatives among faculty and staff (Eynon & Gambino, 2016). Integration of ePortfolios needs to occur at multiple levels. Inside the classroom, ePortfolios must be considered "AS curriculum" (Yancey, 2016). This means that they should not be implemented as an activity completely disconnected within the curriculum but intentionally introduced in order to enhance and expand upon course activities via reflection and presentation of evidence of learning. To do this effectively, learning designers need to focus on the ways that ePortfolio can be integrated into the curriculum to effectively meet essential learning outcomes. Externally, ePortfolios can be thoughtfully integrated through alignment with institutional and programmatic learning outcomes as well as national movements, such as the VALUE rubrics promoted by AAC&U and the Degree Qualifications Profile.

While the recognition of ePortfolios as a HIP is a significant milestone in our field, ePortfolios may be the most impactful when thought of and employed as a meta-HIP. Reflecting on and curating evidence of learning is certainly a powerful practice in and of itself; however, the combination of this "folio thinking" process together with HIPs extends and iteratively amplifies the positive benefits of these practices. As a pedagogy, ePortfolio and folio thinking provide scaffolding to guide learners in capturing their experiences. Further, these practices prepare learners for life in the 21st century by allowing them to develop integrative learning and build habits of mind that are central to lifelong learning (Penny Light, Chen, & Ittelson, 2011). The ePortfolio artifacts and narrative become an authentic representation of learning, a record that could, in the future, be viewed similarly to a traditional transcript or resume (Black, 2016; Chen, Grocott, & Kehoe, 2016). Explorations of this very idea have been investigated in the Comprehensive Student Record project led by the American Association of Collegiate Registrars and Admissions Officers (AACRAO) and NASPA: Association of Student Affairs Professionals (AACRAO, 2016) to strengthen how we document competency-based education and curricular and co-curricular outcomes. Collectively, these efforts highlight the need and the opportunity to create closer connections between formal records and credentials and actual evidence of learning.

We are indeed entering a new era of opportunity for ePortfolio practices. As the evidence base solidifies in support of the efficacy of well-designed and well-performed ePortfolio practices, and new initiatives are considering how ePortfolios can be leveraged in new contexts, this emerging ePortfolio era provides institutional leaders with informed perspectives on which data-driven decisions can be made regarding initiatives in teaching and learning. The most promising of which may indeed be Signature Work that couples a range of HIPs with ePortfolios.

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How Authors and Readers of ePortfolios Make Collaborative Meaning

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This article reports on a case study, using a think-aloud approach (Boren & Ramey, 2000; Jaspers, Steen, van den Bos & Geenen, 2004; Kilsdonk et al., 2016), to investigate how different types of audiences interpret ePortfolios. During recorded viewing, students, instructors, and business professionals narrated their experience of reading two ePortfolios. Consistent with findings by Conrad and Bowie (2006), Ramirez (2011), and Gallagher and Poklop (2014), interpretation of an ePortfolio's purpose varied depending on the audience reading the ePortfolio. Navigation through the ePortfolio was most consistent across all 3 groups, with participants interpreting the navigation menu order as a recommendation of reading order by the author of the ePortfolio. Motivation to continue reading, interpretation of personalization, and perception of reflective writing also varied depending on the audience reading the ePortfolio. This study provides evidence that an important element of teaching students how to build an ePortfolio is awareness of the purpose of the portfolio and the intended audience. In addition, the responses of the 3 different audiences suggest that multi-purpose ePortfolios may not be as successful in engaging audiences as targeted, single purpose ePortfolios.

ePortfolios in the 21st century address the new necessity for students to communicate through digital rhetoric (Clark, 2010; Yancey, 2009). ePortfolio practice, both as pedagogy and technology, answers this challenge by offering a digital space where students compose digital artifacts, negotiate with multiple audiences, and develop digital identities. Current research indicates that these skills contribute to the strength of ePortfolios in assessment, reflection, and knowledge integration, although more empirical studies of effectiveness are needed (Bryant & Chittum, 2013; Chertoff, 2015). Specifically, Rhodes, Chen, Watson, and Garrison (2014) called for further research in ePortfolios that includes both quantitative and qualitative methodologies to explore ePortfolios' impact with multiple stakeholders such as employers, as well as students and instructors. This study seeks to address this call by examining how three different audiences approach reading ePortfolios using a think-aloud method to illustrate how they negotiate the design of a portfolio and make meaning from what they see.

Ramirez (2011) observed that the audience can actively influence the creation of the portfolio. In order to move beyond intuition concerning what is effective for ePortfolio readers, evidence from a range of reader experiences in comparable contexts could be helpful. Fortunately, the present literature on how different audiences read ePortfolios is moving towards more evidence based recommendations. Conrad and Bowie (2006) studied the experiences of ePortfolio readers through interviews with six readers showing distinct differences in the ways the ePortfolios were read, depending on the purpose of the ePortfolio. Lievens (2014) examined career ePortfolios. His study focused on the literature on labor market economics as well as human resource management to outline what the

ePortfolio should include. Gallagher and Poklop (2014) interviewed eighteen students and six instructors over a 3-year period and analyzed eighteen students' ePortfolios to investigate the students' conceptualization and responsiveness to perceived audiences. They identified three key rhetorical moves that supported multiple audience needs, which included clear design and navigation, context for artifacts, and use of multiple voices.

In this study, we extend the work of Gallagher and Poklop (2014) by looking at three different groups of readers, keeping the ePortfolios as a constant, and focusing on how each group navigated the ePortfolio and created meaning from it. To explore how specific audiences read ePortfolios, we asked students, faculty members, and business professionals to read the same two ePortfolios. The findings from this comparative study inform how we help our students create more effective ePortfolios for different audiences and purposes. Instructors need to help students understand the key rhetorical moves needed to accommodate reader styles, which will allow students to establish their ethos for both academic and professional audiences.

Literature Review

Although ePortfolios have been used for years, they are still an emerging genre that defies easy definition (Batson, 2015). In defining genre, Swales (2009) wrote, "The work of genre is to mediate between social situations and texts that respond strategically to the exigencies of those situations" (p. 14). If ePortfolios are the "texts," what are the "social situations" to which they respond? Two common situations are to find employment and to document learning, each of which requires different texts or ePortfolios to achieve their respective purposes.

A general description of an ePortfolio is

a digital collection of authentic and diverse evidence, drawn from a larger archive, that represents what a person has learned over time, on which the person has reflected, designed for presentation to one or more audiences for a particular rhetorical purpose. (National Learning, 2003, as cited in Cambridge, 2008b)

The key element of this definition is that the ePortfolio is “designed for presentation to one or more audiences for a particular rhetorical purpose.” This specification suggests that one text or ePortfolio can be used for different rhetorical purposes. It also implies that ePortfolio creators are aware of these audiences and are able to make rhetorical choices to achieve a particular purpose with each one.

In addition to considering the correct rhetorical choices for particular audiences, ePortfolio creators must keep in mind that ePortfolios require a different type of reading or viewing than traditional texts. The reader navigates the text using links and encounters other elements, such as images, videos, and audio files. Fitzgibbons (2008), in her discussion of hypertext theory for reading, presents primary navigation strategies of readers as linear, mixed, and mixed review. Her discussion focused on hyperlinking, but it would seem that this could also apply to readers’ choices in navigating ePortfolios. ePortfolios are distinct from hypertexts, but the nature of ePortfolio navigation may be similar to the choices readers make while reading hypertexts because they use the navigation of ePortfolio as links that lead to text choices. Brown (2015) suggested that general readers in digital spaces expect a blending of videos, images, and sounds, as well as intuitive navigation. Brown (2015) identified some of the rhetorical choices available in an ePortfolio: “placement of content, and the ability to communicate via image, color, movement, and sound are as important to making meaning as the alphabetic” (p. 335). She asserted that as students construct their ePortfolios, they “are not only creating content—they are constructing their ethos using an entirely new set of rhetorical tools, and the boundaries between how they portray their work and how they portray themselves are blurred” (Brown, 2015, p. 337). An ePortfolio—more than other traditional academic genres—blends students’ personae into the representation of their learning.

Where Brown (2015) pointed out the affordances of ePortfolios, Gallagher and Poklop (2014) provided empirical evidence of how effectively students are able to achieve their rhetorical purpose in their

ePortfolios. Their analysis of 18 first-year students’ ePortfolios suggests that students have difficulty making sophisticated choices among the new rhetorical tools available to them to meet the expectations of different audiences in one ePortfolio. Gallagher and Poklop (2014) reported that instructors were conceptualizing audience in new ways as they adopted ePortfolio pedagogy in their first-year writing courses. Instructors reported that students saw the teachers, and possibly fellow students, as the primary audience for their ePortfolios. Some instructors indicated that using ePortfolios allowed them to increase their attention to audiences beyond the classroom and away from just the instructor and peers. Students were able to recognize a more general mass audience for their ePortfolios and tried to meet the needs of both an unfamiliar reader and familiar reader with one ePortfolio. Some students were able to successfully negotiate these two audiences’ needs by designing clear navigation for each type of audience, explaining connections between the artifacts, and using appropriate voice for different audiences. However, more often than not, students experienced what Gallagher and Poklop (2014) termed *audience interference*, where students were not able to meet the differing needs of different audiences within their ePortfolio. In these instances, students did not conceive of the audience as a particular set of readers. Some students had difficulty repurposing work done for a class for a more general audience.

Conrad and Bowie (2006) studied different portfolio readers’/viewers’ perceptions. In this study three staff members, not closely related to coaching portfolios, and three mentors, who worked closely with students creating portfolios, were interviewed concerning their experiences with summative and formative teaching portfolios. The principal focus of the study was on the relationship of reading context and audience on assessment of a portfolio. All participants commented on the conflict of summative and formative constructions appearing in the same portfolio. They suggested that the audiences of these two forms read the portfolios with different expectations for how to deal with showing development or mastery. The analysis of the interviews showed that the staff and mentors interpreted the artifacts of teaching portfolios differently. For example, the staff readers were more interested in evidence that showed mastery of teaching, and the mentor readers were interested in the teaching reflections and looked for a breadth of evidence and an understanding of what quality teaching is. Conrad and Bowie (2006) concluded that these portfolios highlight the tension between demonstrating formative development and presenting summative evidence of mastery since

different readers were guided by the expectations of one purpose or the other.

In another reading experience study by Quinlan (2001), readers participated in a think-aloud interview protocol. Participants all read the same ePortfolio and narrated their experience and judgments as they read. Quinlan (2001) observed that participants read the ePortfolios linearly, looking at each piece of evidence as it was presented by the author. Quinlan (2001) noted, "The readers' linear progression through the documents does not suggest a search for particular pieces of information to confirm or disconfirm hypotheses" (p. 1047). These readers all expected the evidence to show mastery of skills, and the linear approach appears to be an expectation that the author may have ordered the ePortfolio to fulfill this expectation. In addition to this expectation, additional contextual knowledge, such as the reader's knowledge of the author and the author's departmental affiliation, contributed to the readers' judgments. The ePortfolio was interpreted to be supplemental evidence to support readers' previous knowledge of the author.

Lievens (2014) contributed to the discussion with a theoretical discussion of how career ePortfolios can contribute to students participating more competitively in an increasingly challenging labor market. He wrote that career ePortfolios can help students demonstrate their mastery of job specific skills, thus highlighting their potential fit for specific employers. Lievens (2014) cited a study in the Netherlands that underscored issues affecting this utility. Most importantly, employers and employees need to share expectations about what skills are required for a job. In addition, many employers already have specific instruments to evaluate applicants, so the ePortfolio would need to be incorporated into existing assessments. Lievens (2014) also mentioned that questions of credibility and validity of information in the career ePortfolios need to be addressed so that they may be accepted as reliable documentation of skills mastery. It is possible that the growth of digital badging (e.g., Peck, Bowan, Rimland, & Oberdick, 2016) may be one way to address this problem of credibility.

In their in-depth analysis of one student's ePortfolio, Yancey, McElroy, and Powers (2013) noted that the author, Kristina, did not provide readers with directions on how to approach reading her ePortfolio. They suggested that the navigational scheme instead guides readers. Kristina offered readers brief introductions to her artifacts but did not provide an overall reflective document to guide readers in how to approach reading her ePortfolio. Her design caused Yancey et al. (2013) to question "What rhetorical moves—thinking here of addressing specific audiences—count as powerfully addressing audience, and what count as negatively limiting audience,

ignoring the greater digital context in which the work is placed?" It is possible that audience awareness may need to be more foregrounded for students so they can consider audience needs, including what information to provide and in what format. Cambridge (2008b) presented competing ideas for a professional ePortfolio, involving a focused career ePortfolio and a "symphonic self," a more holistic presentation of digital identity. Cambridge (2008b) did acknowledge that "improving employability while simultaneously critiquing employability seems to put an ePortfolio to work on contradictory purposes" (p. 257). These multiple purposes and multiple audiences create a complex challenge for ePortfolio builders and those who are teaching students to build ePortfolios.

As an example of how ePortfolio authors have negotiated this challenge, in the Minnesota ePortfolio project, Minnesota State Colleges and Universities (MnSCU) opened up an ePortfolio platform for the general public (Cambridge, 2008a). In survey responses, the users of this platform indicated that they more often used the ePortfolio for educational planning, while employer directed ePortfolios were more often presented for second contact experiences rather than as introductions. These respondents seem to have had a clear perception that one ePortfolio is not sufficient for multiple audiences. In fact, each distinct audience may have highly different needs. To best address these different needs, Yancey et al. (2013) suggested that ePortfolio authors must consider the different methods of coherence that might affect the reader. They also suggest that part of what guides choices to create coherence is the "web-sensibility" of the reader. The previous website experiences of the reader may change how the reader perceives the coherence of the ePortfolio reading experience.

The literature on ePortfolio reading strategies and audience interaction suggest that the audience is a key stakeholder in ePortfolio design at all levels. The reader's previous experience, purpose, genre expectations, and perceptions of the author's ethos all influence how a reader makes meaning from an ePortfolio. Given this multitude of considerations, it is important to compare and contrast different readers to understand the range of choices readers make. Understanding these choices can help authors make more effective choices in designing ePortfolios for multiple audiences, or multiple ePortfolios for different audiences.

The Study

This study sought to address the question of how different audiences employ strategies to read/view an ePortfolio. Reading an ePortfolio is distinct from reading a traditional text because the individual participating with multi-modal text is making meaning

from not only the alphabetic text, but also the structural arrangements of different kinds of text, such as navigation, and the interaction of text and graphic elements or even text as a graphic element (e.g., Freebody & Luke, 1990; Sarafini, 2012). Recognizing that ePortfolio “reading” is not the same as reading a traditional text, in this study we choose to use *reader* in the sense of a *reader/viewer* using a “mixed set of reading practices” (Yancey et al., 2013, p. 9).

The research question of reader strategies evolved from the growing emphasis at our university concerning ePortfolios for employers as well as for instructors and assessors. In order to understand how each audience might read an ePortfolio, we identified three types of key readers. Professionals would provide insights into how local businesses professionals might read ePortfolios for hiring purposes. Instructors could describe ways in which ePortfolios could be read in educational contexts. Students could describe how they would read ePortfolios of their peers. These multiple audiences might require different rhetorical approaches. We wanted to document the needs of different audiences to understand how ePortfolio instruction might need to vary so that students can best appeal to different audiences.

Case Study Approach

Since we wanted to develop an understanding of how various audiences read/view ePortfolios, we designed a case study project using the think-aloud practice (Bogden & Biklen, 2007; Jaspers, Steen, van den Bos, & Geenen, 2004; Kilsdonk, Peute, Riezebos, Kremer, & Jaspers, 2016). The case study method is best suited to help answer our research question of how readers make meaning from ePortfolios (e.g., Gallagher & Poklop, 2014). Yin (2008) argued that a case study should be used when a “‘how’ or ‘why’ question is being asked about a contemporary set of events, over which a researcher has little or no control” (p. 14). We used a think-aloud practice to learn participants’ perspectives on ePortfolios as they engaged with them.

Boren and Ramey (2000) indicated that this practice of asking the participant to vocalize his or her thoughts while working through a process is a valuable approach for understanding the usability of a procedure or a technology. Jaspers et al. (2004) outlined using the think-aloud practice as a good way to gain insight into the different ways that individuals approach problems. Kilsdonk et al. (2016) further suggested that using the think-aloud approach can help researchers extrapolate a mental model of how information is negotiated by the people interacting with the process or technology in question. Falan and Han (2013) conducted a study using the think-aloud approach in a similar way to the application in this study. They asked participants to view

the same image to compare how each participant interpreted the same information. Another study similar to our use of the think-aloud approach was conducted by Wright and Monk (1991), who used the think-aloud approach with software users to evaluate user-interface design. In this study, we were interested in how ePortfolio readers both interpreted the ePortfolio and reacted to the design of the ePortfolio. Participants’ perceptions help us to theorize about the exigencies for the emerging genre of ePortfolios. Through the analysis of the participants’ reading of the ePortfolios, as communicated in their think-aloud sessions, we construct an explanation of how audience and purpose affect the way readers make meaning through interacting with ePortfolios that can guide instructors in their work with students as they create those ePortfolios.

Context

We conducted our research in a suburb of a large metropolitan area at a regional college of a public U.S. research university. At our college, ePortfolios are beginning to be used more widely. Currently, the English and Communication Department, and the Business and Economics Department are beginning to use ePortfolios for course and program assessment. Instructors teaching natural science first-year experience courses are considering using ePortfolios, as well. As a result, instructors have mixed experience on our campus with the use of ePortfolios. Students often experience their first exposure to ePortfolios in their English composition courses, where ePortfolios are most widely used for course and program assessment. Instructors in the English and Communication department are most familiar with ePortfolios, and instructors in other departments are becoming more aware of how ePortfolios can be used as interest rises. The campus Learning and Teaching Center sponsors ePortfolio development Faculty Learning Communities (FLCs) and workshops on a regular basis. However, in the larger metropolitan area, ePortfolios are uncommon in business hiring processes.

Our research focused on the experiences of faculty, students, and local business professionals in reading/viewing the ePortfolios from this college. We recruited faculty who were both familiar and unfamiliar with ePortfolios, with the final group representing a convenience sample of those willing to volunteer time to be interviewed. Students were recruited from the Student Ambassador Program, which involved highly motivated students who participate in work-study in Student Services. Business professionals were recruited through personal connections and represented professionals from health care, city administration, engineering, and large for profit businesses and corporations.

Interview sites included participants' homes and offices. Student participants were invited to the investigators' offices in order to maintain their privacy. Professionals were asked where they preferred to be interviewed; some chose to be interviewed in their homes and others in their business offices. Instructors were interviewed in their offices. Two ePortfolios were selected from an applied business degree program designed for professionals with an associate's degree so that they can earn a bachelor's as a means of career advancement. The program focuses on business management and business communication. Students produce ePortfolios as a capstone experience.

Data Collection and Analysis

Interviews. To design a meaningful experience for readers, the author of an ePortfolio must meet basic needs of readers. Different types of readers may have specific expectations, and all readers may share certain needs in common. To document these needs and expectations we conducted a comparative study of 11 students, 13 faculty, and 10 business professionals reading the same two ePortfolios. Participants were recorded engaging in a think-aloud practice with screen capture audio and video that documented how they navigated the ePortfolio and what they were thinking about as they read the ePortfolio. Each participant clicked through each ePortfolio in 15 minutes for a total of a half hour interview: the data was comprised of 15 hours of interviews. During the ePortfolio reading sessions, one researcher sat behind or beside the participant while he or she was reading the ePortfolio to help with technical problems, should they arise. In addition, the researcher would pose specific questions, such as "Why did you choose to click on that link?" or "What is your reaction to that navigation bar?" similar to the co-operative evaluation described in Wright and Monk (1991).

The two PIs independently analyzed all interview transcripts. We identified themes in the transcripts using NVivo software and calculated an 85-90% coding consistency. The video recordings were used as a type of observational field notes and the audio recordings were transcribed and coded using NVivo to identify themes in the interviews. Navigation was also documented, click-by-click, using the video to describe how each participant progressed through the ePortfolios. We collaboratively identified and defined thirteen main coding themes. Using NVivo to isolate and sort the thematic coding of the transcripts, we collaboratively refined these coding themes to five principal findings through discussions of the analysis.

ePortfolios. Two students agreed to allow us to use their ePortfolios for this project. In analysis and presentation of this study, student confidentiality is

required, due to the highly personalized nature of the ePortfolios, graphic examples of their work are not possible, but descriptions allow this confidentiality to be maintained. One student used LiveBinders, while the other student used WordPress as the ePortfolio platform. Each student created an ePortfolio to represent the work they had completed in their Bachelor's program. Over the course of their program, they collected assignments from different courses to document their work. Professors in different courses facilitated the addition of work from each course into the ePortfolio. The final collection of work was refined and presented in a capstone course for the program. Students were allowed to choose the platform, design, navigation, and some content, but they were specifically asked to include a section for their resumes, capstone projects, bridging course materials, and applied workplace writing samples. Since these ePortfolios were created over several courses, they were built for multiple audiences. These ePortfolios were neither of very poor quality nor very high quality in terms of depth of reflection, clarity of navigation, quality of artifacts, or aesthetic appeal of design.

"T's" ePortfolio was created in WordPress. On T's homepage, she told readers briefly what types of artifacts they might find. Her ePortfolio contained several artifacts: resume, mid-collegiate course assignments of samples (text, PDF, Word, YouTube, photo), mid-collegiate course resume and goals, senior capstone case study project linked as a Word document, the final senior capstone project, an image of her poster, and a link to her applied workplace writing course ePortfolio that contained the artifacts from that course.

T used the menu to connect her artifacts. She used a hierarchical arrangement for the items on the menu to indicate how the various parts fit together. The platform navigation structure required readers to go back to the pop-up main menu each time they wanted to move to another part of the ePortfolio. When she linked her ePortfolios from her mid-collegiate bridging course and her applied workplace writing, she did not provide a link back to her main ePortfolio.

T's personalization of her ePortfolio consisted of selecting a stock template from WordPress (i.e., the Together Theme), which she did not customize. The Together Theme has a large banner of dancing figures on a purple background that takes up the entire screen and often hides the text below. This banner appears on all the pages of the ePortfolio.

"J's" ePortfolio was created in LiveBinders. His opening page had a photograph of himself and brief introduction to his employment aspirations and personal interests. He provided a five-tab navigation on the left, with each tab opening onto a submenu of documents. J included the same elements as T, but in somewhat greater quantity. The documents ranged from text to

Table 1
Summary of ePortfolio Elements Favored (X) and Disfavored (O) by Students, Instructors, and Employers

ePortfolio element	Students	Instructors	Employers
Graphics	X	X	X
Personal Photos	O	X	O
Multiple lines of menu tabs	O	O	O
Multi-colored menu tabs	O	O	O
Generally named menu tabs	O	O	O
Linear navigation	X	X	X
Downloading documents	O	X	O
Text of more than one screen	O	X	O
Blank pages or filler text	O	O	O
Short reflection introducing a piece	X	X	X
Long over-all reflection	O	X	O
Resume up front	X	O	X

presentation slides to photos. He included his resume, reflective pieces, and specific coursework assignments.

J used embedded menus to connect his work. Under each of the five vertically organized main tabs were further submenus, and in some cases, these subpages also included pages with horizontal menus linking to more documents. This navigational structure required readers to navigate within increasingly embedded pages. These pages were the artifacts that represented his work in different courses.

J's personalization of his ePortfolio consisted of color choices for menu tabs and backgrounds, and he included two photographs, one on his opening page and one on his resume. The LiveBinders template allowed the left vertical menu to be visible at all times, while the horizontal page specific menus were visible only on a given page.

Findings: Themes and Participant Perceptions

Five themes emerged from the analysis of the participant interviews and the observations of participant navigation through the ePortfolios: audience and purpose, motivation to continue reading, navigating the ePortfolio, personalization, and reflection. These themes echo the findings of previous research described in the literature review. These themes are also interconnected with each other. Who the readers are plays a role in the type of motivation they need to continue reading, as well as how they react to the personalization and the reflection offered in the ePortfolio. The one theme that seems to be independent of the reader's background is navigation. Most participants followed the same navigational pattern.

Table 1 summarizes the readers' favorable and unfavorable perceptions of the ePortfolio elements on which they commented.

Finding 1: Audience and Purpose

ePortfolios are designed to achieve a particular rhetorical purpose with an audience. In our study, participants had difficulty identifying the purpose for the ePortfolios they reviewed. Because the purpose for the sample ePortfolios was not clear, participants were unsure of whether they were the intended audience. One student said, "I think that it's important for people to know this is what you're looking at. This is why you're looking at it. It makes the reader feel informed." Without this context, participants had a difficult time imagining how ePortfolios would fit their needs. Participants identified four potential audiences: general readers, students, instructors, and employers. When participants identified students as an audience, they talked about how ePortfolios could be used to track their learning as a repository of their assignments. One instructor pointed out that putting an ePortfolio together could "help prepare the student for interviews" because the process of putting the ePortfolio together would allow the student to reflect "on what he's done and where he wants to go." In this case, the ePortfolio would not need to be shared with employers, since it would be used to help the student consider how to represent what he has learned in his college experience.

When participants thought of the audience as instructors, they describe how the ePortfolio could demonstrate and document student learning in a course or program. In these learning ePortfolios, instructors

wanted more focused reflections that discussed exactly what the student had learned and used the artifacts as evidence of that learning. Instructors had more patience and interest in understanding what the various purposes might be for an ePortfolio. They acknowledged the instrumental purpose of employment, but they also noted that the ePortfolios demonstrated a range of learning through the collection of artifacts. Nevertheless, instructors also indicated that they wanted the ePortfolio authors to be clearer about their intended purpose for the ePortfolio.

Most participants identified potential employers as the most likely audience for the sample ePortfolios. However, they noted that ePortfolios are not common practice in most hiring processes. One business professor said, "It's probably not something experienced professionals use all that much." On the other hand, another younger professional who places college students into co-op positions at his company stated that he would like to use ePortfolios to help him in that process because they provided information about the skills and knowledge students have.

Participants recognized that resumes are the most important artifact for employers. Resumes, as a genre, have been honed to meet employers' needs for fast and efficient review of multiple candidates. Resumes are set up for quick scanning, and the standardized format allows readers to find the information they need quickly. As one professional noted,

I'm not vested in figuring [the applicant] out . . . It's just a fact that people who are viewing these have a lot of things going on, and you need to make it as easy as you can for them to buy into you.

Therefore, he expected the ePortfolio to be streamlined to demonstrate quickly and efficiently the applicant's skills and knowledge, suggesting he preferred to read the whole ePortfolio like an extended resume.

Participants identified problems with ePortfolios for potential employers. They suggested that the ePortfolio needs to be tailored for specific jobs, just as resumes are tailored. These readers wanted contextualization of artifacts and intuitive navigation. Participants wanted authors to provide appropriate content. One student suggested that "employers want to know what you did in school. They don't want your homework. You have to kind of summarize." This recommendation was also given by professionals. They suggested providing executive summaries for the artifacts as a way to provide quick, easy to read context.

Professionals struggled with understanding how ePortfolios would be involved in the hiring processes already in place. One information technology professional asked when the applicant would present the ePortfolio. He didn't think he would review it in the

first review of resumes. He said it would be a problem to view it during an interview because his organization was not set up for that. Another professional from city government stated that the city office had a specific procedure for applicants to follow that involved a standard application and a place to upload a resume. There was no place for applicants to add an ePortfolio.

Nevertheless, there were some professionals who thought they could use ePortfolios. One human resources professional said an ePortfolio could be "helpful to try to get a feel for what a person has done, how they think, and how they would fit in the organization." Several business professionals thought that with relevant artifacts and explanations, an ePortfolio might help them narrow a list of final candidates after they had reviewed resumes.

One instructor described how he would teach students to do an ePortfolio for an employer:

I would tell them to make it simple. Make it logical. Just make it easier for the reader to follow. To be able to logically say, "this ties to this" and how it's all supposed to fit together. I would tell them "you have to sell yourself. Why are you doing these things? Why is it important to you? Why is it important to me?"

This instructor's directions reflect what the business professionals in this study wanted. This advice would help students create ePortfolios that would achieve their purpose for an employer as audience and develop coherence throughout the ePortfolio.

Finding 2: Motivation to Continue Reading

Regardless of purpose, the reader must feel motivated to continue reading the ePortfolio past the opening page. The primary motivation of all three groups was to look at the content of the ePortfolio. Easy access and having their interest piqued seemed to be key to increasing or decreasing this motivation. All three groups of readers generally agreed that navigation, design, and purpose were important elements that affected their continued motivation to read further.

Student readers found the navigation structure most important in motivating them to read further. When navigation menus were cluttered or unclearly labeled, they were very clear that this frustrated them and caused them to not want to continue through the ePortfolio. Students' key criteria for continuing reading was that the ePortfolio author create a navigation system that made it easy to find what they wanted, and when they clicked on a link or tab, what they expected to come up would appear. One student summarized the general feeling when she said, "You shouldn't have to

guess your way through someone's ePortfolio because the minute you can't navigate yourself, you're going to lose interest." The second most important element students cited was the length of documents. Short, one-paragraph explanations were read, but longer texts were only scanned, if they were read at all. Finally, blank pages were cited as a clear demotivation; students often commented that hitting a blank page was like hitting a road-block in the ePortfolio, and they all commented that they would quit at that point.

Professionals shared the students' perceptions of motivation to continue reading. They cited clear navigation tabs as an element that made them want to continue through the ePortfolio because it helped them find what they wanted quickly. They also cited clear, concise statements of purpose for what each page should mean. In the same vein, they reported that the principal reason they would not read a page or artifact was length. None of the professionals who reviewed the ePortfolios read the documents of more than one page. They would scan the documents if they felt the document's purpose was clear, but only read selectively. Professionals were most motivated to continue to read when the author easily facilitated their purposes in reading.

Instructors agreed that navigation was an important driver in feeling motivated to continue reading because clear navigation made it easy for them to read what they wanted. They also commented that they were motivated to read further when their expectations were met when what they clicked on gave them what they expected. In addition, instructors reported that graphics and color caught their interest and contributed to their desire to read further. One instructor summarized this view in her comment: "I like the graphics. It's eye catching and it's got me interested so I'm excited to see what the work is just because the graphics have kind of drawn me in here." Even if a page's content did not initially engage the reader, the graphics might motivate them to continue.

All participants agreed that unclear navigation was a strong demotivator because it did not allow the readers to find easily the artifacts they wished to find. This included unclear tab labels as well as inconvenient menu structures, such as embedded menus or menus that required clicking on an icon to bring up the main menu. This difficulty was characterized by all groups as "wasting my time." Both students and professionals cited length as the next strongest demotivation to read. They skimmed long text or just exited the document immediately after scrolling past one page. Participants in the professional group indicated that they wanted three sentence introductions to explain why they should bother reading a document longer than one page. Instructors, in contrast, had more patience with

longer documents, and would generally read or scan them, often looking for specific parts of the document to read carefully, such as conclusions, recommendations, or results.

Finding 3: Navigation Through ePortfolios

All three groups showed strong similarities in navigating through the ePortfolios. Patterns of navigation and perceptions of author meaning in navigational structure were observed in both the click through screen-capture video and the participants' observations as they read the ePortfolios. In general, all readers followed the vertical and horizontal menu orders. Long text was not read by anybody but was often scanned to the bottom. Short text of one screen was more likely to be read. Students and employers spent more time on the resume, and instructors were more likely to read the reflections. Blank pages confused and irritated all readers. A reader would scroll up and down on a blank page to make sure nothing was there and waited to see if something might load. Often all readers will scroll up and down on a page to preview what was there and then scan or move on. Scrolling up and down was a form of pre-reading that helped them decide where to focus their attention and for how long they would attend.

In reading the ePortfolios, all three groups interpreted the reading of the ePortfolio as a collaborative act of co-constructing meaning with the author. While moving through the ePortfolio, the readers would often address the author directly such as, "Don't let me down!" or "What are you doing here?" or "Oh, you went sideways on me!" The navigation menu, the design, the menu labels, and the relationship of artifacts with each other in the ePortfolio were all interpreted to have specific meaning by the readers, such that the ePortfolio seemed to become an avatar of the author. The design was interpreted as the affect of the author and the organization as the intent of the author. Readers actively looked for guidance from the author through the menu and file names. The menu was seen as an overview of the site, and the opening page was expected to set up the reading experience for the reader. Readers felt that dealing with the ePortfolio was work, and they saw the author's job as creating an easy experience for the reader. Being confused by navigation or by a document's significance was felt as a "waste of time." Readers also objected to being forced to go through several clicks to find something since clicking multiple times is perceived as a lot of work that the author should not make a reader endure.

Confusion about where to go or what a document signified was felt as a betrayal by the author. For example, a menu tab called "resume reflection" that did not deliver a resume was a source of irritation, and a

blank page was interpreted as an irresponsible act by the author. The faculty readers were more likely to assume that they had done something wrong or the page may have been slow to load, but student and professional readers often indicated that a blank page or a confusing set of menu tabs would make them stop reading. In fact, a particularly confusing menu elicited dismay, confusion, and shock in all readers. In this case, the author was perceived as no longer providing sufficient guidance to the reader, and the cooperative relationship was no longer reciprocated to by the frustrated readers, almost all of whom quit reading at that point.

The menu was interpreted by all readers as the principal guidance provided by the author to show the reader around the ePortfolio. All readers expressed a preference for vertical menus or horizontal menus of one layer. The majority of readers followed the menu order as a deliberate request from the author to read the ePortfolio in this way. Proximity of items in the menu was interpreted as relationships between documents, and the order of presentation was also interpreted as creating a framework that gave meaning to individual documents. Readers also transferred their general knowledge of how to navigate from other websites. When the menus of the ePortfolio became too confusing, readers would often revert to navigating with the browser commands.

Readers also viewed the choices of platform as deliberate constructions of meaning by the author. Readers recognized that the author's choices were constrained by the templates of the platforms, but they also expected the authors to be able to make choices within those platforms. Good choices were characterized as clean, clear, and slick, while bad choices were characterized as confusing, cluttered, and old fashioned.

Finding 4: Personalization of the ePortfolio and Its Effects on Readers

Participants explicitly noted the personalization of each ePortfolio. One instructor said, "It's interesting how personality comes through just from the very first page." This personalization came in the form of several design choices the authors made. One author chose to use personal photos, while the other chose to use stock images from the WordPress template. J used lots of different colors while T stuck with the template colors. J chose to use a left fixed menu, while T used a hidden menu icon. These design choices influenced the way participants read/viewed the ePortfolios. How participants conceived of their role as readers and their purpose for reading also affected how they responded to these choices. How participants

position themselves as readers appears to influence how they react to and interpret the personal photos and the stock banner image.

Design. Although design may not seem like a primary concern, it is the gateway to content. If readers are put off by the design, be it color or navigation, then they will not even look at the content. Similarly, grammar and punctuation are not the content of the text, but they are perceived by readers as barriers to understanding content, and indicators of the author's ability to communicate. Grammatical errors seemed to create perceptions of a personal lack of ability if the author is perceived to be a native speaker of English. Instructors were willing to work through the design since they perceived the errors as part of the learning process. They viewed the ePortfolios as unfinished process pieces. In contrast, students and business professionals viewed the ePortfolios as final products. Students were highly critical of poor design and language problems since these were issues that they perceived to be key to their own success. Business professionals were least tolerant of poor design and language choices. In their perception, poor design and language choices wasted their time, which irritated them, and were indicators of the author's professional abilities or inabilities.

Banner with personal photos. When participants assumed the role of an employer reviewing the ePortfolio, no participant approved of J's decision to include a photo of himself on his resume. Many participants interpreted this move as an attempt to provide a headshot. One student participant, who actually uses headshots in her applications, describes how she uses them: "I sing opera. If they require headshots, I have them professionally done on photo paper to give them, not like a little clip on the top of the resume." When participants explained why they believed the photo was inappropriate, they said it could lead to bias for or against the author. One student said, "I don't like the photo on the resume. Like, they're judging you based on how you look."

The type of photos J used elicited strong negative reactions. Professionals, faculty, and students all questioned the use of an informal photo instead of a professional headshot. In describing the ePortfolio one instructor said, "His biggest error was that picture." The use of a photo that did not match readers' expectations led to negative interpretations of J.

The negative responses ranged from mild amusement to strong disapproval. Among the mild reactions, participants said that it seems "this person is really into themselves." They recognized that J may not have realized how the large size of the first image and placement of the photo on the resume might be considered narcissistic. They thought it was a novice mistake. The background of a gothic style fence caused

one business professional to “start thinking about religion,” which would be inappropriate in the business environment. Another professional stated his objections more bluntly: “I would not even read it. Just his look and the way he’s dressed. It’s too formal for scientific fields.” These professionals’ expectations as readers were violated. This violation of the reader expectations can undermine an ePortfolio’s appeal to the reader.

Some instructors liked the idea of a photo of the ePortfolio creator because it helped them “put a face with a name.” It also gave them a sense they were “dealing with a real person.” Instructors were less put off by the personal photo. One instructor said, “This is nice because now I have an idea of who J is.” Some instructors saw the photo as inviting.

Banner with stock image. When participants positioned themselves as a generic reader exploring an ePortfolio, participants made positive comments about the image and the colors. They pointed out that the dancing figures were joyous, whimsical, and happy. Three students associated the banner with being artistic. Instructors said it showed T was collaborative and open-minded. They liked the colors and thought the banner “is a good balance of fun and drawing your eye to it all.”

Instructors and professionals also conceived of themselves as needing to be able to review the ePortfolio contents quickly and efficiently. In this reader position, the size of the banner became an issue. The banner appeared on most of the screen, obscuring the text below. Four instructors and three professionals were frustrated by the extra scrolling they had to do because of the banner size.

When participants positioned themselves as potential employers reviewing the ePortfolio for potential employment, they interpreted the stock image negatively. Interestingly, instructors did not take on this role when they read the ePortfolios, so they did not discuss the mismatch between the purpose and the stock image. Both students and professionals did comment on this mismatch and reacted strongly to it. One professional said, “This dancing stuff. It looks like it might be good for some art or some other musical or some entertainment something, but not for what I’m looking for.” A student commented that

I don’t have a sense of the person who created it. I feel like the picture stands out because I don’t know why they chose that and they have their reasons. I think they were studying business administration and they talked about working in hotel work, so that dancing in a circle kind of confuses me.

The negative reactions of these two participants arises out of mismatch between the ePortfolio creator’s

conception of the purpose and audience for this ePortfolio. The professional could not conceive of himself as a general audience. He expected the image to target his needs as a reader, and when those expectations were not met, he stopped reading. The student recognized this disconnect between the image and the ePortfolio’s employment purpose as well. The student did not see how this image of dancers connected to T’s stated career goal of event planning. T did not explain why she has made this design choice, so readers were left to work out the relationship of the image to the purpose of the ePortfolio independently. Readers perceived this extra rhetorical work as the responsibility of the author, and they expressed annoyance at having to guess the connections.

Finding 5: Reflection

Instructor readers were strongly focused on the reflective pieces as demonstrations of personal growth and development. They interpreted the reflective pieces as showing maturity and diligence on the part of the author. In some cases, instructors commented that the reflections should guide the reader to understanding the overall purpose of the ePortfolio and give the reader a general frame of reference. Nonetheless, instructors still asserted that the reflection should be a rigorous piece of writing and not so informal as to be more like a diary entry. Students and professionals were less interested in the reflective pieces, often criticizing them for being too informal, too long, or insufficiently relevant to the practical purpose of the ePortfolio. Reflective pieces were clearly more interesting, familiar, and informative for instructors than for either students or professionals. The reflections in these two ePortfolios were not able to meet the expectations of any of the readers. Each reader came to the reflections with greatly varying expectations about the function the reflections served in the ePortfolio.

Discussion

These findings lead us back to Yancey et al.’s (2013) question, “What rhetorical moves—thinking here of addressing specific audiences—count as powerfully addressing audience, and what count as negatively limiting audience, ignoring the greater digital context in which the work is placed?” (p. 22). The participants in our study clearly identified specific elements of the ePortfolios that affected them powerfully, such as navigation and design, and those that negatively limited them, such as unclear purpose of an artifact or lengthy text. Gallagher and Poklop (2014) addressed this idea of rhetorical moves, identifying intentional design, adequate contextualization, and

flexible voice as key moves to accommodate different audiences. The participants in this study support the assertion that these three moves were important for making meaning of the ePortfolios. In Fitzgibbons's (2008) characterization of reading practice in hypertexts as linear, mixed, and mixed review was also supported by the experience of the participants in this study. They occasionally used mixed review but most often, all opted for a linear progression through the navigation structure offered by the author, which is also similar to the findings in Quinlan's (2001) study. These participants' perceptions also supported Brown's (2015) assertion that ePortfolio authors are constructing their ethos through the organization of their ePortfolios. Participants in this study voiced personal judgments concerning the authors based on navigation choices, text choices, and graphics choices. Finally, Conrad and Bowie (2006) document how instructors and professionals (mentors and staff in their study) read for different purposes. The instructors in our study were more interested in the learning demonstrated by the ePortfolios, and the professionals were more interested in demonstrations of mastery. Thus, the findings from this study support and corroborate the findings of previous research.

Role of Audience and Purpose

Ramirez (2011) suggested, "The 'audience' for any given ePortfolio may not be readily located or defined" (p. 1). This was true for the sample ePortfolios used in our study, which led to participant frustration. These ePortfolios do not seem to address a particular exigency that Swales (2009) described as the work of a genre. Miller (1984) claimed that exigence was "a form of social knowledge. . . [that] provides the rhetor with a socially recognizable way to make his or her intentions known" (pp. 157-158). This social knowledge must be shared by the audience. In our study, participants did not share this social knowledge with the ePortfolio authors. The competing purposes of documenting learning for an instructor and demonstrating skills and knowledge for an employer prevented the ePortfolio authors from meeting the expectations of either group. Although some researchers (Cambridge 2008a; Lievens, 2014) have argued that ePortfolios can be useful for employment, the professionals in our study had several reservations about including a new step in the candidate review process, especially when the ePortfolio would add more time and effort.

Our work with three different audiences suggests that students do need to create audience and purpose-specific ePortfolios to address the highly contextualized needs of their readers. For instance, time and again the business professionals expressed the need for conciseness. They wanted executive

summaries, bullet points, and a clear rationale for why they should read the ePortfolio. One professional said that the sample ePortfolios were "too academic." Professionals might be motivated to read longer pieces if there was a strong enough rationale for doing so. In creating ePortfolios for potential employers, students would do well to remember that employers will be reading many resumes and possibly ePortfolios, so they need to capture their reader's interest quickly. Most of the professionals we interviewed were least accepting of editing errors. They viewed such errors as an indication of the student's work ethic. In fact, one professional said he would not even call T for an interview because of the number of editing errors (two) on her home page. However, one of the medical professionals expressly said that editing issues were not a concern if the content was accurate. For an effective ePortfolio, the author must have a clear vision of the audience and purpose of the ePortfolio to be able to effectively make choices that will meet the needs and expectations of that specific audience. It is unclear that multi-audience ePortfolios are as effective for readers as ePortfolios tailored for a specific audience.

Role of Coherence/Navigational Meaning

In the emerging genre of ePortfolios, we are still learning how writers achieve coherence across the entire ePortfolio. In examining how one student achieved coherence in her ePortfolio, Yancey et al. (2003) raised these questions:

What methods of coherence does an ePortfolio composer design and to what effect? And how successfully do these methods enact the composer's intent? How much (and what kind) of context should be provided for a web audience? How can this context be balanced against the context to be provided for an assessor, which is presumably different from the context of a vernacular reader? (p. 26)

The participants in this study suggest that they found coherence created for them through easy navigation, sub-menus that grouped related artifacts together, explicit explanations that specified the author's intent in presenting a particular artifact, and clear tab and file names that met readers' expectations. Violating expectations for coherence was perceived by the audience as damaging to their relationship with the author in making meaning of the ePortfolio, and often resulted in the readers expressing disappointment in the author or irritation from feeling that their time was being wasted. Clear navigation appears to be a critical element for creating coherence for readers.

Role of Personalization

By the role of personalization, we are considering aesthetic appeals such as banners, colors, and layout. Yancey et al. (2003) further raised the questions, "What does such an aesthetic contribute to our reading experience? Does such personalization 'ground' the ePortfolio in a way, even as different readers create their experience of the ePortfolio, with the result that we experience a concurrent doubled reading?" (p. 25). One of the affordances often mentioned with ePortfolios is their ability to be personalized by the student. But how do students learn how to make effective design choices that will support the purpose of their ePortfolios? In our samples, students chose their platforms and templates. They decided the backgrounds and navigational structure, but it did not seem like they gave much consideration to how these elements might support the argument their ePortfolio was making.

Audiences interpreted the personalization in the design of the ePortfolio as a representation of the author. They often expressed strong emotions when encountering specific design elements, such as graphics and colors. The design choices did not always support the meaning the readers were making as they read the ePortfolio. For instance, readers did not interpret one of the photos as representing a person seeking a management position. Therefore, they judged the author as not being serious about the search. Design choices could also inhibit a reader's predisposition to collaborate with the author to make meaning when those choices were unappealing. For example, dense, multi-colored menus caused all readers to abandon reading. Therefore, personalization of design becomes an important element in collaborating with the reader to make meaning as well as motivating the reader to continue in that collaboration.

Role of Reflection

Reflection is often viewed as an essential element of ePortfolios. Reflection is what differentiates a collection of assignments from an ePortfolio that shows how students have integrated their learning. Yancey et al. (2003) questioned what form reflection should take in ePortfolios. The professionals responded that they were not so interested in extended reflection. They seemed to want a quick overview and then a three-sentence interpretive guide for each artifact. It seems that reflection should be more condensed and concise in professional ePortfolios, and in learning ePortfolios it might be fuller and more comprehensive. The purpose and audience should determine the type of reflective writing used in the ePortfolio as evidenced by the professionals who wanted a quick explanation of the ePortfolio's purpose, and some even said they would

prefer if it were in bullet points. One of the professionals commented that the sample ePortfolios were too academic because there was too much text and the writing wasn't focused.

The instructors were the most interested in reading reflection as a way to understand what students thought they were learning or getting out of the program. An introductory reflection/piece describing the purpose of the ePortfolio was mentioned as necessary by all participants. Many participants asked why they would read the ePortfolio. Without any introduction as to why the student put the ePortfolio together, they just followed a simple navigational pattern through the ePortfolios. They tried to understand why artifacts were included, but when they encountered blank screens or links with no explanation, they were stymied. They liked having introductory pieces that helped to explain the artifacts, but they especially expressed a need for an overall introduction to the purpose of the ePortfolio. Most participants were unfamiliar with this genre and needed guidance from the writers in how to approach reading it. A reflective introductory piece gives readers the context they need to interpret the artifacts presented in the ePortfolio and a reason for reading the ePortfolio. This supports their motivation to continue reading. Readers may conceive of reflection differently; as a result, recognizing the specific expectations of what reflection achieves for the intended audience is a key element.

Limitations

We had a limited sample size for each type of audience in order to delve more deeply into how each participant approached reading ePortfolios. In further research, more participants would provide a broader representation of members of each group. It might be fruitful to focus on a specific type of employer or student in understanding how ePortfolios are read within specific discourse communities. Additionally, a wider range of ePortfolio quality would provide clearer indications of which rhetorical choices work most effectively with different audiences. Finally, more varied audiences and a wider range of ePortfolios would provide a broader perspective on specific reader expectations. Further research should focus on authentic readers as they engage in reading ePortfolios in professional and community contexts external to the academy.

Conclusion

The findings above suggest key elements that students need to consider in creating effective ePortfolios. Instructors need to theorize audience with students so that they can make effective choices when representing themselves to different audiences. We believe this study demonstrates that an ePortfolio

author's choices about how to realize elements of their ePortfolios need to be explicit in order to create a coherent digital identity. These choices are how readers make meaning from an ePortfolio, whether the author means it to happen or not. Readers seem to be making meaning from where the author chooses to locate evidence and how the author designs the representation of artifacts. Navigation is an element that allows the reader to interpret the meaning of how artifacts are connected. Due the fact that different audiences read ePortfolios for their own specific purposes, it seems that an author may need multiple ePortfolios to target specific audiences. Each audience will require tailored navigation, design, reflection, and content. We hope this investigation will support those who help students create ePortfolios as part of their courses or programs as they make choices about audience and purpose in this emerging genre.

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The Cart Before the Horse? Exploring the Potential of ePortfolios in a Western Australian Medical School

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In 2014, the School of Medicine Fremantle of the University of Notre Dame Australia initiated a study to explore the curriculum underpinning portfolios used by first-year medical students. The School had used portfolios since 2005 and judged it timely to consider digital technologies as a mechanism to enhance student learning and improve efficiencies. A qualitative approach was adopted that investigated how the curriculum intersected with two ePortfolio platforms: Blackboard and Mahara. Data pertaining to the way in which Blackboard and Mahara ePortfolio platforms supported existing curriculum were collected from students through focus groups and tutors via interviews. As a measure of comparison, data were also collected from students and tutors who used the existing paper-based portfolio system. Findings confirmed that the curriculum should shape the way in which technology solutions are interpreted and implemented. It is posited that low-tech solutions are sometimes most appropriate for the curriculum context. However, exploring the potential of digital technologies helped the School to imagine other possibilities for curriculum renewal. Indeed, one outcome of the research was the development of a plan to re-invigorate portfolios, shifting the current task-based emphasis to one which recognizes the key role of reflection. The study may be of interest to teachers and managers seeking to explore ePortfolios as part of broader curriculum renewal initiatives.

An ePortfolio is an electronic collection of evidence that demonstrates a learning and/or professional journey over time (Barrett, 2010). Evidence may be in writing and/or include photos, videos, observations by mentors and peers, and reflective thinking. The key to an ePortfolio is that it includes reflection on evidence, such as why the evidence was chosen and what was learned from the process of situating the evidence in the ePortfolio (Barrett, 2010). ePortfolios, as a form of learning, are well established in the educational literature, and Long (2013) argued that they are becoming an important form of learning, particularly for 21st-century professionals. The purpose of this paper is to explore the potential and the pitfalls of using ePortfolios in a Western Australian medical school.

In medical education, there has been an expanding and broadening of the use of ePortfolios (Tochel et al., 2009) in an increasingly crowded curriculum. Traditionally, the term *curriculum* was equated with the syllabus or the content that medical students were required to learn (the formal curriculum). However, recent observations (Grant, 2010) suggest that curriculum is more complex. For example, in addition to that which is documented as the formal basis for instruction, consideration might be given to the way teachers interpret the curriculum which is manifested in their instructional strategies (the taught curriculum) and the knowledge, skills, and attitudes that students take away from the learning process (the learned curriculum). Consideration might also be afforded to the transmission of beliefs, norms and values conveyed through social structures of organizations and the attitudes and behaviors of staff (the hidden curriculum;

Hafferty, 1998). The curriculum can, therefore, consider planned and unplanned educational experiences, including those taught and learned and those transmitted through attitudes, behaviors, and social structures.

There are important pragmatic, strategic, and educational reasons that justify the need to move to an ePortfolio in medical education. Digital technologies are becoming a mainstay of educational and clinical practice. ePortfolios are easier to share, allow for portability, and if implemented well, can increase the efficiency of learning for both student and teacher. Educationally, ePortfolios support student-centered learning by focusing on practices such as reflection through journaling. In medical education, ePortfolios are worth investigating because they emphasize competency-based education, empowering students to capture what they do as well as what they know (Miller, 1990). This emphasis means less time-served experience and more actual demonstration of expertise. Affording students the locus of control denotes a philosophical shift from an institution managing the student's learning journey to students managing their own learning journey. It is accepted that successful implementation of ePortfolios in educational settings are characterized by some form of institutional scaffolding which gradually subsides as students realize the value of systematically collecting artifacts to support their professional identity and career progression (Van Tartwijk & Driessen, 2009). Ideally, therefore, an ePortfolio system should have institutional and student components.

ePortfolios can be seen as both a product to share with others and also as a process that supports learning and

development (Barrett, 2010). Although currently, ePortfolios are viewed by many in terms of their assessment capabilities, there are opportunities to conceive them as a broader teaching and learning solution. For example, students may be invited to share their ePortfolio with their clinical mentor to help the clinical mentor become acquainted with a student's current level of knowledge and skills prior to a clinical rotation.

The School of Medicine Fremantle (the School) of The University of Notre Dame Australia (the University) offers a four-year graduate-entry medical program and has used portfolios since its inception in 2005. The portfolio system is largely task-driven with three domains, in particular—personal and professional development (PPD), population and preventative health (PPH), and communication and clinical practice (CCP)—setting various written tasks for students to complete and submit to tutors in paper-based form. These tasks, administered across each of the four years of the program, have collectively become known as “the portfolio.” An example of a task, pertaining to Aboriginal health is shown in Figure 1.

In 2013, the School confronted growing calls from students and staff to consider more flexible and progressive approaches to the portfolio by conducting a scan of available ePortfolio options. An options paper was prepared using criteria of cost, functionality, security, and portability to rate three established portfolio platforms (Blackboard, Mahara, and PebblePad) in addition to social media solutions (e.g., Blogger, Google Drive) and productivity tools (Evernote). The options paper revealed that established ePortfolio platforms performed well against the chosen criteria, with cost being the major discriminator (only PebblePad was discounted on the basis of cost). Social media solutions did not rate highly on functionality and security, and the productivity solution (Evernote) was found to have inadequate scalability (e.g., limited file storage), along with cost implications for students. Acting on the options paper, the School decided to explore how two ePortfolio platforms, Blackboard and Mahara, intersected with the existing curriculum. Student and staff perceptions of the costs and benefits of implementing an ePortfolio solution were canvassed through focus groups and interviews.

Method

The study reflects the way in which current portfolios operate at the School. That is, a clinical debriefing tutor facilitates learning and reflection for groups of between eight and 10 students using pre-defined tasks as a focus. A sample of students ($n = 25$) derived from the 113 first year students enrolled in the Bachelor of Medicine degree was invited to take part. This sample comprised of three discrete

groups. A Blackboard group comprised of one tutor and eight students; a Mahara group comprised of one tutor and nine students; and a portfolio group, comprised of one tutor and eight students, who engaged with the existing portfolio system. The study centered on how students and staff used the ePortfolio in responding to three assessment tasks:

- an Aboriginal health reflection;
- a health and wellness reflection using a modified ESSENCE + model (Hassed, 2011); ESSENCE+ is a physician wellness program that focuses upon seven pillars of health (education, stress management, spirituality, exercise, nutrition, connectedness, and environment). The School also added an emotional intelligence component;
- an exam reflection.

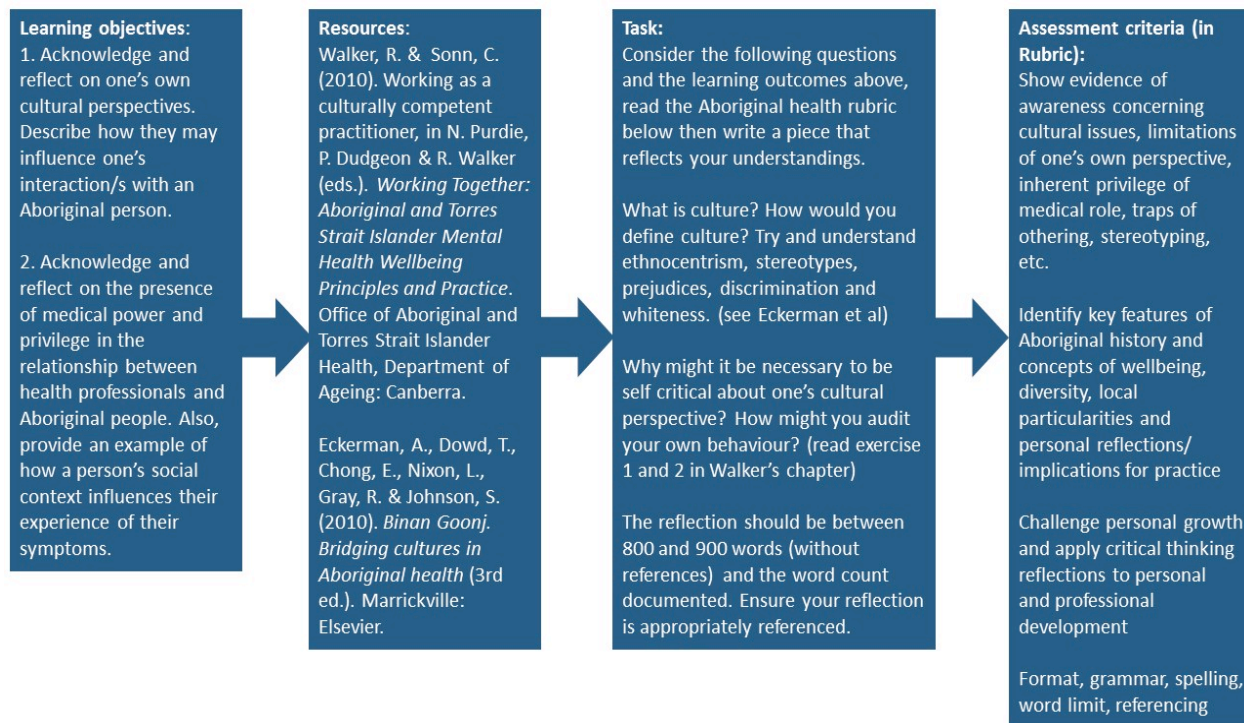
The assessment tasks were compulsory but formative, meaning that students did not receive a grade for their work. However, completion of tasks to an identified standard was mandatory to ensure progression through the course. The focus was on tutors providing quality feedback such that students were able to develop their reflective capabilities.

A technical introduction to the Blackboard and Mahara ePortfolio platforms was provided at the inception of the research. The purpose of the introduction was to show students and staff how the ePortfolio platform could add value to existing portfolio tasks. Other functions (e.g., reflective tools, action planning templates) were also introduced. The introduction lasted approximately one hour for Blackboard and Mahara groups.

Students had access to an ePortfolio platform between March and July in 2014, at which time the study concluded. The assessment tasks were also undertaken by the rest of the first-year medicine cohort as part of the existing curriculum. The tasks provided a focus for students using the ePortfolio tools. Students were also encouraged to be creative in bringing other artifacts (e.g., photographs and video clips) into their ePortfolio, in addition to using tools for reflecting and action planning and engaging more deeply with the tutor and peers. The formative nature of the assessment meant that student participation in the study did not carry the possibility of losing marks.

The study collected evidence about the costs and benefits of using ePortfolios from students via focus groups (questions attached as Appendix A) and tutors via interviews (questions attached as Appendix B). Three focus groups were convened at the conclusion of the study in July 2014 to gather student perceptions: a Blackboard group ($n = 8$), a Mahara group ($n = 9$), and an existing

Figure 1
A Typical Task in Aboriginal Health for First-Year Medical Students



portfolio group ($n = 8$). Feedback was also collected from the three tutors who facilitated learning in these groups. The quality assurance manager collected all the data at the School. Data collection techniques followed a semi-structured format that allowed the interviewer to engage participants in a conversation about the study. The semi-structured format consisted of a series of questions that were in the general form of a schedule, but the sequencing of the questions could be varied. Questions allowed scope for the quality assurance manager to ask further additional and probing questions from responses that were seen as noteworthy (Bryman, 2008). In focus groups, the quality assurance manager ensured that all participants had ample opportunity to share their views. Data were captured through audio recording before being transcribed textually. Transcriptions were imported into NVivo qualitative data analysis software. Data were coded into categories of intuitiveness, reflective capacities, communicative capacities, and sharing capacities. Coding by the researchers followed the coding considerations identified by Lofland and Lofland (1995).

Results

Students from both the Blackboard and Mahara groups were generally unimpressed by the potential of the ePortfolio platforms to help them engage

more deeply with the curriculum. In relation to the overall functionality of the ePortfolio, students were asked to rate the platform on a scale of 1-10, with 1 being the lowest and 10 being the highest. Students from the Blackboard group recorded a mean of 3.63 ($SD = 1.41$), while students from the Mahara group rated the platform slightly higher at 4.17 ($SD = 0.90$).

At the focus group sessions, students were invited to share whether they felt that the ePortfolio enabled them to be more effective as a learner. This question drew mainly negative responses, with an overriding perception that the software solutions were "overcomplicated" and "confusing." Typical comments included: "There is a disconnect between what you are trying to achieve, which can be kind of simple, and all these extra bells and whistles which are complicated" (Blackboard); and "I think the electronic submission was good, but I didn't find Mahara itself was a very useful platform."

Students were supportive of electronic submission to replace the current paper-based system. However, they revealed themselves as strategic learners (Ramsden, 2003), not deviating from what was expected in the curriculum: "I am studying medicine, and I am therefore not too interested in making it look pretty, uploading pictures and photos. I just wanted to do it, send it in and get it done" (Mahara); and,

We had so much on our plate this year with the learning that it was almost extra time playing around with a system, that you don't get any extra marks for, when we've already got so much stuff to do. So I don't think anybody really experimented too much. (Blackboard)

The main concern expressed by participants from the Blackboard and Mahara groups was having access to an efficient way of uploading files for assessment purposes. These sentiments were echoed by the existing portfolio group: "Printing can be time-consuming and expensive" and "The ability to upload assignments and not have to print them out would be appreciated."

One of the key advantages of using a portfolio to enhance student learning is that it encourages reflection (Barrett, 2010). However, students admitted to affording a low priority to their portfolios, many completing them just in time; "You just want to belt them out and get on with the study that actually is going to make us pass"; and "Completing the portfolio just before the deadline reduced the reflective element."

Students seldom used tools provided in the software such as journals, blogs, and planning scaffolds. Sharing and collaboration were not encouraged in the development of ePortfolios because tutors wanted to ensure that items were the students' own work. Concerns of tutors tended to be on their ability to provide quality feedback to students, and the capacity of the ePortfolio/portfolio system to promote reflection. Specific reflective tools and strategies were not integrated into the curriculum in either the Blackboard or Mahara groups. The tutor responsible for the Mahara group was confident that these tools would enhance students' reflective capabilities if implemented: "It will be very useful to use blogs and journals for students on a weekly basis to share reflections. We can easily develop this reflective part of their personality, and it will definitely be better professional development."

It is clear from the study that the curriculum shaped the way in which portfolios were used in practice. Currently, the curriculum, as it relates to portfolios, comprises a series of largely unrelated tasks that do not seem to invite deep reflection, subsequent action planning, or collaboration. Completion of the tasks did not attract a concrete reward for students in terms of an assessment grade. It is, therefore, unsurprising that students exhibited a lukewarm reaction to the ePortfolio platforms, apart from the efficiencies gained in being able to upload work electronically.

Discussion

Findings from the study suggest that students placed little value on portfolio tasks in the development of their identity as a doctor. In fact, they seemed to pay

lip service to the portfolio despite it being an explicit requirement for progression through the course. Although the technical introductions provided to acquaint students with Blackboard and Mahara were relatively short, students did not identify their technical competence as a concern. Rather, it seems to have been the way in which portfolio tasks *related* to the formal curriculum that promulgated a sense of apathy amongst students. It is suggested that the curriculum is at the root of this problem and that an absence of constructive alignment (Biggs, 1996) and authentic task design (Herrington & Herrington, 2006) might explain students' apparent indifference to the portfolio.

Constructive Alignment

Ensuring harmony between learning outcomes, learning activities, and assessment tasks is integral to curriculum design. Biggs (2003) suggested that "a good teaching system aligns teaching method and assessment to the learning activities stated in the objectives, so that all aspects of the system act in accord to support appropriate learning" (p. 10). This concept is what he calls constructive alignment. Although there is some debate on the theoretical integrity of constructive alignment and its practical application to improving students' educational experiences (Hussey & Smith, 2008; Jervis & Jervis, 2005), it is generally accepted that bringing together outcomes statements, learning activities, and assessment strategies provides a sound approach to curriculum design (Barrow, McKimm, & Samarasekera, 2010; Joseph & Juwah, 2012; Larkin & Richardson, 2013).

The way in which learning outcomes were expressed in portfolio tasks was inconsistent. For example, the three portfolio tasks considered in this study presented three different types of outcomes to students: program-level outcomes (exam reflection), course-level outcomes (aboriginal health reflection), and specific learning outcomes (health and wellness reflection). The design of learning activities and associated resources for clinical debriefing at the School are largely based on concurrent problem-based learning (PBL) cases that promote both *reflection in action* and *reflection on action* (Schön, 1987). Students engage in PBL, working through authentic cases in small groups (reflection in action), and then discuss and debrief these cases in specially arranged clinical debriefing sessions (reflection on action). Resources are provided on a weekly basis to acquaint learners with issues (e.g., ethical and professional dilemmas). Unfortunately, portfolio tasks are largely divorced from these processes. The challenge for medical educational designers is to ensure that clinical debriefing discussions and reflections are incorporated into the portfolio tasks. Such integration will increase the value

of the portfolio learning and reduce perceptions of the portfolio as simply “busy work.”

Summative assessment at the School for the two pre-clinical years is conducted at the mid-point and end of the academic year, and exam questions tend not to

draw upon the learning that emanates from student portfolios. There is a disconnect between the formative but compulsory nature of portfolio tasks and the high stakes summative assessment that occurs to facilitate student progression through the course. It seems that

Table 1
Analysis of the ESSENCE+ Portfolio Task Against the Three Features of Authentic Task Design as Identified by Herrington and Herrington (2006)

Aspect of the Task	Extent to Which the Task:		
	Is Ill-Defined	Has Real World Relevance	Can be Completed Over a Substantial Period of Time
Review and reflect on one or two of your significant experiences during participation in the ESSENCE+ process. You need to address the following points from the rubric:	The task is well defined and asks students to respond to a specific set of questions.	The task is relevant to students' general health and wellbeing. However, there is no link between the task and the real world clinical and professional responsibilities of medical practitioners.	The task is built around a model of reflecting on the ESSENCE+ program that is run over a period of weeks.
Describe your personal reaction to the ESSENCE + experience	Descriptive and reflective.		
Explore how this has influenced your attitudes and behaviour.	Limited complexity. There is also an underlying assumption that the ESSENCE+ program has an inherent capacity to <i>influence</i> students' attitudes and behavior.		
Connect your ESSENCE+ learning to one or two past experiences and emotions. What have you learnt about the state of your health and emotional wellbeing?	Limited complexity. There is an underlying assumption that the ESSENCE+ program will lead to greater student insights into their health and wellbeing.		
Has this program promoted wellness for you?	Limited complexity. Closed question.		
What has this experience taught you personally about your lifestyle choices and the change process?	Limited complexity. There is an underlying assumption that the ESSENCE+ program has reflective attributes that might lead to improved lifestyle choices.		

presenting portfolio tasks as formative and compulsory (i.e., barrier tasks) has generally resulted in students expending enough energy to enable their portfolio to be accepted as achieving a minimum standard.

In summary, variations in the way in which learning outcomes are presented, coupled with a lack of integration between the learning activities put forward in the portfolio and the summative assessments provided to students, have contributed to the portfolio tending to stand outside of mainstream curricula.

Authentic Task Design

Learning activities that have relevance to students' lives are more likely to result in deeper knowledge construction (Jonassen, Peck, & Wilson, 1999). Therefore, learning activities should closely mirror the way in which knowledge is developed and used in the real world. Herrington and Herrington (2006) argued that everything about the learning experience, from its context to how learners engage with activities and resources and the way in which learning is supported and assessed, should be authentic. The authors argued that three key features of authentic task design are that tasks are ill defined, have real world relevance, and can be completed over a sustained period (Jonassen et al., 1999). Table 1 provides an analysis of the ESSENCE+ portfolio task in relation to these three features.

From an instructional design perspective, there are some issues with the above portfolio task. Firstly, it is not anchored in a real world authentic clinical or professional context. There is a large body of educational literature advocating the design of curriculum for the professional world for which students are being prepared (McKenzie, Morgan, Cochrane, Watson, & Roberts, 2002). Medical students are hungry for opportunities to be exposed to clinical and professional problems. Situating the learning in the clinician's world, as opposed to the student's world, might have increased levels of student interest and engagement. Secondly, rather than being ill-defined, the task is prescriptive in that it is broken down into a series of discrete questions to be answered. Jonassen (1997) argued that ill-structured problems lead to deeper and more meaningful learning. Third, the task includes a number of perhaps inappropriate assumptions about the capacity of the ESSENCE+ program to stimulate student learning and reflection. These assumptions may lead student thinking, potentially depriving them of the opportunity to frame creative responses. Fourth, there is limited scope for student collaboration in completing the task. Collaboration may deepen understanding of concepts underpinning ESSENCE+. Fifth, the analytical and evaluative opportunities for learning are limited in the task design. For example, students might have been

afforded opportunities to critique or present alternatives to ESSENCE+. Finally, the task does not invite creative solutions. For example, asking students to create an online learning package to persuade or influence practicing clinicians and/or patients into changing their lifestyle choices.

Authentic learning has received widespread support in the educational literature. While it is tempting to see this as a panacea for portfolio curriculum in the School, first-year students are typically asked to respond to tasks by drawing on their own felt experience (i.e., considering phenomena in the context of their own values, attitudes, and behaviors). This approach, authentic being-as-learner (Ashton, 2010), may be more appropriate for adult learning contexts. However, further research is required to test the most appropriate learning designs in the early years of medical education, particularly in finding ways to increase student engagement outside of the clinical context.

Figure 2 gauges the ESSENCE+ portfolio task in relation to Anderson and Krathwohl's (2001) revised Bloom's taxonomy. It is clear that students are directed towards basic understanding and application to their own lived context. Designs that might encourage deeper learning such as analysis, evaluation, and creation of new knowledge were absent in the learning design.

It is evident that the School is at a particular stage of development with regards to its portfolio curriculum. It is posited that a portfolio system should first and foremost serve the needs of the curriculum. Figure 3 graphically represents the evolution of a portfolio from institution-centric to learner-centric. The School, denoted as a circle, is shown in the institution-centric stage.

An institutionally-centric portfolio sets defined tasks within prescriptive parameters. Responding to these tasks is a requirement for students to progress through the course. The institution "owns" the tasks, and grades (as opposed to learning) tend to be more valued by the learner. Institutional requirements foster an extrinsic form of motivation. As the portfolio system moves to a more institutionally sponsored model, assessment becomes primarily formative, focused on providing quality feedback for the personalised tasks that are chosen by the learner with expert guidance from tutors. The formative approach to assessment fosters a more intrinsic form of motivation. A learner-centric portfolio system might be characterized by greater levels of self-assessment and peer input along with just-in-time feedback oriented to workplace experiences, provided through a variety of sources. A constructivist teaching and learning environment affords opportunities for students to appraise their current understandings, engage in active and authentic meaning-making, collaborate with others to deepen their knowledge, and activate their meta-cognitive capacities. This type of curriculum,

Figure 2
Consideration of the ESSENCE+ Portfolio Task in Relation to Anderson and Krathwohl's (2001) Revised Bloom's Taxonomy

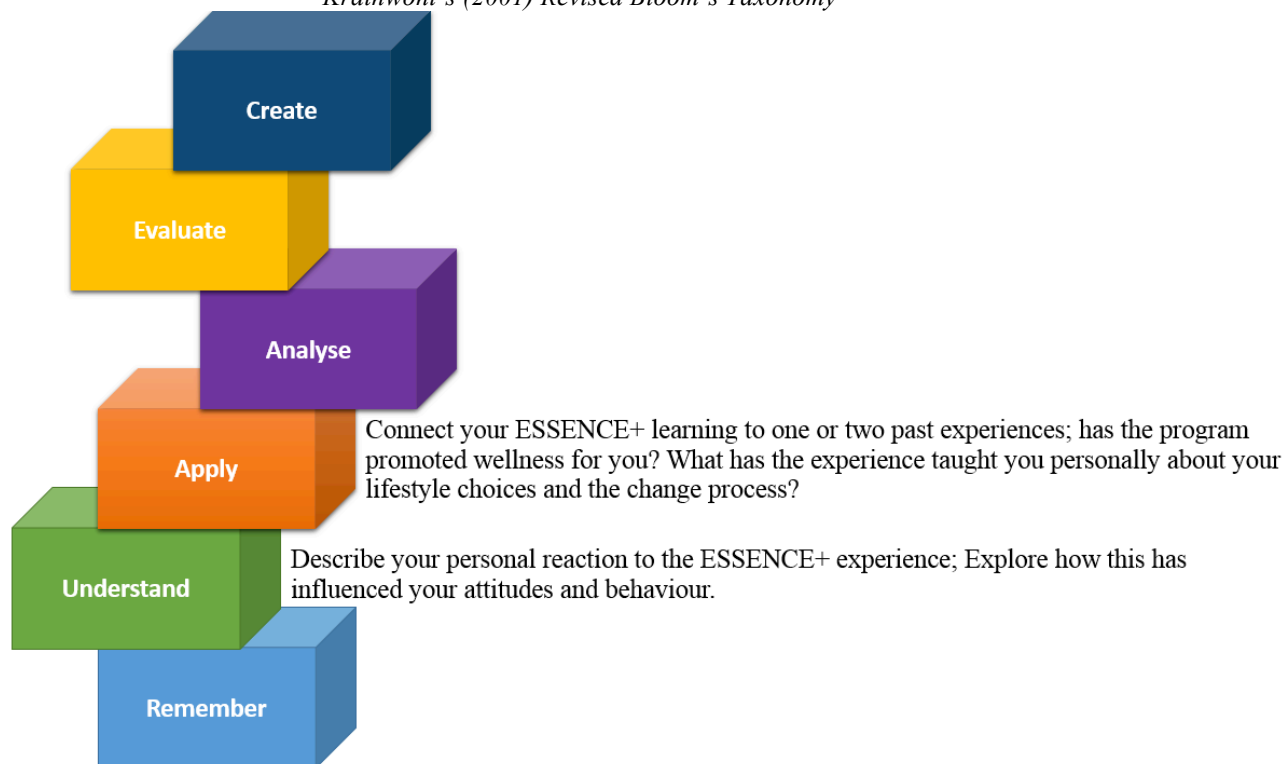
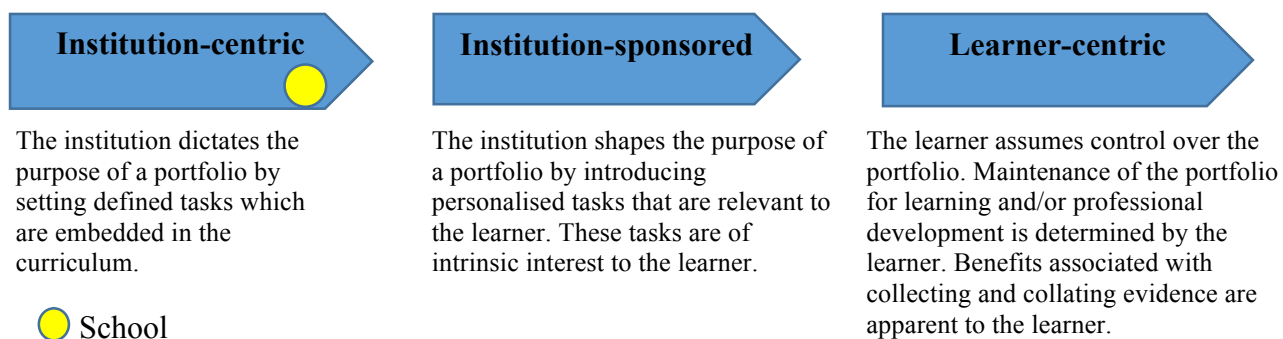


Figure 3
Stages of Portfolio Development



which has been shown to underpin learner-centered educational environments (Jonassen et al., 1999), is consistent with moves towards programmatic assessment (van der Vleuten, Schuwirth, Driessen, Dijkstra, Tigelaar, Baartman, & Van Tartwijk, 2012), which encourages students to generate evidence of their learning and institutions to make judgments about the quality of this evidence.

Ultimately, the curriculum should shape the way in which technology solutions are interpreted and implemented. It is argued that the selection of appropriate 21st-century digital tools, including an ePortfolio, depends on the extent to which the curriculum is institution- or learner-centered. An institution-centered portfolio may simply call for an electronic method of uploading documents efficiently

for tutors to view and grade. As such, the School has provided opportunities for electronic submission of assignments using the Blackboard learning management system (not the Blackboard ePortfolio) and implemented an action plan to enhance the personalization attributes of portfolio assessment tasks to move progressively to an institutionally sponsored portfolio model. These process changes offer a “fit for purpose” solution for curriculum renewal.

Current literature concerning the purpose of ePortfolios stresses the importance of reflection. Hall, Byszewski, Sutherland, and Stodel (201) argued that “all portfolios . . . should demonstrate reflection, evolution of thought, and professional development” (p. 745). It is interesting that in the current study, although all of the three tasks in the pilot were overtly reflective in nature, none were valued by students. Further research into students’ apparent indifference towards task-oriented assessments might be useful, particularly consideration of how the hidden curriculum might impact on learners’ dispositions towards reflection. As the School moves towards a learner-centered curriculum, more sophisticated ePortfolio tools and scaffolds may be required. For example, a reflective e-journal could be shared with others for feedback, goal-setting tools could integrate reflection and improvement, and collaborative tools could help deepen understanding through communicating with others. Assembling and publishing artifacts (including multimedia) in innovative ways could also be considered.

Conclusion

The study found that the current curriculum context in a metropolitan medical school in Western Australia does not necessitate a sophisticated ePortfolio system. To support its current curriculum, the School can use its Blackboard learning management system to facilitate uploading and marking of assignments. Low-tech ePortfolio solutions are sometimes most appropriate for the curriculum context, and can act as a valuable stepping stone to more sophisticated technology solutions. However, the study also found that the current curriculum could be transformed in at least three ways. First, it could be reshaped to evoke more constructivist learning and teaching practices, as described by Jonassen et al. (1999). These practices would likely facilitate a greater level of student engagement and also lead to a more authentic fit between university- and clinically-based learning. Second, the curriculum could be better aligned so that portfolio activities are explicitly linked to learning outcomes and underpinned by summative assessment. Alignment of tasks, learning outcomes, and assessment would most probably lead to an increase in

the extent to which students value the portfolio. Third, if, as Niemi (1997) suggested, reflection is central to the development of professional identity, then the curriculum should require students to take responsibility for reflecting on both their professional actions and their learning. Reflection should be woven into the design of tasks such that it becomes a habitual part of the learning process. If these transformations are implemented, then more sophisticated ePortfolio solutions could be sought. Although educational change initiatives should be shaped by curriculum, as opposed to developments in digital technologies, the study has shown that digital technologies have an important role in helping educators to conceive of possibilities. In this way, ePortfolios can provide a useful lens in which to gauge the value of current learning and teaching practices.

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Appendix A Focus Group Questions

1. Did the portfolio system help you to be more efficient as a learner? Yes/No, why?
2. How would you rate the ease of use and intuitiveness of the portfolio system?
3. We are interested in your perceptions of the features of the portfolio system (e.g., linking to other tools like the journal or the blog). To what extent did they assist you in your learning?
4. Do you believe that the portfolio systems enhanced your reflective capabilities? Yes/No? Why?
5. Do you believe that the portfolio systems enhanced your propensity to collaborate with others? Yes/No? Why?
6. To what extent did the portfolio system enhance your ability to share your work and gather feedback?
7. Did you feel that the artifacts you uploaded to the ePortfolio were secure? Yes/No? Why?
8. Would you prefer to use an ePortfolio in the future as you progress through your university studies? Yes/No? Which platform? Why?

For each individual in the group:

9. On a scale of 1-10, where 1 is the lowest and 10 is highest, rate the overall functionality of the ePortfolio platform.

Appendix B Tutor Interview Questions

1. Did the portfolio system help you to be more efficient as a tutor? Yes/No, why?
2. How would you rate the ease of use and intuitiveness of the portfolio system?
3. We are interested in your perceptions of the features of the portfolio system (e.g., journal, blog, planning tool). To what extent did they assist you in being the best CD tutor that you can be?
4. Do you believe that the portfolio system enhanced students' reflective capabilities? Yes/No? Why?
5. Do you think that the portfolio system enhanced students' propensity to collaborate with others? Yes/No? Why?
6. To what extent did the portfolio system enhance students' ability to share their work and gather feedback?
7. How would you rate the security of the ePortfolio system?
8. Would you prefer to use an ePortfolio in the future in your teaching? Yes/No? Which platform? Why?
9. On a scale of 1-10, where 1 is the lowest and 10 is highest, rate the overall functionality of the ePortfolio platform.

An Empirical Framework for ePortfolio Assessment

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This research focuses on ePortfolio assessment strategies that yield important accountability and reporting information. Under foundational categories of reliability, validity, and fairness, we present methods of gathering evidence from ePortfolio scores and their relationship to demographic information (gender, race/ethnicity, and socio-economic status) and criterion variables (admission tests and course grades) as a means for stakeholders to ensure that all students, especially traditionally underserved students, strengthen their connection to the academy. Data is drawn from two sources: University of Idaho first-year writing program's ePortfolio student certification assessment (n = 1208) and its relationship to the State of Idaho's K-20 longitudinal data collection system; and New Jersey Institute of Technology's longitudinal ePortfolio-based first-year writing program assessment (n = 210). Following results and discussion of these two case studies, we conclude by offering guidelines for quantitative reporting based on fairness as a framework for integrative and principled action.

In response to the US's standardized testing movement during the late 1980s and rebooted by the Spellings Commission report in 2006, portfolio assessment helped usher in the powerful capability to combine student learning, faculty evaluation, and documentation of program outcomes. In contemporary higher education landscapes, ePortfolio-based assessments—combining the print tradition of multiple samples of student performance with digital affordances of new genres—have become commonplace. Locally developed and administered, ePortfolios are viewed as congruent with curricular aims at specific institutional sites and are lauded as preferable alternatives to standardized assessments. As Suskie (2009) noted, these construct-rich assessments “can be used in virtually any learning experience” (p. 204) to document both individual student accomplishments and specific course goals across a curriculum. These two uses of ePortfolio based assessment—student certification and program assessment—are the subject of this study.

Rhodes (2011) asserted that ePortfolios, “a powerful, iterative mode for capturing student work and enabling faculty to assess student learning” (para. 3), allow postsecondary institutions to leverage a vast amount of data regarding student learning; consequently, such assessment allows institutions to respond to multiple levels of mandates. First, Rhodes (2011) noted ePortfolio assessment provides a broad means for institutions to respond to the current high-stakes legislative accountability climate focused on measuring student learning. Second, ePortfolios are specifically responsive to shifting accreditation demands of regional or professional organizations: They yield a collection of identifiable student learning artifacts showing that student learning is aligned with faculty demands, and that coursework prepares students for workplace demands.

We agree that portfolio assessment holds a great deal of potential to respond to these general promises

and precise claims. The assessment of ePortfolios nevertheless tends to evade educational measurement scrutiny. Despite their widespread use, a dearth of empirically-based inquiry into ePortfolio assessment continues. In their analysis of 118 peer-reviewed journal articles on ePortfolio research, Bryant and Chittum (2013) found that only 15% of the sample focused on outcomes-based research in which student performance was reported.

Appearing first in 2006, the genre of ePortfolio research is relatively new; as such, the tardy application of empirical assessment techniques in ePortfolio research can be partially traced to three reasons. First, widespread access and use of the high speed Internet that is necessary for ePortfolio use is very recent. According to the Organization for Economic Co-Operation and Development (OECD; 2014), the number of adult Internet users in OECD countries increased very recently from fewer than 60% in 2005 to 80% in 2013, with youths reaching 95% during this period. Accompanying this broad usage is a decrease in unit prices and increase in smart devices with data-intensive applications. Second, the interactive elements accompanying Web 2.0—blogs, social networking, video sharing, and wikis, each important to ePortfolio design—are also relatively recent. When the 2006 *Time Magazine* cover featured “you” as the Person of the Year, the designation was accompanied by praise “for seizing the reins of the global media, for founding and framing the new digital” (Grossman, 2006, p. 41). Functioning in an era of technological advancement and media breathlessness, it is no wonder that traditional descriptive and inferential quantitative techniques appear as forms of scrutiny tangential to the gleaming future to come.

Acknowledgment by the educational measurement community that standard gauge techniques used to judge evidence as fit or failing—and new conceptualizations in psychometrics responsive to

advancements in digital technologies and cognitive psychology (Mislevy, 2016)—may be the third reason empirical inquiry into ePortfolio assessment is a recent phenomenon. The *Standards for Educational and Psychological Testing* (2014)—published by the American Educational Research Association (AERA), the American Psychological Association (APA), and the National Council on Measurement in Education (NCME)—asserted that definitions of traditional measurement procedures have broadened considerably, partially in response to scholarship about the merits of portfolio assessment and the widespread implementation of portfolios in traditional print and digital forms. For example, consensus estimates drawn from a timed, impromptu writing sample and used to estimate inter-reader reliability may be higher than that of an ePortfolio, but the latter constitutes a far richer representation of the writing construct. In the cost-benefit analysis accompanying all educational measurement in the accountability environment described by Rhodes (2011), robust construct representation enriches our ability to make important inferences about students. Because many are interested in investigating how ePortfolios can accommodate the complexity of learning for diverse students, it is first necessary to map empirically the landscape—just as Bryant and Chittum (2013) suggested.

These technological developments and educational measurement evolution suggest an important moment in ePortfolio research, and this study both signals the advent of empirical research in this unique form of performance assessment and suggests directions for research reporting. To these dual ends, we begin this study with a literature review of trends in the assessment of complex writing samples; identify foundational measurement concepts of reliability, validity, and fairness; and propose a unification of these concepts under an opportunity to learn framework. We then turn to two case studies—one conducted at the University of Idaho (UI) and the other at New Jersey Institute of Technology (NJIT). As a basis for discussion, the two case studies are used to demonstrate distinct aims (student certification at UI and program assessment at NJIT) and evidence gathering techniques (both descriptive and inferential) suited to those aims. Following a discussion of findings related to our research questions, we conclude by proposing quantitative reporting guidelines for ePortfolios.

Our perspective in this study is drawn from our experiences in the field of Rhetoric and Composition/Writing Studies (Phelps & Ackerman, 2010). As specialists in writing assessment, our experiences evaluating the complex construct of writing allow us to recognize the difficulty of coming to terms with student performance in both

print and digital environments. Because ePortfolios allow robust construct representation and pose unique challenges to our field, our experiences in assessment have led us to conclude that quantitative research is an essential approach that yields important information about student ability, particularly about those who are often overlooked or not counted. Informed by our disciplinary stance, our work reported in this article answers the call of Rhodes, Chen, Watson, and Garrison (2014), who asked, “How do we move beyond perceptions and attitudes to explore how ePortfolios can be used to document evidence of student success and achievement of learning outcomes?” (p. 4). To answer their question of agency, we focus on the unique perspectives empirical techniques afford in capturing the complexity of student learning. While tentative, our answers intend to provide a specific direction, based on advancement of opportunity to learn, for the diverse ePortfolio community.

Literature Review

“At the heart of e-portfolio practice research,” Yancey (2009) wrote,

is a claim about the significance of evidence-based learning. Whether outcomes are programmatically identified or student-designed, the process of connecting artifacts to outcomes rests on the assumption that the selection of, and reflection on, a body of evidence offers another opportunity to learn and a valid means of assessment. At the same time, research has only recently focused on the process of selection and on what counts as evidence. (p. 31)

To establish a research focus, Yancey, McElroy, and Powers (2013) proposed five directions for assessment of ePortfolios: the role of personalization, coherence, reflection, assessment, and web-sensible design. Calling for a new vocabulary and fresh set of practices, Yancey and her colleagues—all leaders in the field of writing studies—provide important directions for evidence-based investigation. Empirically-based quantitative analysis has a distinct place within these directions. We argue that the newly revised foundational measurement concepts articulated in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014) allow us to establish an interconnected vision of score interpretation and use based on fairness, and to move beyond mere statistical applications and the reductionism so often associated with empirical quantitative research (Charney, 1996).

Assessment of Complex Writing Samples

Most information about writing assessment has been gained under the carefully controlled experimental conditions often associated with testing (Elliot, 2005). Historically, this narrow view continued until 1983, when Roberta Camp of the Educational Testing Service proposed that portfolio assessment be based on three aims: to provide a comprehensive measure of writing ability that would allow students to demonstrate a wide range of writing experiences; to formulate common assessment tasks and accompanying standards so that student strengths and weaknesses could be evaluated; and to facilitate the transition from secondary to post-secondary institutions by providing information less subject to distortion than that provided by the current application process. The emphasis on construct representation, task and rubric development, and admission and progression use endures, and the academic community took up the challenge to accommodate more complexity in the assessment of writing. From early work at the State University of New York at Stony Brook (Elbow, 1986) to the current program at Washington State University (Kelly-Riley, 2012), portfolio assessment has continued to emphasize connections between instruction and evaluation. The importance of such connections is also widely documented across disciplines and academic programs (Suskie, 2009).

Robust construct representation—accompanied by a need for consideration of assessment consequence—is especially important to writing studies (Behizadeh & Engelhard, 2015). Viewed as a social cognitive construct, writing is a “technology designed to communicate among people” (Bazerman, 2015, p. 11). Writing instruction, and hence writing assessment, is best executed by attending to four domains: cognitive (e.g., genre, task, audience, writing process, problem solving, information literacy, conventions, metacognition), interpersonal (e.g., collaboration, social networking, leadership, diversity, ethics), intrapersonal (e.g., openness, conscientiousness, extraversion, agreeableness, and stability), and physiologic (e.g., nerve, attention, and vision capacity; White, Elliot, & Peckham, 2015). Seen in this way, the empirical assessment research identified by Bryant and Chittum (2013) as outcomes-oriented and affective in design directs attention to issues in construct representation that appear to be similar across disciplinary communities.

Reliability, Validity, and Fairness

While four domains are designed to facilitate representation of the writing construct, three

foundational categories of educational measurement—reliability, validity, and fairness—provide methods of obtaining information about those domains. These foundational categories have undergone substantive evolution from their first articulation in the 1966 *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1966), which placed reliability as the most important consideration in test use and separated it from validity, a property of a particular test. The 1999 *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999) entirely revised the concepts of reliability and validity, advanced a unified concept of validity as the most important consideration, and situated validity within the use and interpretation of test scores in particular settings. Further, the most recent version of the *Standards* (2014) elevated the concept of fairness to be a foundational consideration for tests, parallel in importance to validity and reliability.

In the present study, we are particularly influenced by theorists who rearticulated the foundational concepts in the revised AERA, APA, and NCME (2014) standards. Haertel (2006) defined reliability as concerned “with how the scores resulting from a measurement procedure would be expected to vary across replications of that procedure” (p. 65). At the present writing, Generalizability Theory (G theory; Brennan, 2001) provides the best, most nuanced framework for reliability, complete with conceptual and statistical tools for analysis. Regarding validity, Kane (2013) conceptualized it as “the process of evaluating the plausibility of proposed interpretations and uses of test scores” (p. 16). As such, it is not the assessment that is validated; rather, the interpretations and uses of the assessment are validated. In order to achieve clear statements of these uses, Kane (2013) advanced the idea of interpretation and use arguments to support inferences derived from scores. Because we believe that opportunity should be linked to definitions of fairness, as noted above, the orientation towards ethical assessment provided by Suskie (2009) is especially helpful: A fair assessment will use tasks that are equally familiar to all and thus advance opportunity to learn (Kelly-Riley & Whithaus, 2016). The measurement community also supports this common sense orientation as the most recent iteration of the standards (AERA, APA, & NCME, 2014) redefined fairness as

the validity of test score interpretations for intended use(s) for individuals from all relevant subgroups. A test is fair that minimizes the construct-irrelevant variance associated with individual characteristics and testing contexts that otherwise would compromise the validity of scores for some individuals. (p. 219)

While reliability, validity, and fairness often become silos in practice, using fairness as an integrative principle—as we will demonstrate below—allows an agenda for principled investigation and action.

Opportunity to Learn

The subsequent link between assessment and instruction allows direct attention to consequence if fairness is accepted as an integrative principle of assessment. While traditional identification of intended and unintended consequences remains an important facet of assessment (Messick, 1980), emphasis on opportunity to learn, as Suskie noted (2009), establishes a critical link between instruction and assessment.

A primary aim of assessment, Suskie (2009) observed, is the advancement of opportunity to learn, defined as assurance that each student in a course, program, or college has sufficient opportunity to achieve each established curricular goal. As Pullin (2008) has stressed, emphasis on the opportunity to learn is both a reflection of the learning environment and a concept demanding articulated connections between the assessment and the instructional environment. For the assessment to proceed along the lines of fairness, resonance must be demonstrated among the following: the design of the assessment, the opportunity to learn, and the educative intent to improve and continue that learning. This resonance positions score interpretation and use as a vehicle for examining what Gee (2008) identified as the rights of students in terms of opportunity to learn: universal affordances for action, participation, and learning; assurances of experiential ranges; equal access to relevant technologies; emphasis on both information communication and the communities of practice that manage that information; and emphasis on identity, value, content, and characteristic activities associated with language across academic areas.

Associated with the opportunity to learn is identification of those who are least advantaged by the assessment. There are many reasons that opportunity is denied, and thus the pursuit of fairness calls for disaggregation of assessment scores by sex assignment at birth (gender), race/ethnicity, socioeconomic status (SES), and special program enrollment as we demonstrate in Tables 7 through 11. Depending on the writing task at hand, there are many factors—from genre familiarity to digital proficiency—that could result in student disenfranchisement. Identification of membership along a continuum of groups is not intended to obviate racialization processes; rather examination of group differences reveals a long tradition of empirical study that cannot be resolved by identification of economic status, race/ethnicity, or any singular factor. As we

demonstrate in the following two case studies, score disaggregation is a fundamental step in allowing us to learn more about the inferences we can make from ePortfolio scores. Put straightforwardly, data from our two case studies will demonstrate how the category of least advantaged is not fixed and that students may, in fact, shift in and out of that designation.

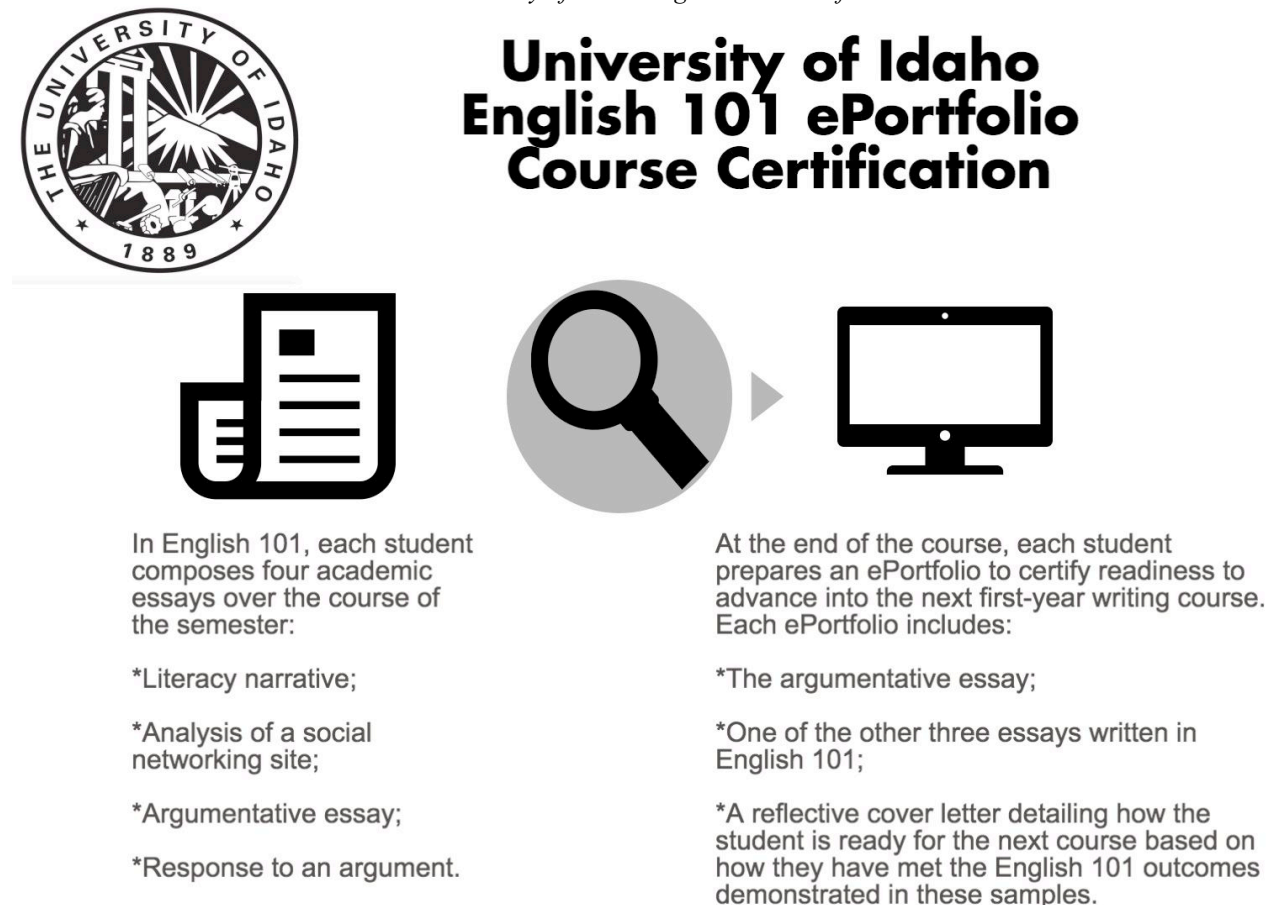
Methods

The two case studies informing the recommendations we make are drawn from distinct intuitions with differing missions. This range demonstrates the universality of the analytic methods we use and the promise of the foundational approach we advocate. We begin with a description of both universities and the ePortfolio-based assessments at each. We then turn to detailed methodological considerations, including identification of criterion measures and sub-group categories, a description of our quantitative techniques, and identification of our research questions.

University of Idaho: ePortfolios and Individual Student Certification

University of Idaho (UI)—the state's land grant, flagship institution—is the one of two study locations. According to the Carnegie Classifications of Higher Education, UI is designated as a Research University with high research activity that selectively admits undergraduate students and has doctoral and professional dominant graduate programs. At University of Idaho, ePortfolios have limited institutional adoption, but the English Department has incorporated end of course portfolio assessment using holistic scores in the first course of the first-year writing sequence, English 101 (Introduction to Academic Writing). The English 101 ePortfolio adapts Belanoff and Elbow's (1986) portfolio assessment as a way for students to certify their readiness to move into the next course in the first-year writing sequence, English 102, College Writing and Rhetoric. ePortfolios have been integral to the UI First-Year Writing Program since 2010 when a standardized curriculum was implemented and administered through the course management system, Blackboard Learn, and the ePortfolio certifies individual student knowledge and skills along with final grades. Each ePortfolio contains the argumentative essay, one of the three other essays written for the course, and a reflective letter that details the student's readiness for English 102 by virtue of meeting the outcomes of English 101 demonstrated in the ePortfolio collection (Figure 1). English 101 is taught by new MA level English graduate teaching assistants, many of whom have little to no teaching

Figure 1
University of Idaho English 101 ePortfolio



experience, and the English 101 curriculum is highly structured to mitigate their lack of instructional experience and/or knowledge of writing studies.

At the end of the semester, ePortfolios from English 101 are assessed by teaching assistants, adjuncts, and tenure-line faculty who score student work using the expert reader model of evaluation detailed by Smith (1993) and Haswell and Wyche (1996). Scores are used either to certify students for placement directly into the next course or to decide that the student is not ready for English 102 (and has not passed English 101). Scores from the ePortfolio therefore influence the course grade.

University of Idaho uses the English 101 ePortfolio shown in Figure 1 as a way to gauge student progress through the undergraduate curriculum, and this progress is further analyzed by the state of Idaho's two data systems: Idaho System for Educational Excellence (ISEE), which collects student data in the K-12 setting, and the State Longitudinal Data System (SLDS), which tracks student performance data for all of the

postsecondary institutions. Based on data from 2014 to the present, the UI case study highlights the integration of data available through ISEE and SLDS, combined with the ePortfolio assessment at the end of English 101, and reports on the coordination of this data with UI student performance. For the case study reported here, the sample is drawn from 1208 students who enrolled in English 101, Introduction to Academic Writing, in Fall 2014. Of these, 650 were male and 558 were female. In the sample, 860 are White; 153 are Hispanic/Latino (hereafter referred to as Hispanic); 50 were two or more races. African-American, Asian/Pacific Islander, and Native American students comprised the remaining number, but did not have sufficient numbers to conduct the statistical analysis.

NJIT: ePortfolios and Program Assessment

The location of the second study is New Jersey Institute of Technology (NJIT), the state's science and technology institution. Classified as a science,

technology, engineering, and mathematics-dominant research institution by the Carnegie Commission on Higher Education, NJIT selectively admits undergraduate and graduate students. Historically, portfolio assessment at NJIT has been used as a form of program assessment—a planned, recurrent documentation effort intended to demonstrate that those responsible for the program have advanced its mission of student learning—in support of accreditation by the Middle States Commission on Higher Education (MSCHE). Featured in the 2002 accreditation process as a print-based evaluation and in 2012 as a digital evaluation, assessment of complex writing samples has supported both successful reaccreditation visits and will be part of the 2017 periodic review report. Evolving from print portfolios (Elliot, Briller, & Joshi, 2007), ePortfolios have been used in first-year writing (Klobucar, Elliot, Dees, Rudiny, & Joshi, 2013), undergraduate technical writing (Johnson & Elliot, 2010), and at the graduate level in professional and technical writing (Coppola & Elliot, 2010). While the Department of Humanities has historically used ePortfolios to benefit NJIT, ePortfolios have had limited institutional adoption, as is the case with UI. In the present study, attention is given to ePortfolio assessment conducted in Humanities 101 (English Composition: Writing, Speaking, Thinking I) and the relationship of those scores to the next writing course (Humanities 102, English Composition: Writing, Speaking, Thinking II).

Conducted annually in the fall with entering first-year students in Humanities 101, the ePortfolio assessment used in this case study is congruent with the proposed MSCHE (2015) annual updates focusing on assessment student learning. ePortfolio assessment is also designed to serve the NJIT's professional programs as accredited by the Association to Advance Collegiate Schools of Business, Accreditation Board for Engineering and Technology, and National Architectural Accrediting Board. In this use, the NJIT ePortfolio system is similar in its aim to that of Ketcheson (2009) and Larkin and Robertson (2013); in both institutions, however, no claim to universal institutional use can be made that is comparable to that of Williams (2010).

In contrast to ePortfolio use at UI, scores from the NJIT ePortfolio shown in Figure 2 do not influence the course grade. To ensure that grade influence does not occur, assessment of ePortfolios occurs after final grades have been posted. Also distinct from the UI program, NJIT first-year portfolios, while required of all students enrolled in the first writing class, are not all read each semester. Based on traditional power analysis techniques designed to yield a specified confidence interval ranging from 0.8 to 0.95 (Kerlinger & Lee, 1999), ePortfolios are read based on both random and

purposive sampling techniques designed to allow representation of student groups (White et al., 2015). Use of ePortfolios for regional accreditation and subsequent principles of selection, of course, does not separate the content of the ePortfolio from the very course that supports its creation. Nevertheless, while student certification requires that ePortfolios from each student be read each semester, program assessment does not demand this level of data collection.

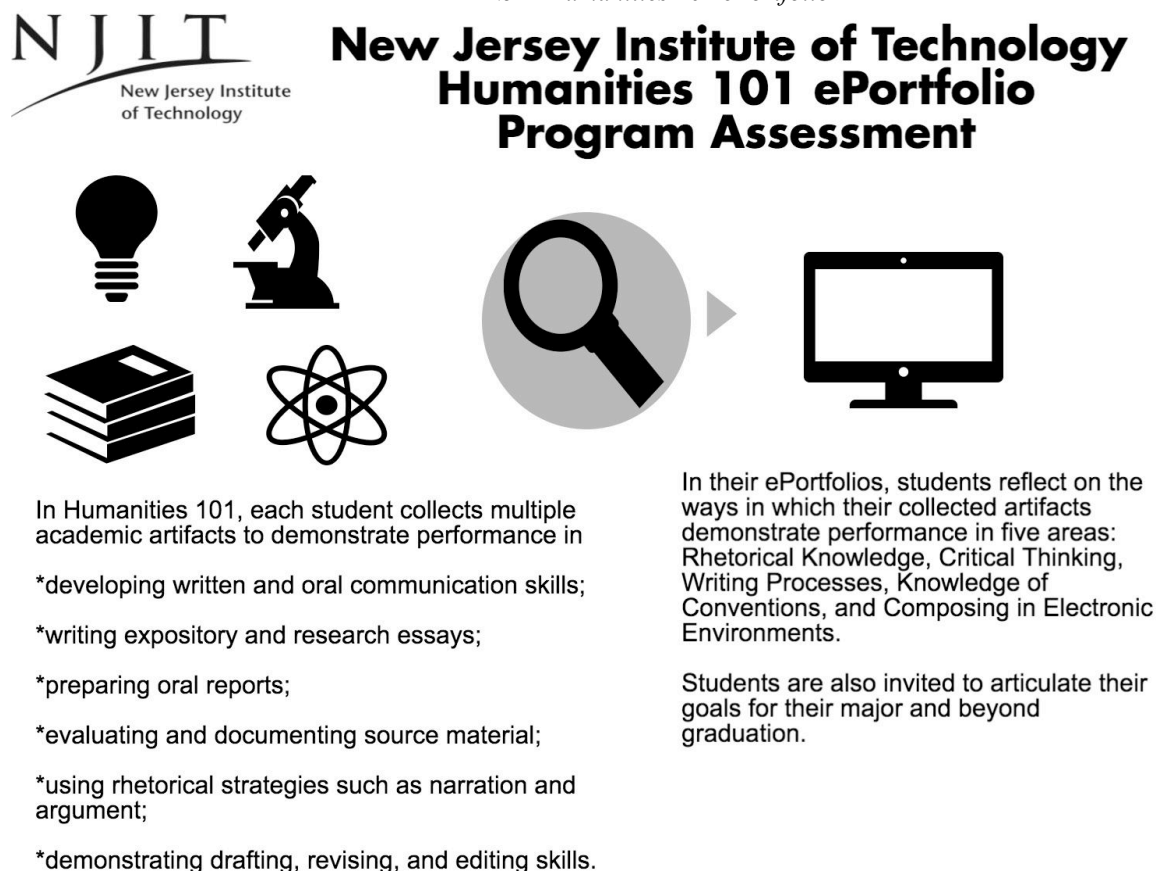
To structure comparison between UI and NJIT, we focus on the NJIT first-year writing sequence from 2010 to the present, with special attention on the formative years for the program from 2010 to 2012. These courses are taught by full-time, experienced lecturers, as well as by tenure-line and tenured faculty, and all who teach the classes participate in the ePortfolio scoring. While the UI ePortfolios are scored holistically, NJIT ePortfolios during this period were scored on a national consensus model of the writing construct (Council of Writing Program Administrators, National Council of Teachers of English, & National Writing Project, 2011). Specifically, trait scores—often termed multiple trait scoring (Hamp-Lyons, 2016)—are provided for rhetorical knowledge, critical thinking, writing processes, and knowledge of conventions (Figure 2). A holistic score is also provided. Differences of scoring method are appropriate to assessment aim. The sole use of holistic scoring at UI is appropriate for the certification purpose of the assessment program. As well, because each ePortfolio must be read, it would be costly and difficult to score each student performance using multiple traits. Because a sample of ePortfolios is read at NJIT, the trait method is appropriate to an aim of identifying student strengths and tailoring the program to leverage success.

Detailed Methodological Considerations

Criterion measures. As an identifiable construct, writing can be measured in a number of ways. Independent of the measure of interest—in this study, ePortfolios—criterion measures are used to evaluate relationships between and among different ways that the construct is represented. Tables 1 and 2 identify pre-college, enrolled, and predictive academic measures important to each university. These include high school grade point average, high school rank, and common standardized test scores used in admissions.

Sub-group categories. Evidence related to reliability, validity, and fairness must be collected for both the overall group and sub-groups relevant to institutions. Tables 1 and 2 identify sub-groups important to the intuitions and relevant to interpretative ranges. While sub-group representation may be small and need qualification in terms of score interpretation and use, it is nevertheless important to collect

Figure 2
NJIT Humanities 101 ePortfolio



information on distinct and related group categories. As is clear in the case of NJIT female students, whose ePortfolio sample size was small ($n = 31$), restricted ranges of this high performing group impact both consistency and correlation evidence.

Idaho is a fairly racially homogenous state, but there is a great deal of economic diversity. Pell grant status is one way to examine students' socio-economic status, but it does not give a range of economic backgrounds. We used the Expected Family Contribution (EFC) as a way to represent a full range of economic information for ePortfolio assessment. Many variables affect students' EFC, and families often are initially referred to consider parental adjusted gross income reported on federal income taxes as a way to estimate anticipated EFC for their college student. Other factors such as assets, requirement account savings, and number of children in college affect EFC. For this project, students' EFC data collected by the University of Idaho was the starting point, and then their EFC was mapped back to a range of adjusted gross income (Onink, 2014); then this adjusted gross income

was mapped back to the ten College Board income categories to broadly represent the spectrum of family income (College Board, 2015b, p. 4). Finally, for this analysis, these ten categories were then divided into quartiles. This process ensured that the range of financial background of University of Idaho students was adequately represented, and not simply divided into four equal quartiles. The EFC quartiles divided in the following ways: EFC Quartile 1 = \$0-\$20,000; EFC Quartile 2 = \$20,000-\$60,000; EFC Quartile 3 = \$60,000-\$100,000; and EFC Quartile 4 = \$100,000+.

Quantitative techniques. Techniques used in both case studies are descriptive and inferential. Descriptive statistics are used in Tables 1 and 2, and means and standard deviations are shown for all measures. Table 3 uses a Gaussian (normal) distribution to describe consensus scoring techniques. For inferential statistics, general linear modeling is used for the correlation and regression analyses shown in Tables 4 through 11. A confidence level of $p < .05$ is used to ensure that a 95% confidence interval is reached. Interpretatively, the correlation

Table 1
University of Idaho: Descriptive Measures, All Groups

	Pre-College Measures			Enrolled College Measures		Predictive College Measures
	HS GPA (N, M, SD)	SAT Writing (N, M, SD)	ACT Composite (N, M, SD)	ePortfolio: Holistic Score (1-6) (N, M, SD)	Eng 101 Course Grade (N, M, SD)	Eng 102 Course Grade (N, M, SD)
Total	1161, 3.23, .44	919, 457.78, 66.37	594, 20.31, 3.14	1208, 3.73, .95	1208, 2.82, .54	971, 3.21, 1.08
Male	619, 3.13 _a , .44	467, 451.7 _a , 67.45	320, 20.79 _a , 3.27	650, 3.62 _a , 1.01	650, 2.76 _a , .59	501, 3.06, 1.14
Female	542, 3.34 _a , .42	452, 464.03 _a , 64.71	274, 19.76 _a , 2.88	558, 3.85 _a , .85	558, 2.88 _a , .45	470, 3.36, 1.0
White	846, 3.24, .43	678, 465.91 _a , 63.02	449, 20.84, 2.93	860, 3.7, .91	860, 2.84, .51	693, 3.1, 1.1
Hispanic/ Latino	152, 3.12 _a , .45	128, 426.17 _a , 66.05	85, 18.27, 3.22	153, 3.72, .85	153, 2.84, .48	132, 3.1, 1.0
Two or More Races	49, 3.36 _a , .42	44, 465.68 _a , 68.79	<i>qns</i>	50, 3.64, 1	50, 2.76, .63	43, 3.3, 1.14
First Gen	434, 3.22, .44	354, 447.82, 69	231, 19.97, 3.23	441, 3.80 _a , .894	441, 2.85 _a , .48	360, 3.16, 1.10
Pell Grant	509, 3.18, .44	414, 450, 69.12	275, 19.79, 3.22	516, 3.75, .981	516, 2.80, .55	416, 3.19, 1.07
EFC Q1	313, 3.15 _a , .45	252, 444.60 _a , 68.28	170, 19.55 _a , 3.21	253, 3.74, 1.02	253, 2.79, .56	253, 3.2, 1.06
EFC Q2	253, 3.22, .43	204, 458.53, 69.91	140, 20.34, 3.22	259, 3.78, .93	259, 2.82, .53	202, 3.13, 1.11
EFC Q3	223, 3.27 _a , .43	187, 467.81 _a , 64.6	116, 20.71 _a , 2.93	226, 3.76, .85	226, 2.84, .51	176, 3.3, 1.2
EFC Q4	210, 3.32 _a , .40	179, 472.18 _a , 61.84	110, 21.06 _a , 3.02	211, 3.83, .80	211, 2.88, .46	186, 3.2, 1.07

Note. Different subscripts (_a) within a row represent *M* different at the 0.05 level by independent sample *t* test (2-tailed) for gender, first generation status, and Pell grant status and by Tukey's HSD test for race and EFCQ. Sample sizes under 30, too small for inferential analysis, are designated *qns* (quantity not sufficient). HS GPA: Male < Female; Hispanic/Latino/a < Two or more races; EFCQ1 < EFCQ3; EFCQ1 < EFCQ4. SAT writing: Hispanic/Latino/a < Two or more races; Hispanic/Latino/a < White; EFCQ1 < EFCQ3; EFCQ1 < EFCQ4. ACT composite: Hispanic/Latino < White; EFCQ1 < EFCQ3; EFCQ1 < EFCQ4.

ranges used in analyses and discussions are as follows: high positive correlations = 1.0 to 0.70, medium positive correlations = 0.69 to 0.30, and low positive correlations = 0.29 to 0.00.

Because we hold that reliability information is an important prerequisite to evidence of validity and fairness, our analysis is presented in terms of reliability, validity, and fairness. However, as we propose, fairness is an important governing concept for both reliability and fairness in advancing the opportunity to learn. Our presentation of information is therefore more functional than conceptual.

Research questions. Our research is guided by the following questions regarding ePortfolio-based assessments used to determine individual and group student performance:

1. How may reliability evidence be used to better understand a general student population and relevant sub-groups in terms of consensus and consistency estimates?

2. How may validity evidence be used to better understand a general student population and relevant sub-groups in terms of correlation analysis?
3. How may fairness evidence be used to better understand a general student population and relevant sub-groups in terms of statistically significant difference and regression analyses?

Results

We begin by describing the first-year writing performance profiles of students at both UI and NJIT. We then proceed to results grouped according to evidential categories of reliability, validity, and fairness. Because of our interest in fairness, additional attention is given to this category. It is important to recall that these are specific types of statistical analyses and are not intended to exhaust the many sources of evidence related to these three foundational measurement concepts. Our report highlights the ways that this framework can be used to examine ePortfolio assessments with different aims: one that certifies student performance and the other for program assessment.

Table 2
NJIT: Descriptive Measures, All Groups

	Total (N, M, SD)	Male (N, M, SD)	Female (N, M, SD)	White (N, M, SD)	Asian (N, M, SD)	Hispanic (N, M, SD)	Black (N, M, SD)
Pre-College Academic Measures							
HS Rank	1420, 73, 21	1155, 71 _a , 21	265, 80 _a , 19	502, 72, 21	300, 75, 21	344, 76, 19	154, 72, 19
SAT Writing	2636, 534, 85	2086, 525 _a , 81	550, 568 _a , 94	974, 550 _a , 76	616, 550 _a , 97	510, 508 _a , 77	243, 503 _a , 75
Enrolled College Measures							
ePortfolio Rhetorical Knowledge	210, 8.06, 2.14	179, 7.94 _a , 2.22	31, 8.77 _a , 1.39	89, 8.11, 1.97	59, 8.05, 2.03	36, 8.42, 2.01	<i>qns</i>
ePortfolio Critical Thinking	210, 7.88, 2.06	179, 7.73 _a , 2.09	31, 8.74 _a , 1.57	89, 7.80, 1.94	59, 8.03, 1.9	36, 8.31, 1.93	<i>qns</i>
ePortfolio Writing Processes	210, 6.81, 1.96	179, 6.6 _a , 2.01	31, 7.71 _a , 1.37	89, 6.62, 1.93	59, 7.15, 1.93	36, 7.06, 1.84	<i>qns</i>
ePortfolio Knowledge of Conventions	210, 7.91, 2.02	179, 7.79 _a , 2.05	31, 8.65 _a , 1.74	89, 7.96, 1.88	59, 8.05, 1.98	36, 8.22, 1.59	<i>qns</i>
ePortfolio Composing in Electronic Environments	210, 6.57, 2.33	179, 6.45, 2.3	31, 7.26, 2.02	89, 6.33, 2.27	59, 6.69, 2.13	36, 6.86, 2.36	<i>qns</i>
ePortfolio: Holistic Score	210, 7.6, 2.17	179, 7.46 _a , 2.21	31, 8.39 _a , 1.76	89, 7.58, 1.98	59, 7.71, 1.94	36, 8.06, 2.27	<i>qns</i>
Hum. 101 Course Grade	2172, 3, 1.09	1727, 2.94 _a , 1.11	444, 3.24 _a , .96	856, 3.11 _a , 1.08	498, 3.1 _a , 1.0	391, 2.87 _a , 1.06	199, 2.75 _a , 1.14
Predictive College Measures							
Hum. 102 Course Grade	2147, 3.11, .96	1678, 3.04, .98	469.34, .93	810, 3.24, .886	517, 3.13, .942	403, 3.01, .967	201, 2.81, 1.11

Note. Different subscripts (a) within a row represent means different by independent sample t test (2-tailed) for gender and by Bonferroni for race/ethnicity. Sample sizes under 30, too small for inferential analysis, are designated *qns* (quantity not sufficient). *p*-values are reported at $p < .05$. Gender: HS rank: $M < F$; SAT writing score: $M < F$; ePortfolio rhetorical knowledge: $M < F$; ePortfolio critical thinking: $M < F$; ePortfolio writing processes: $M < F$; ePortfolio knowledge of conventions: $M < F$; ePortfolio holistic score: $M < F$; ePortfolio writing course grade: $M < F$; ePortfolio next writing course grade: Race/ethnicity: $H < W$, $H < A$, $B < W$, $B < A$; Writing course grade: $H < W$, $H < A$, $B < W$, $B < A$; Next writing course grade: $H < W$, $B < W$, $B < A$.

Student Profiles

To begin, we highlight results disaggregated by particular demographic characteristics, alternating between findings from the UI and NJIT ePortfolio assessments. Given the extensive amount of data available, we will highlight only key patterns of analysis to illustrate the ways such data can help us understand the complexity of student performance, as viewed through a fairness lens.

Table 1 provides descriptive performance information for various demographic characteristics at UI. To understand how ePortfolios were situated among other measures of student performance, we categorized data as follows: pre-college enrollment measures (high school GPA, SAT Writing scores, and/or ACT composite scores); enrolled college measures (ePortfolio scores and writing course grades); and predictive measures (grades in the next

writing course or next semester). The portrait of UI students shown in Table 1 is one that supports the Carnegie Classification description of the university as one of selective undergraduate admission. Compared to state profiles compiled by the College Board (2015a) that include performance on the SAT Writing scores, UI students ($n = 919$) overall scored above the state sample ($n = 17,695$, $M = 442$, $SD = 98$) at statistically significant levels ($t[1162] = 7.26$, $p < .001$). In the enrolled and predictive measures, the writing course grade is high in both courses. In the case of ePortfolio holistic scores, the mean score of UI students is above the cut score of 3.0.

As Table 2 demonstrates, NJIT students have profiles similar to those of UI.

Compared to College Board (2015b) state profiles, overall SAT Writing scores of NJIT students from 2010 to 2012 ($n = 2,636$, $M = 534$, $SD = 85$) were higher than state levels ($n = 85,012$, $M = 499$, $SD = 118$) at statistically

Table 3
University of Idaho ePortfolio Consensus Estimates

Score level	Method: Tier Rating			Efficacy: Score Frequency		
	Tier 1	Tier 2	Final reading	Frequency	%	Cumulative %
Score 6	Distinction	Distinction	Distinction	38	3.1	100
Score 5	Distinction	Pass	Pass	22	1.8	96.9
Score 4	Pass	→	Pass	926	76.7	95
Score 3	No Pass	Pass	Pass	95	7.9	18.4
Score 2	No Pass	No Pass	No Pass	49	4.1	10.5
Score 1	Fail	→	Fail	78	6.5	6.5

Table 4
NJIT ePortfolio Consistency Estimates

	Consistency estimates	
	Method 1: Non-adjudicated Pearson	Method 2: Adjudicated Pearson
ePortfolio: Rhetorical knowledge	.42***	.67***
ePortfolio: Critical thinking	.54***	.71***
ePortfolio: Writing processes	.37***	.59***
ePortfolio: Knowledge of conventions	.43***	.67***
ePortfolio: Composing in electronic environments	.53***	.76***
ePortfolio: Holistic score	.53***	.77***

*** $p < .001$

significant levels ($t[2959] = 20.536, p < .001$). In enrolled and predictive patterns, students writing course grades in the first course ($n = 2,172, M = 3.0, SD = 1.09, \text{Range} = 0, 4$) and the second ($n = 2,147, M = 3.11, SD = .96, \text{Range} = 0, 4$) were high. In the case of ePortfolio holistic scores, the mean score of NJIT students ($n = 210, M = 7.60, SD = 2.17, \text{Range} = 2, 12$) is above the score of 7—the warning score that students may not be performing at agreed-upon levels of proficiency.

Reliability Evidence

As noted above, Haertel (2006) defined reliability in terms of replication. In the case of ePortfolio scores, questions of inter-reader reliability remain an important prerequisite to score

interpretation and use. Important to interpretation of information presented in Tables 3 and 4 are distinctions by Stemler (2004) regarding consensus and consistency estimates.

In the case of UI, consensus estimates of inter-reader reliability are appropriate to the aim of certification of student ability. Based on the assumption that skilled readers should be able to come to exact agreement about how to apply various levels of a scoring rubric to an ePortfolio at hand, consensus estimate of inter-reader reliability are computed through the use of percent-agreement, as demonstrated in Table 3. On the left side of Table 3, each score level is identified from the highest (6) to lowest (1). Because certification is the assessment aim, categories are developed to

Table 5
University of Idaho Correlation of Criterion Measures: All Students

Measures	1	2	3	4	5	6
1. HS GPA ($N = 1161$)	—	.23**	.31**	.23**	.22**	.33**
2. SAT writing ($N = 919$)		—	.64**	.16**	.05	.12**
3. ACT composite ($N = 594$)			—	.07	-.02	.12**
4. ePortfolio score ($N = 1208$)				—	.82**	.15**
5. Eng.101 course grade ($N = 1208$)					—	.05
6. Eng. 102 course grade ($N = 971$)						—

* $p < .05$ **; $p < .01$

Table 6
NJIT Correlation of Criterion Measures: All Students

Measures	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. HS rank ($N = 1420$)	—	.30**	.12	.14	.27**	.23**	.23*	.20*	.33**	.32**
2. SAT writing ($N = 2636$)		—	.16*	.13	.13	.29**	.03	.16*	.24**	.27**
3. ePortfolio: Rhetorical knowledge ($N = 210$)			—	.84**	.60**	.71**	.59**	.84**	.10	.18*
4. ePortfolio: Critical thinking ($N = 210$)				—	.62**	.71**	.57**	.82**	.14*	.26**
5. ePortfolio: Writing processes ($N = 210$)					—	.61**	.50**	.70**	.14*	.24**
6. ePortfolio: Knowledge of conventions ($N = 210$)						—	.44**	.73**	.19**	.21**
7. ePortfolio: Composing in electronic environments ($N = 210$)							—	.69**	.05	.12
8. ePortfolio: Holistic score ($N = 210$)								—	.18*	.20**
9. Hum. 101 course grade ($N = 2171$)									—	.39**
10. Hum. 102 course grade ($N = 2147$)										—

* $p < .05$; ** $p < .01$

determine failure (due to absence of required materials or plagiarism), no pass, pass, and distinction. To assure deliberative review of student ePortfolios, program administrators have established two tiers of review using the expert-rater method of evaluation articulated by Smith (1993) and Haswell and Wyche (1996). While Tier 1 functions as an initial review, Tier 2 leverages second readings when adjudication is needed. While, for instance, the category of no pass is used to justify course failure, a second reading is required to substantiate that judgment. The same is true for the category of distinction. The rating methodology focuses the attention of the rater where most disagreement occurs: at either the low or high end of the evaluation scale. The ePortfolios that obviously are ready for the next first-year writing course are not read a second

time. Efficacy of the model is shown by the Gaussian (normal) distribution on the right side of Table 3. With passing scores of 4 ($n = 926$, or 76.7% of the scores) at the apex of the bell curve, the two tails occur as expected with the higher (scores of 5 and 6) and lower (scores of 1 and 2) ends of the distribution.

In the case of the NJIT scores, inter-reader reliability—termed consistency estimated by Stemler (2004)—is determined for each variable. Scores are reported in Pearson product moment correlations to document their non-adjudicated and adjudicated forms. For example, a score that is matching (6 + 6) or adjacent (6 + 5) is not adjudicated; however, if a score is beyond adjacent (6 + 4), a third reader is called upon to reconcile the scores. That third score is used to determine the final score. So, if an ePortfolio receives a

trait or holistic score of 6 by one reader and 4 by a second, and if the third reader gives it a score of 5, then the total score of 11 is awarded. If, however, the third reader awards a score of 3, then the total score is lowered and recorded as 7.

Reporting both non-adjudicated and adjudicated scores allows assessment stakeholders to determine the degree to which score consistency was reached. As Table 4 shows, statistically significant non-adjudicated Pearson correlations range from 0.42 to 0.53, a medium level of correlation. Under conditions of adjudication, scores rise as expected from a low of 0.59 to a high of 0.77, medium-to-high levels of correlation.

Validity Evidence

As noted above, Kane (2013) conceptualized validity through score interpretation and use. As part of the validity argument, correlation evidence is used to help stakeholders understand the relationship of ePortfolio scores to the pre-college measures, enrolled measures, and predictive measures identified in Tables 1 and 2. Relying on this empirical tradition, in Table 5 we provide relational evidence from UI. We identified a statistically significant low correlation between high school GPA and all other measures. Also evident is a moderate relationship between the SAT Writing and ACT Composite scores. There is a high correlation between the ePortfolio score and the writing course grade. However, correlation between the ePortfolio score and the next writing course is low—and there is no statistically significant relationship between writing courses.

Table 6 provides similar relational evidence from NJIT. High school rank demonstrates a statistically significant low correlation with all measures. SAT Writing scores correlate at statistically significant low levels with present and next writing course grade. Trait and ePortfolio holistic scores correlate at statistically significant medium-to-high levels. Correlation of the ePortfolio holistic score and present writing course grade is low, though statistically significant. While statistically significant, correlation between the holistic score and the next writing course is also low, and correlation between present and next writing course is medium.

Fairness Evidence

Were we to stop the analysis here, with only the most general trends, we would find our evidence related to reliability and validity useful but limited. Categories of evidence are deepened, however, when fairness is centralized in the analysis. To this end, we conducted a brief disaggregated analysis at NJIT to demonstrate the need for detailed sub-group information. More in-depth attention is given to demographic characteristics at both UI and NJIT

Disaggregated reliability consensus estimates.

The importance of disaggregating reliability information according to student sub-groups is illustrated in the NJIT ePortfolio data comparing the overall population and female students (Figures 3 and 4). As Figure 3 illustrates, non-adjudicated scores for all students shown in Table 4 ranged from 0.37 (writing processes) to 0.54 (critical thinking). However, scores for female students, as Figure 3 shows, are much lower, ranging from a low of -0.04 on writing processes to a high of 0.44 on the holistic score. While not shown in Figure 3, only the holistic score achieved statistical significance. As Figure 4 illustrates, scores for the overall population improved upon adjudication, ranging from 0.59 (writing processes) to 0.77 (holistic score). As Table 4 shows, reader scores correlated at statistically significant levels ($p < .001$). Yet, Figure 4 also demonstrates that the adjudicated scores were low for female students, ranging from 0.02 (*nss*) to 0.63 ($p < .001$). Based on the disaggregated information shown in Figures 3 and 4, a radically different picture of consistency appears for female students.

Disaggregated student profiles. Returning to Table 1 at UI, attention is given to gender, race/ethnicity, first-generation college status, Pell grant status, and EFC quartiles in the UI study. An analysis of students' EFC levels from the Idaho State Longitudinal Data System SLDS was recoded to match the family income levels listed in the State Profile Report for college bound seniors in Idaho (College Board, 2015a, p. 4). The College Board listed ten income categories, and then the UI data was recoded into quartiles for EFC analysis. This process allowed for a reasonable and representative portrait of students' family income levels at the UI.

Statistically significant differences are noted for all pre-college measures between male and female students. Depending on measure, sub-group differences are noted for all except first generation, Pell Grant, and second quartile of EFC students. In terms of enrolled college measures, statistically significant differences are present only between the ePortfolio holistic scores of men and women and between first generation students and other sub-groups. In terms of writing course grade, statistically significant differences appear only between male and female students. No statistically significant differences appear on next semester course grades.

Disaggregated validity correlations. To continue our disaggregated analysis with an expansion of Table 5, we provide details in Table 7 on the correlation information for UI students by first generation and Pell grant status. Table 7 demonstrates that the patterns for both categories of students are similar—high school GPAs correlate at a low but statistically significant

Figure 3
NJIT Non-Adjudicated Pearson Correlation Coefficients, All Students and Female Students

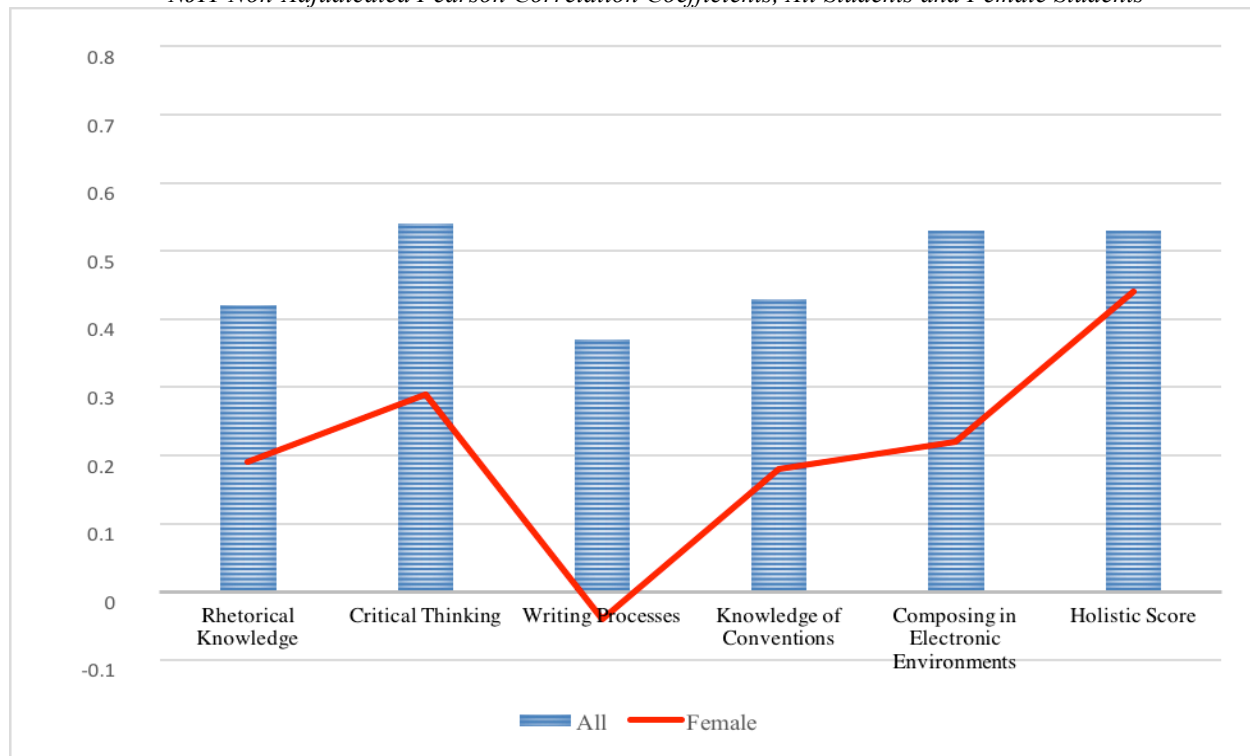
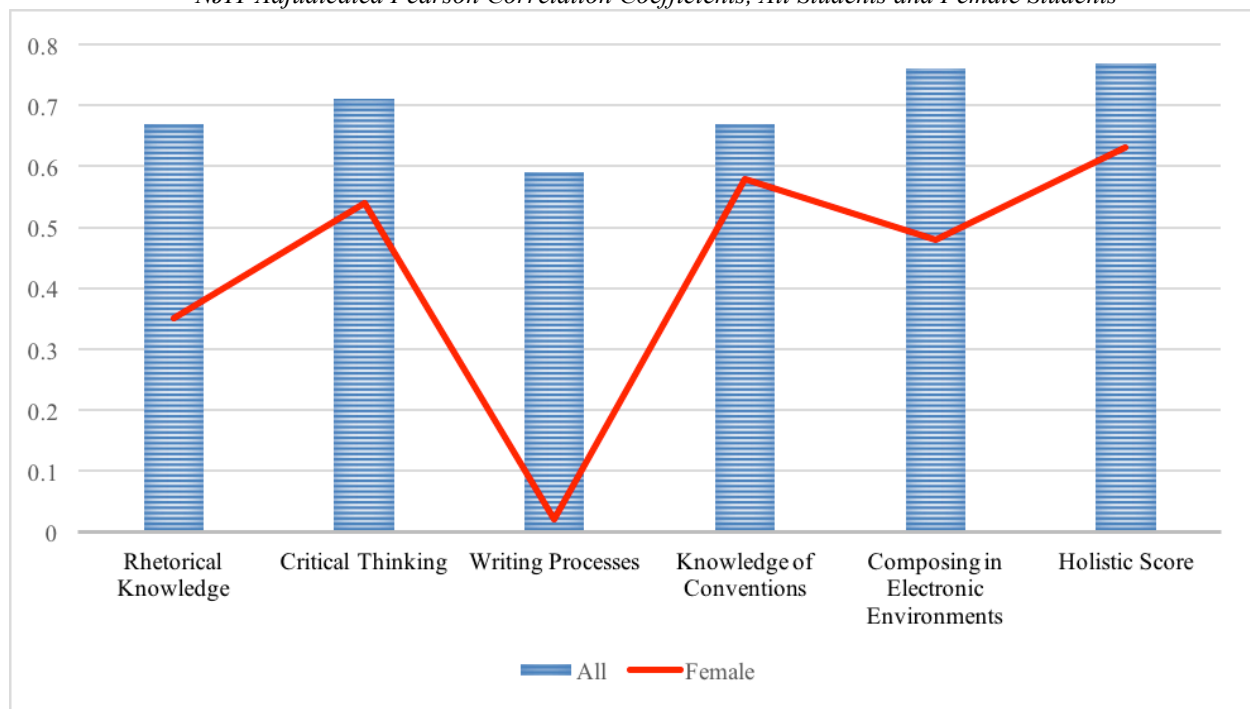


Figure 4
NJIT Adjudicated Pearson Correlation Coefficients, All Students and Female Students



level across all measures; holistic ePortfolio scores and writing course grades correlate at a high statistically significant level; and next writing course grade has no statistically significant relationship to ePortfolio holistic score.

Tables 8 and 9 contain correlations among pre-college, concurrent, and predictive measures disaggregated by EFC status at the University of Idaho from the Idaho SLDS database. Similar patterns to the other measures are observed across all EFC groups. That is, although the descriptive statistics in Table 1 showed statistically significant differences between the first and second EFC quartile and the third and fourth quartiles, the disaggregated pre-college measures and enrolled college measures have similar correlations and strength. As in Table 7, Tables 8 and 9 show statistically significant low correlations between high school GPA and all other measures; a medium to high correlation between the SAT Writing and ACT Composite scores; and a strong relationship between the ePortfolio score and the writing course grade. The lack of a statistically significant relationship between the first and second writing courses remains across EFC groups, and the ePortfolio holistic score maintains its strongest statistically significant relationship with first writing course grades. Although low, statistically significant relationships are maintained across all EFC groups with ePortfolio scores and high school GPA. ePortfolio scores, however, demonstrate no statistically significant relationship to grades achieved in the second writing course.

Disaggregated predictive evidence. Regarding predictive evidence disaggregated by demographic characteristics, Table 9 provides information about the power of criterion measures to forecast writing measures at UI. With the exception of Hispanic students, the pre-college measures achieve statistical significance but account for no more than 14% of the

variance (in Model 1A for students of two or more races) in their relationship to ePortfolio scores. Again, with the exception of Hispanic students, in terms of predicting writing course grade, pre-college measures achieve statistical significance but account for, at best, 17% of the variance (in Model 1C for students of two or more races). In their ability to predict writing course grade, ePortfolio scores achieve statistical significance for all student sub-groups under Model 2A, accounting for 65% of the variance for female and white students to 81% for students of two or more races. In terms of predictive ability for the second writing course, Model 3A accounts, at best, for 29% of the variance for male students; the model fails to achieve statistical significance for female, Hispanic students, and students of two or more races.

Table 11 provides information regarding the power of criterion measures to forecast writing measures at NJIT. Pre-enrollment measures identified in Model 1A fail to achieve statistical significance in terms of predicting the ePortfolio holistic score for the overall group and for all sub-groups. In predicting the writing course grade, statistical significance is achieved for the overall group and for all sub-groups, with the highest prediction for Asian students accounting for 16% of the variance. Enrollment measures in Model 2A achieve statistical significance for the overall group and for all sub-groups, accounting for 84% of the variance for male students. Model 2B fails to achieve statistical significance for female, Asian, and Hispanic students and, at best, accounts for 19% of the variance for white students. Model 3A, designed to predict the second writing course grade, achieved statistical significance for the overall group and for all sub-groups, with 34% of the variance accounted for Asian students.

Table 7
University of Idaho ePortfolio Score Correlations: First Generation and Pell Grant Status

Measures	1.	2.	3.	4.	5.	6.
1. HS GPA (First Gen $N = 434$; Pell $N = 509$)	—	.28***	.31**	.19**	.16**	.33**
2. SAT writing (First Gen $N = 354$; Pell $N = 414$)	.22**	—	.67**	.18**	.08	.08
3. ACT composite (First Gen $N = 231$; Pell $N = 275$)	.26**	.68**	—	.06	-.04	.10
4. ePortfolio holistic score (First Gen $N = 441$; Pell $N = 516$)	.24**	.13**	.11	—	.82**	.09
5. Eng. 101 course grade (First Gen $N = 441$; Pell $N = 516$)	.24**	.02	.02	.80**	—	-.00
6. Eng. 102 course grade (First Gen $N = 360$; Pell $N = 416$)	.33**	.10	.08	.15**	.05	—

Note. Correlations for first generation status are in the upper diagonal of the matrix and correlations for Pell Grant status are in the lower diagonal of the matrix.

* $p < .05$; ** $p < .01$

Table 8
University of Idaho ePortfolio Score Correlations: EFC Quartiles 1 and 2

Measures	1.	2.	3.	4.	5.	6.
1. HS GPA (EFC Q1 <i>N</i> = 313; EFC Q2 <i>N</i> = 253)	—	.13*	.17*	.25**	.26**	.29**
2. SAT writing (EFC Q1 <i>N</i> = 252; EFC Q2 <i>N</i> = 203)	.32**	—	.63**	.10	-.05	.08
3. ACT composite (EFC Q1 <i>N</i> = 169; EFC Q2 <i>N</i> = 137)	.36**	.71**	—	.01	-.10	.10
4. ePortfolio holistic score (EFC Q1 <i>N</i> = 313; EFC Q2 <i>N</i> = 253)	.18**	.20**	.20*	—	.80**	.09
5. Eng. 101 course grade (EFC Q1 <i>N</i> = 313; EFC Q2 <i>N</i> = 253)	.17**	.13	.17*	.79**	—	.03
6. Eng. 102 course grade (EFC Q1 <i>N</i> = 250; EFC Q2 <i>N</i> = 199)	.47**	.14	.08	.19**	.13	—

Note. Correlations for Q1 are in the upper diagonal of the matrix and correlations for Q2 are in the lower diagonal of the matrix. EFC Q1 = \$0-\$20,000 family income; EFC Q2 = \$20,000-\$60,000.

p* < .05; *p* < .01

Table 9
University of Idaho ePortfolio Score Correlations: EFC Quartiles 3 and 4

Measures	1.	2.	3.	4.	5.	6.
1. HS GPA (EFC Q3 <i>N</i> = 223; EFC Q4 <i>N</i> = 210)	—	.23**	.40**	.34**	.29**	.42**
2. SAT writing (EFC Q3 <i>N</i> = 185; EFC Q4 <i>N</i> = 179)	.20**	—	.60**	.18*	.07	.20*
3. ACT composite (EFC Q3 <i>N</i> = 116; EFC Q4 <i>N</i> = 110)	.28**	.62**	—	-.03	-.09	.32**
4. ePortfolio holistic score (EFC Q3 <i>N</i> = 226; EFC Q4 <i>N</i> = 211)	.26**	.14	.15	—	.84**	.15*
5. Eng. 101 course grade (EFC Q3 <i>N</i> = 226; EFC Q4 <i>N</i> = 211)	.23**	.10	.04	.82**	—	.00
6. Eng. 102 course grade (EFC Q3 <i>N</i> = 176; EFC Q4 <i>N</i> = 186)	.31**	.09	.10	.10	-.05	—

Note. Correlations for Q3 are in the upper diagonal of the matrix and correlations for Q4 are in the lower diagonal of the matrix. EFC Q3 = \$60,000-\$100,000; EFC Q4 = \$100,000+.

p* < .05; *p* < .01

Discussion

We frame our comments in terms of our three research questions to discuss the application of empirical methods to ePortfolio-based assessment at two distinctly different universities with selective undergraduate student profiles.

Reliability Evidence: Consensus and Consistency Estimates

In addressing the relationship between reliability and validity, Mislevy (2004) asserted that researchers

must not sell techniques short based on standard practice. To do so is to “miss the compiled wisdom underlying those techniques” (Mislevy, 2004, p. 244). In the examples presented in Tables 3 and 4, we demonstrate that there are multiple ways to conceptualize, execute, and present information on inter-reader reliability. Indeed, as a way to conceptualize inter-reader reliability, the model offered by Stemler (2004) provides a straightforward method to attack complex evidentiary problems related to precision.

In terms of inferences based on this information, we conclude that the holistic method used at UI is well

Table 10
University of Idaho Regression Models: Pre-College Enrollment Measures, Enrolled Measures, Predictive Measures by Gender and Race/Ethnicity

	Pre-College Enrollment Measures								Enrolled College Measures											
	Model 1A HSGPA + SAT writing→ ePortfolio holistic score				Model 1B HSGPA + ACT composite→ ePortfolio holistic score				Model 1C HSGPA + SAT writing→ Eng. 101 course grade				Model 1D HSGPA + ACT composite→ Eng. 101 course grade				Concurrent		Predictive	
																	Model 2A ePortfolio score→ Eng. 101 course grade		Model 3A ePortfolio score + Writing course grade → Eng. 102 course grade	
																	R^2	F	R^2	F
All	.087	$F(2, 911)=44.423^{***}$	.055	$F(2, 583)=6.879^{***}$	.066	$F(2, 911)=32.230^{***}$	.053	$F(2, 583)=16.318^{***}$	.667	$F(1, 2015)=2416.52^{***}$	.021	$F(2, 968)=10.596^{***}$			
Male	.083	$F(2, 461)=20.918^{***}$	.063	$F(2, 312)=10.450^{***}$	.074	$F(2, 461)=18.411^{***}$	.057	$F(2, 312)=9.370^{***}$	.673	$F(1, 648)=1337.70^{***}$	.029	$F(2, 498)=7.423^{**}$			
Female	.075	$F(2, 447)=18.099^{***}$	.030	$F(2, 268)=4.213^*$	.040	$F(2, 447)=9.284^{***}$	.033	$F(2, 268)=4.550^*$	.652	$F(1,556)=1040.10^{***}$	.011	$F(2, 467)=2.544_{nss}$			
White	.072	$F(2, 671)=26.077^{***}$	.042	$F(2, 439)=9.720^{***}$	.058	$F(2, 671)=20.707^{***}$	.054	$F(2, 439)=12.510^{***}$	.652	$F(1, 858)=1606.39^{***}$	.015	$F(2, 690)=5.109^{**}$			
Hispanic	.125	$F(2, 125)=8.947^{***}$	.057	$F(2, 82)=2.470_{nss}$	.083	$F(2, 125)=5.668^{**}$	.023	$F(2, 82)=.966_{nss}$	.665	$F(1, 151)=299.892^{***}$	.022	$F(2, 129)=1.421_{ns}$			
Two or More Races	.140	$F(2, 40)=3.265^*$	qns		.165	$F(2, 40)=3.942^*$	qns		.809	$F(1, 48)=203.59^{***}$	.033	$F(2, 40)=.676_{nss}$							

Note. p values not statistically significant at the 0.05 level are designated as nss . Sample sizes under 30 are designated as qns .

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 11
NJIT Regression Models: Pre-College Enrollment Measures, Enrolled Measures, Predictive Measures by Gender and Race/Ethnicity

	Pre-College Enrollment Measures				Enrolled College Measures					
	Model 1A HS rank + SAT writing→ holistic score		Model 1B HS rank + SAT writing→ Hum. 101 course grade		Model 2A ePortfolio Traits→ ePortfolio holistic score		Model 2B ePortfolio Traits + ePortfolio holistic score→ Hum. 101 course grade		Model 3A ePortfolio traits + ePortfolio holistic score + Writing course grade→ Hum. 102 course grade	
	R^2	F	R^2	F	R^2	F	R^2	F	R^2	F
All	.046	$F(2, 109) = 2.6^{nss}$	.139	$F(2, 1077) = 88.16^{***}$	.83	$F(5, 204) = 199.16^{***}$	.06	$F(6, 200) = 2.13^*$	.232	$F(7, 177) = 7.65^{***}$
Male	.026	$F(2, 96) = 1.25^{nss}$	.119	$F(2, 881) = 59.53^{***}$	.838	$F(5, 173) = 179.59^{***}$	.079	$F(6, 170) = 2.44^*$	.252	$F(7, 151) = 7.26^{***}$
Female		Qns	.25	$F(2, 193) = 30.84^{***}$	.766	$F(5, 25) = 16.34^{***}$	.088	$F(6, 23) = .369^{nss}$		Qns
White	.038	$F(2, 48) = .955^{nss}$	.154	$F(2, 404) = 36.83^{***}$	.824	$F(5, 83) = 77.73^{***}$	.192	$F(6, 81) = 3.20^{**}$	.317	$F(7, 71) = 4.70^{***}$
Asian		qns	.156	$F(2, 216) = 21.16^{***}$	.819	$F(5, 53) = 47.89^{***}$	.04	$F(6, 51) = .325^{nss}$	.344	$F(7, 44) = 3.29^{**}$
Hispanic		qns	.106	$F(2, 244) = 15.59^{***}$	.80	$F(5, 30) = 24.20^{***}$	.116	$F(6, 28) = .611^{nss}$		qns
Black		qns	.16	$F(2, 107) = 10.17^{***}$		qns		qns		qns

Note. p values not statistically significant at the 0.05 level are designated as nss . Sample sizes under 30 are designated as qns .

* $p < .05$; ** $p < .01$; *** $p < .001$.

suited to certification assessment aims in which each ePortfolio has to be read. Reference to consensus methods and Gaussian distribution provides additional evidence that the scores are normally distributed and that, in cases of discrepancy, measures are in place to ensure adjudication. We may also conclude that the consistency reliability measures at NJIT are well suited to the aim of program assessment in which multiple traits provide information that can, in turn, be used to structure opportunities to learn for students by curricular refinement.

However, this is not to say that positive claims are free from qualification. At UI, the single ePortfolio holistic score is just that—a single score upon which a judgment is to be made. While the multiple-trait method used at NJIT may appear preferable, that method would take additional time and resources; furthermore, it is not clear what role the traits would serve in a certification assessment.

In terms of disaggregation by sub-group illustrated in Figures 3 and 4, none of the non-adjudicated scores for females reached levels of statistical significance, and even under adjudication the writing processes scores failed the test of statistical significance. In stark contrast to the 0.77 holistic score inter-reader reliability reported for the overall population, consistency estimated achieved only a moderate .48 ($p < .01$) for female students. In terms of score interpretation and use, it would be difficult to justify the use of scores for any purpose regarding inferences about the writing ability of female students at NJIT based on ePortfolio scores. In the case of inter-reader reliability evidence related to ePortfolio scoring, investigating complex evidentiary problems related to precision may result in important reservations about score interpretation and use.

Validity Evidence: Correlation Analysis

At UI and NJIT, ePortfolio scores had a demonstrable place in the writing ecology at the institution, with the scores appropriately interpreted in relationship to curricular aims. Any institution, in fact, would benefit from the level of information associated with the two case studies.

Positive claims involving validity evidence are accompanied by qualifications related to assessment purpose. At UI, ePortfolio scores are used to certify students and, as such, the measure is not entirely independent of course grade. This interdependence helps to explain the high, statistically significant correlation between ePortfolio score and Eng. 101 course grade ($r = .82, p < .01$) shown in Table 5 and persisting with little variation across sub-groups in Tables 7 through 9. Used for a different purpose at NJIT, ePortfolio scores used for program

assessment are independent of course grade. Table 6 illustrates the statistically significant, low correlation between ePortfolio score and Hum. 101 course grade ($r = .18, p < .05$). At NJIT, the ePortfolio scores demonstrate disjuncture between the average course grade of B shown in Table 2 ($M = 3.0, SD = 1.09$) and ePortfolio trait and holistic scores well below the ranges associated with above average work.

In both institutions, the relationship of scores to subsequent course writing grades was weaker than anticipated. As Table 1 reveals, at UI the average grade in the second writing course is higher, at statistically significant levels, than the first writing course ($t[1336] = 10.32, p < .001$); furthermore, 20% of the students are lost from the first course to the second. At NJIT, the absence of relationship is due to relatively low trait and holistic scores compared to course grades of B in the second semester writing course, as well as the first. Such evidence reveals the need for connections between assessment findings and curricular refinement. In the case of both institutions, there is evidence that across-course ePortfolio development is worth consideration in order to examine relationships between assessment scores and other forms of convergent evidence. As Elliot et al. (2016) have noted, attention to ePortfolio scores in relationship to criterion measures of the writing construct allows detailed information to be obtained on study-site ecologies—including ways that new digital forms of assessment mediate the writing construct and may inadvertently result in construct underrepresentation.

In terms of reservations regarding validity evidence, it is also worth recalling that even the most robust assessments cannot hope to capture the writing construct in its entirety. Writing instruction and writing assessment are best conceptualized by attending to cognitive, interpersonal, intrapersonal, and physiologic domains. Only an expert instructor observing students over long periods of time is qualified to make inferences about an individual student ability in these domains. No ePortfolio-based assessment evaluated in a scoring session, whether by holistic or trait methods, can hope to capture full representation of the writing construct. To begin with this premise is to appreciate the strengths and limits of ePortfolio assessment.

Fairness: Statistically Significant Difference and Regression Analysis

Portraits of students presented in Tables 1, 2, 7, 8, 9, 10, and 11—as well as in Figures 3 and 4—afford a deservedly complex view of how various students

perform by demographic category, compared to the aggregated portrait that includes all students. While some sub-group categories are familiar, others presented in the UI case study are new. Recently, for example, emerging research documented that there was little agreement on how first-generation students were defined, but “regardless of how they’re defined, first-generation students enroll and graduate at lower rates than do other students” (Smith, 2015, para. 4) and are thus a group of interest.

In terms of evidence related to fairness, ePortfolio scores predict the first writing course grade across all gender and race/ethnicity groups, with prediction at its highest for students of two or more races. While not shown in the present study, this pattern persists across first-generation, Pell grant, and EFC students (at rates no lower than 63%). Minimum group differences in ePortfolio scores among race/ethnicity groups in Table 1 bring our emphasis on principles of fairness full circle. And, while statistically significant group means are identified between men and female and between first generation and non-first generation students, no statistically significant differences are present among Pell grant and EFC students. Absence of group difference in ePortfolio scores is similar at NJIT. While there are indeed differences between males and females, no differences were observed among White, Asian, and Hispanic students ($F[3, 192] = 1.82, p = .14$). On either campus, this is a claim that cannot be substantiated for standardized measures such as the SAT Writing section where statistically significant group differences are everywhere apparent.

The absence of group differences in ePortfolio scores leads us to hypothesize one of the most important findings of the study: Robust construct representation leads to fairness in writing assessment; conversely, constrained construct representation leads to group differences. ePortfolios have been touted for their flexibility across learning environments, and our study suggests that they are also flexible in their accommodation of learning demonstrated by diverse learners. While group differences in standardized measures such as the SAT Writing may lead to disparate impact—unintended racial differences in outcomes resulting from facially neutral policies or practices that on the surface seem neutral but nevertheless have the same consequence as overt discrimination (Poe, Elliot, Cogan, & Nurudeen, 2014)—our results suggest ePortfolios may be a way to minimize this negative impact.

In terms of reservations regarding evidence related to fairness, our analysis also highlights that students may concurrently occupy demographic spaces that place them in positions of both advantage and disadvantage. What actions, for example, do we take in realizing that female students outperform male students in writing ability? Are these tasks

that serve some student groups better than others in advancing opportunity to learn? While a better understanding of student differences must qualify any claim of fairness, the results presented in the two case studies reveal new problems for us to solve. Such analysis encourages us to think about such complexities in our assessment reporting and to move beyond categorization of our students in isolated, demographic silos. Once we can begin to understand how student characteristics interact with domains of writing, we can then begin to chart an equitable and just way forward.

Conclusion

We want to close by proposing guiding questions for quantitative reporting of information related to ePortfolio score interpretation and use. To that end, we offer the questions in Table 12 through the three foundational measurement concepts of fairness, reliability, and validity in order to guide future practice related to ePortfolio score use and interpretation. Under the integrative principle of fairness and its association with opportunity to learn, dividing the table into questions of resource allocation and stakeholder lends specificity to the question: What do the empirical study results *mean* in terms of score interpretation and use? In other words, instead of focusing on the interpretation and use of ePortfolio scores to maintain course quality (at UI) and strengthen program assessment (at NJIT), we reconceptualize these aims as instrumental and therefore secondary to the advancement of opportunity to learn. The primary aim, advancement of opportunity to learn, subsumes all other assessment aims and compels us to reflect on the learning environment, demand articulated connections between the assessment and the instructional environment, and provide resources for the least advantaged students.

To achieve the dual aim of integrative and principled action identified in Table 12, administrators are invited to use ePortfolio scores for traditional aims—such as the maintenance of course quality and enhancement of program assessment—but these aims are restructured to include improvement of the learning environments for those students who appear to be least advantaged. Returning to Tables 1 and 2, administrators would allocate resources to further investigation of the ePortfolios themselves to determine why females score higher than men and why the scores of first generation students differ from those whose parents attended college.

Returning to Figure 1 and 2, administrators would also allocate resources to discover why the ePortfolios of NJIT female students—whose scores are higher than male students—resulted in rating complexities. As Moss (2004) had recommended, here is an excellent opportunity to use qualitative analysis in order to understand contradictory information. In practical

Table 12
Guiding Questions: Evidential Quantitative Reporting for ePortfolios

Standard	Infrastructure resources	Students	Instructors	Administrators (departmental & institutional)	Workforce
Fairness: “All steps in the testing process, including test design, validation, development, administration, and scoring procedures, should be designed in such a manner as to minimize construct-irrelevant variance and to promote valid score interpretations for the intended use of all examinees in the intended population” (Standard 3.0, p. 63).	How does the institution identify and support opportunity to learn for all students through ePortfolio assessment?	What type of evidence documents sensitivity to diverse ways of making meaning in ePortfolio assessment?	How do teachers ensure that diverse learners have opportunity to learn the construct assessed in ePortfolios?	How can administrators use ePortfolio findings to improve learning environments for the least advantaged students?	How can ePortfolio scores support opportunity to learn for all students beyond graduation and into workplace settings?
Reliability: “Appropriate evidence of reliability/precision should be provided for the interpretation for each intended score use” (Standard 2.0, p. 42).	How do institutional technological resources and articulated program outcomes support a stable evaluation of student work?	What does score disaggregation reveal about inter-reader agreement and inter-reader reliability patterns of student groups?	How do the estimates of reliability influence score interpretation and use?	What is the evidence that the administrative and working conditions of the ePortfolio assessment have remained stable?	How are estimates of reliability determined across settings in terms of writing task demands?
Validity: “Clear articulation of each intended test score should be set forth, and appropriate validity evidence in support of each intended interpretation should be provided” (Standard 1.0, p. 23).	How has the institution leveraged ePortfolio assessment to ensure robust construct representation for all students?	How are scores used to draw inferences about students’ abilities assessed through ePortfolios, and how are these inferences interpreted?	How is teacher knowledge used in making decisions about individual student performance in ePortfolio assessment?	What kind of validity evidence is necessary to support principled interpretation and responsible score use of ePortfolios for multiple uses?	How are construct validity demands rendered congruent across academic and workplace settings?

Note. Fairness: Integrative and principled action

terms, examination of the scores of female students is an opportunity for researchers to examine the design of the ePortfolios themselves to see how members of this student group featured their skills in meeting course objectives. As well, examination of the ePortfolio scores of female students would examine the possibility of incorrect consistency estimates resulting in low correlations due to small sample size and range restrictions. For example, students who featured digital artifacts (e.g., blogs, social networking, video sharing, and wikis) may have elicited a wide range of discrepant scores if instructors were not accustomed to evaluating

such artifacts; however, in a holistic score, these same ePortfolios may have received high scores. Only in-depth qualitative analysis would identify such patterns that could, in turn, be used to help all students design their ePortfolios with greater audience awareness.

Along with infrastructure resources determined by administrators, Table 10 calls attention to the importance of the validity inferences made about students. While there is a longstanding tradition in writing studies of distinguishing between low stakes and high stakes writing (Elbow, 1997), attention to fairness helps us to realize that all interpretations and

inferences we make about our students are of great consequence. The uses we make of performance scores are all high stakes because they embody impressions of student ability. While, for example, Model 1A and Model 1C illustrate statistical significance of high school GPA and SAT Writing in predicting, respectively, ePortfolio scores and course grades across all groups, these models cover so little of the variance (no more than 14% for students of two or more races) that questions arise regarding the use of these models for any interpretation whatsoever, including admissions and placement purposes. In similar fashion, comparison of Model 2A and Model 3A suggests that ePortfolio scores are most useful when they are aligned to specific courses and of less value across courses. In terms of impact on students and the inferences we make about them, emphasis on opportunity to learn compels us to realize that qualifications must be drawn across all assessments, regardless of the degree of construct representation. While ePortfolios are often understood as “an antidote to the inadequacies of testing” (Cambridge, Cambridge, & Yancey, 2009, p. 195), their perceived face validity does not negate the need for justification of their use and qualification of their limits in the inferences we draw about student ability.

While his focus is on tests of language, Cumming (2013) emphasized that integrated writing tasks focus on uses of written language to construct knowledge, often in multimodal ways, which involve genres that are ill-defined and so difficult to score. Accustomed to a print environment in high school, many students, among them those at NJIT, struggled when faced with new genres—as did their instructors, who had used the source-based essay as the exclusive reporting structure in first-year writing. It is therefore important to remember that the ability to achieve proficiency in these new genres is compounded if there are any student weaknesses in writing ability in the first place. In their study of the digital skills of 91 low-income students enrolled in writing remediation, Relles and Tierney (2014) found that students who are underprepared according to traditional writing criteria face additional barriers to academic success because of low digital skills. “Today’s remedial writers,” they concluded, “may be challenged by a kind of literacy double jeopardy that is unique to the 21st century” (Relles & Tierney, 2014, p. 497). In the classroom, instructors may be especially challenged to ensure that students have both the traditional and digital abilities to prepare the integrated writing tasks that are often part of the new genre of ePortfolios themselves.

In closing, we want to call attention again to the contention by Yancey et al. (2009) that ePortfolio assessment requires a new vocabulary and a new set of practices. We agree, and our work here is intended

to contribute to the role that empirical assessment should play in such new theoretical models. While the techniques we have illustrated are traditional, emphasis on fairness as vehicle for integrative, principled action intended to advance opportunity to learn is unique. While conceptual advantages have been presented here in terms of ePortfolio score interpretation and use, additional work will be needed if empirical and theoretical domains are to function in complementary fashion in order to structure opportunity for students.

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Guidance for ePortfolio Researchers: A Case Study with Implications for the ePortfolio Domain

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This study examined whether or not students using a career ePortfolio, including a matrix for identifying and reflecting on transferrable skills, enabled them to rate their skills more confidently and positively after a simulated (mock) job interview. Three groups were studied: those completing the skills matrix in the ePortfolio; those using the ePortfolio but not the skills matrix; and those not using the ePortfolio. Results of a one-way ANOVA indicated no significant score differences among groups on a self-reported skill survey. However, other findings pertained to difficulties in conducting research on the effectiveness of online career ePortfolios and suggestions for correcting such problems in the future.

Career ePortfolios are popular in higher education and are used in varied ways to encourage reflection on the meaning of life experiences, to provide a link between academic learning and outside activities, to assess student learning, and to increase students' skills in the use of technology (Clark & Eynon, 2009; Kruger, Holtzman, & Dagavarian, 2013; Peet et al., 2011). This phenomenon, connected to a massive technology infusion in education (Ayala, 2006), has been marked by claims of the usefulness of such ePortfolios (Batson, 2002; Buyarski & Landis, 2014; Fitch, Peet, Glover, & Tolman, 2008), and for enhancing student services such as academic advising (Ambrose & Ambrose, 2013). Empirical studies on student outcomes of using ePortfolios have continued to increase over time. Bryant and Chittum (2013) reported 49% of the 118 peer-reviewed articles they reviewed as empirical in nature. However, Ayala (2006) noted that fewer than 5% of over 300 articles reviewed on ePortfolios provided any data from students about their needs or concerns. Most of the articles he reviewed focused on accountability and assessment issues that are largely of concern to administrators. The present study sought to address this issue by examining the impact on career behavior of student's voluntary participation in an ePortfolio program.

Outcome studies on the use of ePortfolios with students have found positive results of enhanced major and career exploration (Buyarski & Landis, 2014). Buyarski and Landis (2014) examined 47 student ePortfolios and found that out of five learning outcomes, the mean score for major and career exploration was the highest (1.68), followed by self-assessment and awareness (1.62), and goal setting (1.33), for students enrolled in a first-year experience course. In examining pieces of authentic evidence, major and career exploration had the second highest amount (1,125), after understanding of self (1,804). According to the researchers, the majority of the

authentic evidence for major and career was information-based and showed some connection to self-understanding (Buyarski & Landis, 2014). However, the mean scores for all of the learning outcomes were low (based on a four-point scale), which suggested that while the evidence was there, higher critical analysis was lacking. This could be a developmental issue, in that these were first semester students.

In other studies, Singer-Freeman, Bastone, and Skrivaneck (2014) found that use of an ePortfolio increased future-oriented statements by 47 under-represented minority community college students. Eynon, Gambino, and Török (2014) reported impressive differences when comparing retention rates at three different times for students who used an ePortfolio during their first year, as compared to those who did not (90% v. 79% first year, 79% v. 60% second year, 25% v. 15% fourth year graduation rate, respectively). Pitts and Ruggirello (2012) found that growth in professional competency occurred when participants were explicitly required to demonstrate how they had experienced growth via evidence taken at baseline and post-baseline intervals. In spite of these findings, and with increasing numbers of universities and programs using ePortfolios, more student outcome research related to its use is needed (Bryant & Chittum, 2013).

A few published articles have examined student feedback about an ePortfolio system (Buzzetto-More, 2010; Janosik & Frank, 2013; Nguyen, 2013; Peacock, Murray, Scott, & Kelly, 2011). Buzzetto-More (2010) found that the majority of students (88%) who had made an ePortfolio reported that it helped them reflect on their learning, while Janosik and Frank (2013) found that graduate students reported the ePortfolio experience to be a very powerful one in which they learned a great deal about themselves. Nguyen (2013) interviewed eight students about their ePortfolio experiences, with one of the themes that emerged being that students saw previously unknown qualities in themselves, while

Peacock et al. (2011) reported that students rated their ePortfolio experience as a positive one. In another study, Gaitán (2012) found four categories that related to students' attitudes about the portfolio experience, including views about the purpose of the portfolio, amount of personal disclosure included, technical issues, and guidance or feedback from tutors.

The limited literature regarding career development ePortfolios describes the features of various ePortfolio programs and documents the characteristics of student users and their expectations from ePortfolio use. For example, von Konsky and Oliver (2012) reported over 17,000 subscribers one year after introducing an *iPortfolio* at an Australian University. About half (52%) of the student users believed that there would be improvements in employability outcomes from ePortfolio use. Reardon, Lumsden, and Meyer (2005) evaluated a career ePortfolio by emailing surveys to 693 students enrolled in a variety of courses using the program. Completed surveys were obtained from 96 students, a response rate of 14%. Students were asked to indicate how they intended to use their completed career portfolio. Besides using it to complete a class assignment, the top three ways students planned to use their career portfolio included applying for a job (20%), identifying their skills (15%), or applying for graduate or professional school (12%). The two least frequent uses identified by students were applying for an internship (11%) and interview preparation (8%).

Reardon et al.'s (2005) survey also included items related to learner outcome goals. The majority of students had positive views of the career ePortfolio, and 83% strongly agreed or agreed that the ePortfolio helped them understand how their academic and professional skills related to personal career goals, 81% strongly agreed or agreed that the program helped them show evidence of skills that could apply to a variety of occupations, 83% strongly agreed or agreed that the program helped them show evidence of skills necessary to obtain and maintain employment, 85% strongly agreed or agreed that the program helped them communicate their skills to potential employers, and 80% strongly agreed or agreed that the program helped them prepare for job searching and interviewing.

Given these findings about student reactions to the online career ePortfolio programs, the current study was undertaken in an effort to learn more about the impact of one such program.

An Online Career Portfolio Program

The Career Portfolio Program (CPP; Lumsden, Garis, Reardon, Unger, & Arkin, 2001) used in this study is an ePortfolio system initiated and maintained by students. This is in contrast to the common finding reported by Ayala (2006), as cited earlier. CPP is an

online tool enabling students to identify learning experiences leading to the development of desired skills, a collection point for listing students' accomplishments and skills, and a potential marketing tool for students seeking graduate school or employment. It is similar in purpose to the definition of a portfolio by Yao, Thomas, Nickens, Downing, Burkett, and Lawson (2008, p. 10): "a systematic and purposeful collection of work samples that document student achievement or progress over a period of time." Career-related ePortfolios such as the CPP offer the opportunity for students to "understand, develop, chronicle, and communicate their career attributes to others" (Garis, 2007, pp. 3-4).


The CPP was under development for five years before its launch in April 2002 (Reardon et al., 2005), and it has been in continuous operation since then. More than 101,777 portfolios have been created in the program since it began (L. Mille, personal communication, October 20, 2015). There were four goals in developing the CPP, and this study focused on the one related to employers seeking evidence that students were ready to make effective contributions in the workplace.

The career ePortfolio used in this study included a skills matrix (Figure 1) component in which students were required to reflect on their life experiences, jobs, internships, club memberships, and service as a way to learn specific skills. The skills matrix required students to provide and reflect on concrete examples of how they gained skills in the areas of Communication, Creativity, Critical Thinking, Leadership, Life Management, Research/Project Development, Social Responsibility, Teamwork, and Technical/Scientific. Participating in this type of reflection on generic work skills was believed to be effective preparation for interviewing.

An ePortfolio contest program for students was initiated in 2003 to identify ePortfolios that were exceptionally well done, to increase marketing of the program on the campus, and to involve employers, advisors, and other staff in judging the qualities of ePortfolios submitted to the contest. We wanted to use high quality ePortfolios in this study, so we contacted students entering the contest in the preceding two years and solicited their research participation.

More specifically, the idea was that students using the career ePortfolio would know how and be able to communicate and market workforce skills to potential employers or graduate schools in a mock interview. We were unable to identify a prior study examining this issue, so we designed a study examining the extent to which students believed the CPP helped them conceptualize strategies for acquiring and documenting general skills obtained from educational experiences within and outside of the curriculum (Reardon & Hartley, 2007). In the process of introducing the online career ePortfolio to potential users, students often ask

Figure 1
Skills Matrix



Skills Development Matrix

This page is designed to give you a quick overview of the skills / experiences you've recorded and what areas might still need more documentation. If you've already entered information for a given skill / experience combination, an icon (or number) appears in the appropriate cell. Select any hyperlinked skill or experience name (the column and row headings) if you'd like to learn more about it before continuing

[Want to Edit Your Skills List?](#) Recommended next step: [Build Your Profile](#)

Skills	Experiences				
	Courses	Jobs / Internships	Service / Volunteer Work	Memberships / Activities	Interests / Life Experiences
Communication	Add/Edit (0)	Add/Edit (0)	Add/Edit (1)	Add/Edit (0)	Add/Edit (0)
Creativity	Add/Edit (0)	Add/Edit (4)	Add/Edit (0)	Add/Edit (0)	Add/Edit (1)
Critical Thinking	Add/Edit (2)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (2)
Leadership	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)
Life Management	Add/Edit (0)	Add/Edit (0)	Add/Edit (2)	Add/Edit (0)	Add/Edit (0)
Research / Project Development	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (1)	Add/Edit (0)
Social Responsibility	Add/Edit (1)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (2)
Teamwork	Add/Edit (0)	Add/Edit (3)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)
Technical / Scientific	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)	Add/Edit (0)
Add Your Own Skill					

about the benefit of completing it and we believed that the results of this study would help answer that question.

The Present Study

This exploratory study examined students in three groups. Group A ($n = 18$) completed an online career ePortfolio including the skills matrix. Group B ($n = 40$) engaged the ePortfolio but did not complete the skills matrix. Group C ($n = 60$) did not use the ePortfolio before participating in the mock interview. The study was designed to assess whether students completing an online career ePortfolio and the skills matrix (Group A) would report more positive self-ratings of skills in a mock interview situation than students not completing the skills matrix (Group B) or the ePortfolio (Group C). We expected that ePortfolio students using the skills matrix would report a better sense of self-awareness and confidence in their answers and their qualities and skills. Student self-reported ratings were used to examine differences in responses between the three groups.

Mock Interviewing

The career center began offering mock interviews in 2002 with one-on-one simulated job interviews that were video recorded, which allowed students the opportunity to practice their interview skills and then receive feedback on their performance. Students were

encouraged to provide qualitative and quantitative examples of their skills as often as possible when interviewing. The mock interview focused on how well students knew themselves and their past experiences, how well they knew the industry they hoped to enter, and how well they could articulate that information. One-on-one, panel, telephone, and Skype mock interviews were offered to allow students the opportunity to enhance their interview skills in the area of their choice. Trained mock interview mentors (MIMs) interviewed, provided feedback, and assisted students in improving their interview skills. Students completed an application to participate in a mock interview by submitting a resume and cover letter. During the mock interview, MIMs asked questions that were based on the students' career situation (e.g., seeking a job, internship, or graduate school program).

A highlight of this experience is that mock interviews are video recorded and provided in DVD format to students at the conclusion of their mock interview to facilitate ongoing self-evaluation and reflection. Additionally, students who participated in mock interviews had the opportunity to interview with an employer during a designated Professional Development Week, providing a more realistic mock interview experience for some. Over 3,000 mock interviews have been conducted in the career center over the past decade, and more than 100 mock interview mentors have been trained by career center staff.

Method

The present study included three groups of students. Group A used the career ePortfolio skills matrix and engaged with the career ePortfolio before participating in a mock interview; Group B used the career ePortfolio (but not the skills matrix) before participating in a mock interview; and Group C did not use either the ePortfolio or the skills matrix before participating in a mock interview. This study was focused on the following three questions:

- Do students completing the skills matrix of an online career ePortfolio rate themselves more highly on a skills survey than those who did not use the skills matrix of the career ePortfolio? ($A > B$)
- Do students completing the skills matrix of an online career ePortfolio rate themselves more highly on a skills survey than those who did not use the career ePortfolio? ($A > C$)
- Do students completing some portions of an online career ePortfolio, not including the skills matrix, rate themselves more highly on a skills survey than those who did not use the career ePortfolio? ($B > C$)

Participants

The first group of students participating in an ePortfolio contest ($n = 93$) were recruited for participation in the study by e-mail invitations. A second group of students in this study ($n = 172$, 40 male) were not recruited but had simply signed up for mock interviews during the semester.

The 93 students participating in the mock interviews had competed (within 2 years of the study) in the online career ePortfolio contest so we judged that they had produced high quality ePortfolios. These students were encouraged to take part in a mock interview by registering for one of the 300 appointment slots available over the course of nine weeks. The students were informed that a drawing would be held every 3 weeks and \$50 gift cards for local businesses, vendors, and services such as iTunes would be awarded. Students signing up for and participating in a mock interview would have their name added to the drawing. However, students did not respond to this invitation to participate in the mock interview program. We found that only two students of 93 participating in the ePortfolio contest signed up for and completed a mock interview.

As a result, we examined how many of the remaining 172 students participating in mock interviews had prior experience with the ePortfolio

program, even though they had not participated in the ePortfolio contest. Including these students in the study would enable us to compare outcome measures for those who had prior ePortfolio experience with the skills matrix and those who had none. As a result of this analysis, we found that 65 of the 172 students participating in mock interviews had some level of prior experience in the career ePortfolio program but only 16 of these students had actually used the skills matrix portion of the ePortfolio program that was a focal point of our study. These 16 students were added to the two in the ePortfolio contest for a total of 18 students participating in mock interviews with prior career ePortfolio skills matrix experience. This became Group A in our study.

We re-examined the records of the 172 students participating in the mock interviews and found that 40 had some ePortfolio experience but did not use the skills matrix part of the ePortfolio. This became Group B in our study.

Procedures

Each mock interview was approximately one hour in length, including 20 minutes of interviewing and 20 minutes of feedback and discussion between the student and the MIM. All survey data from students and MIMs were collected after each mock interview.

After viewing the interview video and receiving feedback from the MIM, students completed a five-minute survey including questions about demographic information, the interview experience, and the interviewer. In addition, students responded to survey items judged relevant to the development and use of transferrable workforce skills (e.g., "I felt confident when communicating my workforce skills," and "I articulated my skills well")

We used Likert-type self-ratings to measure whether students levels of reported self-confidence and self-awareness during the interview. After all mock interviews had been concluded, we recorded and compared responses on the student self-ratings from Group A, Group B, and Group C in order to examine possible differences among the three groups.

Instrumentation

Students completed a self-reported skills survey about their mock interview experience using a 5-point Likert scale (1 = *strongly agree*, 5 = *strongly disagree*). To evaluate the impact of a student's ability to communicate their skills in a simulated job interview, we reviewed five survey items most closely related to skill development. These items were developed based on components of the skills matrix in the career. The

Cronbach's alpha for the five items was .80 but, because it was not less than .70, we were unable to examine results for individual items.

The items were created by the research team to help students reflect on their effectiveness in communicating these skills at the end of their mock interviews. The five items used in this study include the following:

- I identified that I possess important workforce skills;
- I felt confident when communicating my workforce skills;
- I used specific and concrete examples when discussing my skills;
- I articulated my skills well;
- I have taken the steps to develop workforce skills.

The skills matrix required that students provide and reflect on concrete examples of how they gained skills in the areas of communication, creativity, critical thinking, leadership, life management, research/project development, social responsibility, teamwork, and technical/scientific.

Data Analysis

A one-way ANOVA was conducted to compare survey means among the three groups (ePortfolio plus skills matrix, ePortfolio only, or no ePortfolio).

Results

Table 1 presents the means and standard deviations of the self-reported skills survey totals and individual items. The ANOVA results revealed a nonsignificant effect among the three groups on the self-reported survey results of skills, $F(3, 115) = 0.054, p = .95$. Thus, the answer to each of our research questions was negative. Specifically, students completing the skills matrix of an online career ePortfolio did not rate themselves more highly on providing specific and quantifiable examples of their skills during a mock interview than those who did not use the skills matrix of the career ePortfolio ($A > B$). Nor did students completing the skills matrix of an online career ePortfolio rate themselves more highly on providing specific and quantifiable examples of their skills during a mock interview than those who did not use the career ePortfolio ($A > C$). Finally, students completing some portions of an online career ePortfolio, not including the skills matrix, also did not rate themselves more highly on providing provide specific and quantifiable examples of their skills during a mock interview than those who did not use the career ePortfolio ($B > C$).

Discussion

In this section, we discuss the findings from the analysis of students' self-reported use of workforce skills following a mock interview, an analysis of the procedures used in the study that contributed to the findings, followed by limitations of the study, implications for practitioners, and suggestions for future research.

Use of Self-Reported Skills across Three Groups

Examining the student self-ratings across the three groups revealed that students using the ePortfolio skills matrix (Group A) did not differ in their self-reported ratings on a skills survey from students not using the ePortfolio skills matrix (Group B) and students not using the ePortfolio (Group C). These findings were surprising, given previous research (Buyarski & Landis, 2014; Buzzetto-More, 2010; Singer-Freeman et al., 2014) that indicated positive outcomes from engaging in e-Portfolio use.

There may be several reasons for our findings. Perhaps students in Group C not using the ePortfolio may simply have felt more confident and satisfied with their workforce skills than those in Groups A and B who had either used the ePortfolio skills matrix or engaged in the ePortfolio without the skills matrix. The self-ratings were completed immediately after the mock interview experience, which included 20 minutes of constructive feedback from the MIMs, which might have positively influenced these ratings. A second possibility is that students in Groups A and B may have become more confident with their skills during the mock interview and thus rated themselves highly on the survey. This finding, along with the other comparisons across the three groups in terms of self-reported skills merits further study to gain a better understanding of what might have influenced these self-ratings and why there was no significant differentiation among the groups.

Limitations of Study Procedures

In introducing this study, we noted the apparent difficulties in documenting the impact of ePortfolios on student behavior (Ayala, 2006; Bryant & Chittum, 2013; Reardon et al., 2005). An important outcome of the present study is an increased understanding of these difficulties as outlined below.

Treatment variable. Because we wanted students to engage in the ePortfolio and skills matrix experiences in a natural way (i.e., the way they would engage with the portfolio if not in a study), we did not specify which sections students had to complete or how thorough they had to be in completing each section. We also did not put parameters on who could be included in the study. It is possible that some students were completing the portfolio as a class assignment, while others were using

it to prepare for upcoming job interviews. Thus, it is difficult to judge whether participants were internally or externally motivated.

Our strategy to address these problems was to use participation in the career ePortfolio contest that provided detailed requirements for participation (e.g., enter information under at least four skill headings and three experience categories; total of 12 entries), create at least two profile sections (e.g., goals, objectives) that introduce your ePortfolio, upload a copy of your resume or curriculum vitae, enter at least two references, and upload at least three examples of your work. Additional contest instructions directed students to customize the ePortfolio towards personal career goals or a job objective. However, our effort to specify the ePortfolio treatment variable was undermined by the lack of participation by former contest participants in the mock interviews (only two of 93 contest participants engaged in mock interviews). Additionally, of 172 students participating in the mock interviews, only 18 had used the skills matrix portion of the online career ePortfolio and 40 had some ePortfolio experience; however, we do not know how much, how long, or how often they used it. As a result, we are not able to specify fully the use of the skills matrix of the ePortfolio in this study.

Dual treatment interventions. The mock interview itself provided students with opportunities to document and clarify their transferrable skills because the MIM interviewers asked the students questions about workforce skills. In this way, the mock interviews confounded the possible impact of the ePortfolio skills matrix treatment. Moreover, the MIMs provided feedback to students immediately after the interview which was generally positive and suggestive of ways to improve interview behavior. Although MIMs were trained to provide constructive feedback, it is possible that some offered very positive feedback to students and lacked the real world interviewing experience to evaluate fully the interviewees' strengths and weaknesses. Students completed self-ratings of their skills after getting this feedback from the MIMs, and this may have enhanced positive views of their workforce skills. For example, 168 of 172 (98%) of the students participating in mock interviews reported feeling more confident about their interview skills after participation. This probably had an impact on student self-ratings of the skills survey.

Student self-ratings. Inspection of Table 1 shows that students were very positive about their identification, confidence, and communication of workforce skills following the mock interview. They strongly agreed with all five items. This lack of variability in student self-ratings reduced the likelihood of finding differences in the student self-ratings across the three groups. The students' self-ratings of their skills following the mock interview experience were

overwhelmingly positive. To combat this halo effect, a four-item form for student ratings might be used rather than a five-item form. The positive wording of the five items might also be varied in order to elicit more varied student responses.

Sample characteristics. The sample in this study was overwhelmingly female, 77%. Moreover, 53% of the students indicated that the mock interview was part of a class assignment, although 48% indicated they were preparing for a scheduled interview (internship 45%, full-time job 35%, graduate school 8%, or other 10%). It is unclear how these sample demographic characteristics might have affected the results of this study.

Implications for Practitioners

Despite our findings, we believe that the ePortfolio offers many positive outcomes for students (Buyarski & Landis, 2014; Buzzetto-More, 2010; Singer-Freeman et al., 2014). We were surprised by how few of our ePortfolio contest participants took the next step to engage in the mock interviews. Perhaps having a stronger marketing campaign that demonstrated how activities can combine to create a powerful job search campaign would have increased participation. Perhaps it was the ease of completing the ePortfolio, which could be completed anytime and anywhere, in contrast to the mock interviews that required extra effort such as scheduling and attending a face-to-face appointment with a MIM. Perhaps having an online opportunity for mock interviewing with flexible scheduling would have also increased participation. Understanding the reasons why students choose to engage or not to engage in a given activity can inform career service providers as they create, advertise, and deliver services.

A second implication would be on clearly instructing students how to complete the portfolio and skills matrix, emphasizing how a more complete profile would provide them with more specific examples and artifacts to share with employers when they interview. Making the case of how this would likely increase their confidence when speaking with employers in interviews might result in more involvement with completing an ePortfolio. Having specific examples of a poorly constructed portfolio or skills matrix as well as outstanding examples, and having employer comments related to both, might also increase awareness and a desire to participate fully.

Suggestions for Further Research

Through the process of conducting this research, we came to realize several opportunities for strengthening future studies such as this one. First, in conducting research on the effectiveness of career

Table 1
Student Self-Ratings After the Mock Interview

Item	Group A: Portfolio Skills Matrix (n = 18)		Group B: Portfolio Only (n = 40)		Group C: No Portfolio (n = 60)	
	M	SD	M	SD	M	SD
I identified that I possess important workforce skills	1.61	0.61	1.53	0.60	1.52	0.70
I felt confident when communicating my workforce skills	1.78	0.81	1.65	0.74	1.65	0.78
I used specific and concrete examples when discussing my skills	1.71	0.83	1.73	0.78	1.93	0.94
I articulated my skills well	1.72	0.83	1.88	0.76	1.88	0.76
I have taken the steps to develop workforce skills	1.78	0.65	1.60	0.60	1.40	0.53
Total survey	8.61	2.97	8.38	2.62	8.38	2.77

ePortfolios, we recommend ensuring that the goals of the ePortfolio are reflected in the outcome measures. This particular ePortfolio system features the identification, development, and reflection on generic workforce skills, and the measure used in this study focused on five of those skills.

Second, where possible, including controls of the treatment variable would allow for a more powerful comparison among groups. The design of the present study addressed the specification of the treatment variable (ePortfolio use) through the requirements of the ePortfolio skills contest, but the lack of participation in the data collection (mock interviews) by ePortfolio users thwarted this strategy. In addition, gaining more information about the participants, such as student motivation for engaging in the ePortfolio would allow for more group selectivity (i.e., those engaging in the portfolio for extra credit might be excluded from the study). For example, were students participating in mock interviews asked to explain how their generic work skills had been identified and potentially transferred to a job situation?

Third, while self-reports are important in evaluating an activity, moving beyond self-report to objective external reviews would strengthen future studies. In the present study, MIMS may have felt compelled to share feedback with each participant in a positive light, whereas an external reviewer of the participants' responses who was not providing feedback might have rated the answers to specific questions less positively. In addition, using pre-post studies when evaluating the effect of an intervention would also strengthen the research design.

Conclusion

Although self-ratings of interview skills across the

three groups of students in this study revealed nonsignificant differences, it is believed that continued research in this area might show the impact of using an online career ePortfolio on these ratings. Although difficulties in conducting research on the effectiveness of online career ePortfolios were encountered in this study, suggestions for future studies were discussed with implications for improving research in this area.

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Challenges and Rewards of Implementing ePortfolios Through a Bottom-Up Approach

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While there have been multiple studies describing various ways in which administrators at higher education institutions can and should motivate faculty to increase their use of technology as an instructional tool (e.g., Surry & Land, 2000; Gautreau, 2011), very few have focused on cases in which faculty provided the initial and sustained impetus. This article attempts to fill that research gap by reporting on the results of a case study at a public university, where ePortfolios were implemented over a 15-year period using a bottom-up approach. The case study concluded that this approach has both limitations and benefits. The most notable limitation is that typically, faculty are not initially provided with the resources to implement ePortfolios, which results in a slow rate of adoption. Numerous recommendations were also identified that are especially relevant for institutions that utilize a shared governance model.

A common goal of many public regional higher education institutions is to facilitate the development of lifelong learners who are engaged in their communities. Despite, or perhaps because of this lofty aim, there are many factors that hinder the attainment of this goal. One reality is that institutions typically do not provide the opportunity for students to showcase and integrate their significant learning experiences through a single medium. This is due, in part, to faculty, especially in higher education institutions with a strong history of shared governance, wanting autonomy over their courses and student assignments. The use of a uniform medium (i.e., electronic portfolios) for documenting student learning is viewed by some faculty as a constraint on their academic freedom, even though they support in theory the goal of helping students integrate their experiences across the curriculum. As expressed by a faculty member, "Anything that tries to build consensus seems to be a difficult conversation to engage in." Add to this the perception that integration of an electronic portfolio can be costly and it seems unlikely that electronic portfolios will be successfully implemented or sustainable given the limited funds available to many of the smaller public higher education institutions. This case study demonstrates how it is feasible by documenting a 15-year, faculty-led initiative focused on developing and implementing electronic portfolios as a tool for students to represent and integrate their knowledge and skills.

Although there are case studies that describe how electronic portfolios have been implemented using a top-down model (e.g., Hains-Wesson, Wakeling, & Aldred, 2014) and middle-level model (e.g., Slade, Murfin, & Readman, 2013), the literature describing how years-old projects have been initiated and sustained by faculty is more limited. More recently, several bottom-up model electronic portfolio projects have been briefly described in the Connect to Learn Scaling Up Stories (<http://c2l.mcncr.org/category/campus-stories/scaling-up->

stories/). In particular, projects at Hunter College, Northeastern University, San Francisco State University, Tunxis Community College, and Virginia Tech appear to embody this implementation approach.

Along with the different methods of implementation, there are a variety of software programs that can be used to create ePortfolios. These vary from open source programs such as Sakai to commercially available electronic programs such as Digication and TaskStream. Another option is to use free programs like Google Sites or Foliospaces. Cost, ease of use, and ownership of data are all determinants when an institution is deciding which program should be used to create the electronic portfolios. Many times, when a choice of software must be made, cost is the overriding factor.

This case study adds to the literature base because it encompasses longevity, faculty initiation, and perpetuation, as well as cost avoidance through the use of free or open source software.

Institutional Context

The case study took place at the University of Michigan-Dearborn (UMD), a regional campus of the University of Michigan located in southeastern Michigan, adjacent to the city of Detroit, with an enrollment of approximately 9,000 students. With respect to graduate education, UMD is primarily a master's degree-granting university, but it does have two doctoral programs, in engineering and education. There are four important contextual features of UMD, which are also common to many other colleges: a diverse and large population of nontraditional students, a pledge to address the needs of the local region, faculty participation within a model of shared governance, and a commitment to the teacher-scholar paradigm.

Although the majority of students commute to campus, the diversity of the student population rivals

that of larger, residential schools. Twenty-five percent of the students self-identify as students of color and were born in 52 different countries. Approximately 60% of the students are the first in their family to attend college, and 80% remain in the area after they graduate. Over half of the students are older than 25, and the typical student works about 20 hours a week in addition to completing courses at UMD. This diversity is reflected in the rich array of experiences, skills, and knowledge the students bring to the university classrooms and to the content and structure of their electronic portfolios.

In part because alumni tend to stay in the region, the university has a strong commitment to the local area. This is evidenced by UMD's participation in the Coalition of Urban and Metropolitan Universities, one of whose goals is to provide an educated citizenry and workforce for the states and regions represented by its members (Coalition of Urban and Metropolitan Universities, 2014). As a member, UMD is an active community partner involved in improving the social and economic lives of residents in the region by offering academic service learning courses and community engagement projects through institutional resources such as the Office of Civic Engagement and the Office of Metropolitan Impact. Recently, UMD was awarded the Community Engagement Classification from the Carnegie Foundation for the Advancement of Teaching. That designation represents acknowledgment of the university's commitment to being deeply engaged with the region.

Since the university employs a model of shared governance, the 585 faculty employed by UMD are accustomed to a large degree of academic freedom. As is common among many institutions that have shared governance, many faculty perceive any course requirements mandated by the administration to be an infringement on their academic freedom. This includes learning management systems, policy statements on course syllabi, and specific formats for assignments, such as the ePortfolio. Faculty perception of what constitutes shared governance is an important cultural feature of the university that enabled the electronic portfolio to be successfully implemented from a faculty-led rather than an administration-led initiative.

To show its commitment to teaching excellence, UMD embraces a teacher-scholar model. This approach is described by the Association of American Colleges and Universities (AAC&U) as one in which faculty are

committed to high-quality undergraduate education, pursue an active program of research and scholarship, and are presumed to enliven and enrich their teaching and student experience by incorporating insights from their own research into their instructional activities, student advising, and related work. (Kuh, Chen, & Laird, 2007)

The ultimate goal of the teacher-scholar model is for students to acquire deep knowledge that they can use as they become lifelong learners who are able to consider new questions and make informed decisions (AAC&U, 2007).

Theoretical Framework

The theory of technological determinism posits that technology itself will drive implementation and that the power and promise of new innovations will motivate individuals to adopt nascent technologies (Oliver, 2011). This, of course, does not take into consideration the human element and the impact individuals can have on bringing about change within any given organization. As a result of that human element, new innovations are rarely adopted unanimously but instead follow a pattern of diffusion, as first described by Ryan and Gross (1943). In their seminal study of the use of corn seed among Iowa farmers, the researchers discovered that the rate of adoption of new varieties of seeds was longer than expected and influenced by a variety of social factors. Rogers (2004) defined diffusion as "the process through which an innovation, defined as an idea perceived as new, spreads via certain communication channels over time among the members of a social system" (p. 13). Based on this definition, the theory of diffusion can be applied just as easily to technological innovations as to the adoption of corn seed. The pattern of adoption in this theoretical framework generally follows a standard bell-shaped curve populated with the following categories: innovator, early adopter, early majority, late majority, and laggards (Zayim, Yildirim, & Saka, 2006).

Diffusion relies on a small group of innovators who are willing to try out a new innovation. These individuals are often seen as a pilot group, willing to implement new technologies and processes even if they are not fully formed or tested. The investigation of the implementation of the ePortfolio is framed within Rogers (1995) and Zayim et al.'s (2006) theoretical frameworks of the pattern of diffusion. That is, particular attention was paid to whether faculty fell within the different categories of technological innovation.

Methods

A case study method was used to investigate the implementation of the ePortfolio via a bottom-up approach. This research approach involves investigating events in context and often results in specific recommendations for action (Mills, Durepos, & Wiebe, 2008), while a particular case within the study is specific to time and place (Johansson, 2003). The case within this study is the use of the ePortfolio on the

UMD campus for a 15-year period, 1999-2015. The particular case study approach employed in this study follows Stake's definition (as cited in Johansson, 2003) that the object of the study (e.g., the case) is more important than the methods of investigation. As a result, multiple methods of data collection (e.g., both quantitative and qualitative) were used with the "purpose of illuminating a case from different angles and different methodologies" (Johansson, 2003, p. 3). In this case study, quantitative data were collected to determine which faculty used the ePortfolio in their courses and when they first used the ePortfolio. The qualitative data included informal collection of comments during conversations or meetings and also through semi-structured interviews with a convenience sample of 13 faculty who had used the ePortfolio in at least one of their classes. The interviews were conducted by the authors in 2013-2014 and lasted anywhere from 30 minutes to 1.5 hours in length. The questions focused on the faculty member's history of using the ePortfolio, on motivations for use, and on whether the use of the ePortfolios had impacted faculty members' perception of their students. Students were not interviewed formally for this research. Any quotes attributed to students in this narrative were derived from informal conversations and comments made during class sessions and office hours. The research questions guiding the in-depth analysis within this case study are: How was the ePortfolio implemented in a higher education institution with a strong shared governance structure, and how would knowing this reveal factors that would facilitate the implementation of the ePortfolio on similar campuses?

Innovators and Early Adopters: The Science Education Portfolio

Within the context of the larger university, the teacher preparation program at UMD embraces a social constructivist theory of learning, which states that learners construct new knowledge based upon prior knowledge and experiences (Vygotsky, 1978). According to this theory, teachers and students both generate knowledge as they reflect and work together towards conceptual understanding of the content (Vygotsky, 1978). Even though the school employed this model of knowledge acquisition, there was not a place for students to reflect upon their knowledge. In 1999, this deficiency was noticed by a small group of education and natural sciences faculty involved with the elementary science education program. This group also recognized a need for acknowledgement of nonformal learning experiences, since valuable skills and knowledge are also gained during those experiences and provide the foundation for further learning. To address both of these needs, a grant was obtained in

2000 through the Fund for Improvement of Postsecondary Education to partially subsidize development of Science Education Portfolios (SEP). SEP was the first formalized use of ePortfolios to be implemented at the university. At the inception of SEP, it was limited to a sequence of six science courses and was required of students seeking initial elementary teacher certification. Students used Microsoft Frontpage and file transfer protocol to edit and load their SEPs to a UMD server for review. The process of creating the portfolios and loading them to university servers was difficult for many students and for the faculty who needed to acquire the technological skills themselves in order to teach the students. As one faculty member commented,

We spent a lot of time teaching them how to edit html, which wasn't fun. I think we spent more time teaching them how to write and code html than we spent trying to get them thinking about the work or the papers.

The SEP portfolio, because of its heavy technical training focus, largely fell into the "enrichment add-in" category as defined by Massy and Wilger (1998). The other two levels of technology adoption include personal productivity aids and paradigm shifts. *Personal productivity aids* are defined as any tools or technologies that allow one to work more efficiently. *Enrichment add-ins* are resources such as multimedia, websites, and simulations that can be used to enhance the educational experience but do not fundamentally change how instruction is delivered. The paradigm shift level of innovation involves an actual change in how teaching and learning take place as the result of implementing a new innovation or technology. SEPs were unexpectedly an effective way to develop the technology skills and proficiencies of students and faculty (similar to Milman, 2005), while also laying a solid foundation for future ePortfolio integration to impact teaching and learning within School of Education (SOE).

Within a year of SEP adoption, several other academic programs recognized the SEP model as a useful tool for students to reflect upon their learning experiences and to integrate the connections between their classroom experiences. In 2002, the Early Childhood Education (ECE) and Educational Technology (Ed Tech) faculty started to use ePortfolios with their respective classes by modifying components of the SEP to meet their programs' goals. The time required to implement ePortfolios within ECE and Ed Tech programs was greatly reduced in comparison to the initial development of the SEP because a model now existed. While the three programs had much in common, they operated and supported ePortfolios

independently from each other, including using different platforms. This resulted in redundant work for students, who were required to create and maintain multiple portfolios in order to satisfy the requirements of the ECE, Ed Tech, and Science Education programs, including mastering different tools. Additionally, in all three programs, lecturers often taught courses for a term or two, requiring continual professional development (both technical and pedagogical) as new lecturers were assigned core ePortfolio courses. Because of a lack of institutional structure, faculty shouldered professional development responsibilities with only minimal assistance from technology support staff, who had other job responsibilities. While the administration supported the use of ePortfolios in general, there were not any financial resources set aside for portfolio integration, so that the use of portfolios was largely dependent on individual faculty implementing them in their respective courses.

Early Majority Adopters: From Program Level to School Level Discussions

In 2003, SOE governing faculty and administrators acknowledged that a more formalized approach to using ePortfolios would benefit students and faculty and could be used by SOE to demonstrate a student's attainment of specific state standards for accreditation purposes (see Reese & Levy, 2009). An ePortfolio committee was formed and charged by the dean with the task of aligning relevant state standards for beginning teachers with courses offered at the SOE. By aligning standards and courses, assignments could be identified from specific courses to serve as artifacts for students to include in their portfolios. In this alignment process, the committee identified several issues that would need to be addressed before proceeding with the integration of portfolios at the school level. Many of the issues concerned questions of policy, such as how state standards aligned with institutional and unit level goals; the meaning of basic proficiency; whether requiring faculty to incorporate specific assignments impinged on academic freedom; and whether portfolios would be used as a means of program assessment and course alignment. Other questions concerned the functional requirements for tool adoption, including who would own student portfolios; how access between students and faculty/administrators should be managed; how portfolios could demonstrate individual development over time; by what process faculty should assess student portfolios; and how portfolio submissions and requirements should be managed. While the committee developed school-wide recommendations (including utilizing one software program across all programs), the three SOE programs continued to have their students work on their program-specific portfolios.

The committee's recommendations focused largely on ensuring that faculty and students had flexibility with respect to which artifacts would be included in the ePortfolio, how they would be integrated into the teacher certification program, and who would be responsible for reviewing the portfolios. These recommendations were that:

- students be allowed to select from among several assignments in a range of courses to demonstrate that they have met the appropriate proficiency level;
- the majority of the portfolio construction and evaluation should take place as part of the student teaching seminar at the end of their program; and
- students should have several professional competency checks along the way to ensure that they are developing appropriately throughout their program.

Unexpectedly, the process of implementing ePortfolios helped align institutional requirements to state professional standards and engage faculty in discussions and decision-making that had implications well beyond ePortfolios (e.g., ownership of student/course work, program vs. school-wide decision making, assessment standards, etc.), in addition to the original goal of serving as a powerful educational tool for students and faculty (see also Inoue, 2009; Lorenzo & Ittelson, 2005).

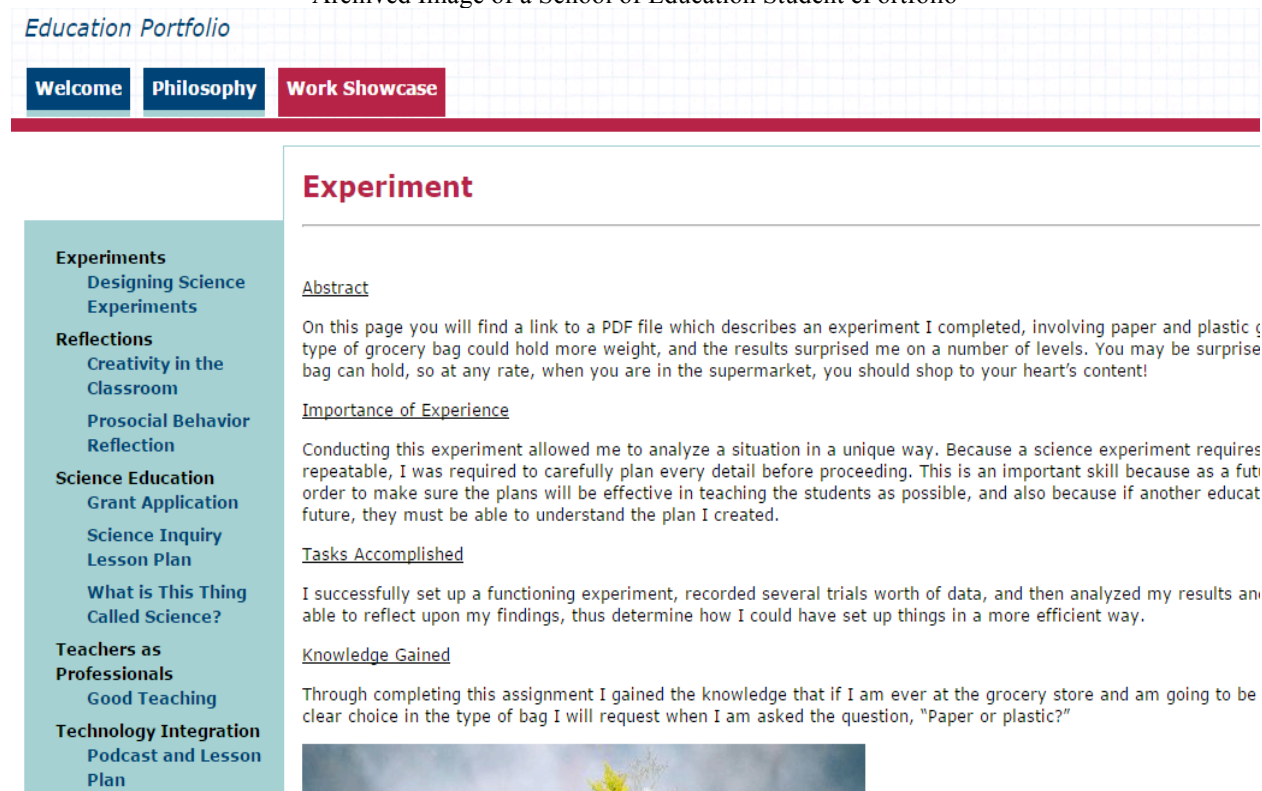
Toward the end of the 2006-07 academic year, it was discovered that one of the UMD sister campuses was using the Open Source Portfolio (OSP) to integrate ePortfolios. School of Education faculty approached the administration and inquired about exploring the use of OSP in the SOE. Permission was given to pursue this option, and in the winter of 2008, a presentation was given at an SOE Governing Faculty meeting that outlined the features and functionality of the OSP tool. This tool was built on the Sakai platform and was directly connected to the learning management system (LMS) that students and faculty were already using, which meant that the interface was quite familiar to the majority of potential users. Since the Dearborn campus was already receiving support for using the Sakai LMS, there was no additional cost for supporting the use of the OSP. After this presentation, it was decided whether the SOE would enter into a pilot phase for the 2008-2009 academic year. The SOE administration supported this decision because it allowed the school to leverage the resources already designated for use of the Sakai LMS. The UMD sister campus was also in favor of the school piloting OSP, as it allowed them to expand their research and development of the tool. During this phase, faculty developed and implemented a shared vision and an initial plan for piloting and evaluating OSP

across the curriculum. This included identifying existing curricular pathways and pedagogical strategies to support students in fully utilizing ePortfolios and developing new strategies where necessary. This phase also included a small pilot of students using ePortfolios in specific areas of the curriculum.

Engagement of faculty was voluntary and varied during the piloting phase. Again, while the administration was supportive of participation in the pilot, it was left to individual faculty members to decide if they wanted to participate, which meant learning how to use the portfolio tool and revising their courses to integrate it effectively. More than half of the faculty fully embedded ePortfolios into their courses, expecting full-scale implementation to follow the pilot. In contrast, two faculty members were hesitant to fully embrace ePortfolios in their classrooms because of a lack of clarity concerning how ePortfolios would be adopted beyond the pilot. As one stated during one interview, "I don't know how this is going to play out with the School of Education so I don't want the portfolio to be that integral in the class." Three were concerned that ePortfolio implementation might become overly structured and lose its value for their classroom and for students, in particular transfer students.

During the summer of 2009, as a result of the one-year school-wide pilot, SOE faculty determined that ePortfolios should be focused on engaging students in analysis, reflection, feedback, and dialogue in order to help them understand how their varied experiences (both in the classroom and outside of the classroom) could demonstrate their core values and philosophy towards teaching. The focus at this point was consistent with contemporary ePortfolio research, including the work of Young (2002) and Richardson and Ward (2005). To meet this focus, students were required to include Welcome and Philosophy pages where students could introduce themselves and share their thoughts and ideas about teaching and learning. In addition, each student developed a Work Showcase, which was a collection of "examples of work" in which students documented and reflected on their learning as they moved through the teacher certification program. Students organized their Examples of Work within the Work Showcase into skill areas that represented their teaching values and core strengths. Figure 1 shows an archived image of a student portfolio from this period of ePortfolio implementation.

Figure 1
Archived Image of a School of Education Student ePortfolio



From 2009-2011, SOE faculty worked to integrate ePortfolios into their coursework using OSP. The use of ePortfolios was not required, but all faculty choosing to use portfolios with a class were expected to use OSP to minimize confusion for students. Faculty across the school agreed that students would maintain one ePortfolio for all of their courses, allowing students flexibility within the basic structure (as described above) in completing portfolio assignments across their courses. Regular training sessions were developed and facilitated for students and faculty in order to help them learn the basics of the OSP software. In addition, a new course called Introduction to Education was created and required of all students entering the teacher certification program. This course was first offered in the Fall 2010 term and was focused on helping students understand the core expectations for teachers graduating from UMD, becoming familiar with portfolio requirements so that they could document their development towards the core expectations, and crafting a basic start to their portfolio, including a welcome page and philosophy statement. The expectation was that these basic components would evolve as students worked through the program. Having students take this class early on in their coursework helped them understand the value and purpose of developing a portfolio over time, as well as develop the technical skills to continue working on it in subsequent classes. With this basic foundation set through the Introduction to Education course, faculty teaching subsequent classes could shift their focus from the basics of portfolios to portfolios that were intentionally tied to the goals of their course, thus allowing portfolio work to move from being an enrichment add-in to a paradigm-shift level of innovation (Massy & Wilger, 1998).

As portfolio use became more prevalent in the SOE, other departments and academic units on campus became interested in using them as well. Faculty from a variety of disciplines, including engineering, English, foreign languages, writing, math, and the sciences started to incorporate ePortfolios into their own courses. In response to the expansion of ePortfolio integration across campus, in 2010 a new university-level administrative position was created to manage the use of portfolios throughout the institution. The creation of this position made it possible to leverage the work and resources of individuals across the campus and for the project to move forward as a collaborative ePortfolio initiative rather than several disparate groups working in isolation from each other. While we maintain that the stimulus and initial support for ePortfolios on campus came from faculty, the hiring of a faculty member to oversee ePortfolio development and implementation was also crucial once the portfolio had gained some momentum and credibility at the university. It also

signified explicit support from the Provost and central administration for the use, and importance, of ePortfolios across all disciplines. Figure 2 shows a rapid increase in the number of faculty who used ePortfolios once the position was staffed. It is important to note that the decrease from 2013-2014 occurred when the faculty member was on a leave of absence and the position was left largely unstaffed. This individual returned to campus in 2015 to resume the role of ePortfolio support, recruitment, and assessment.

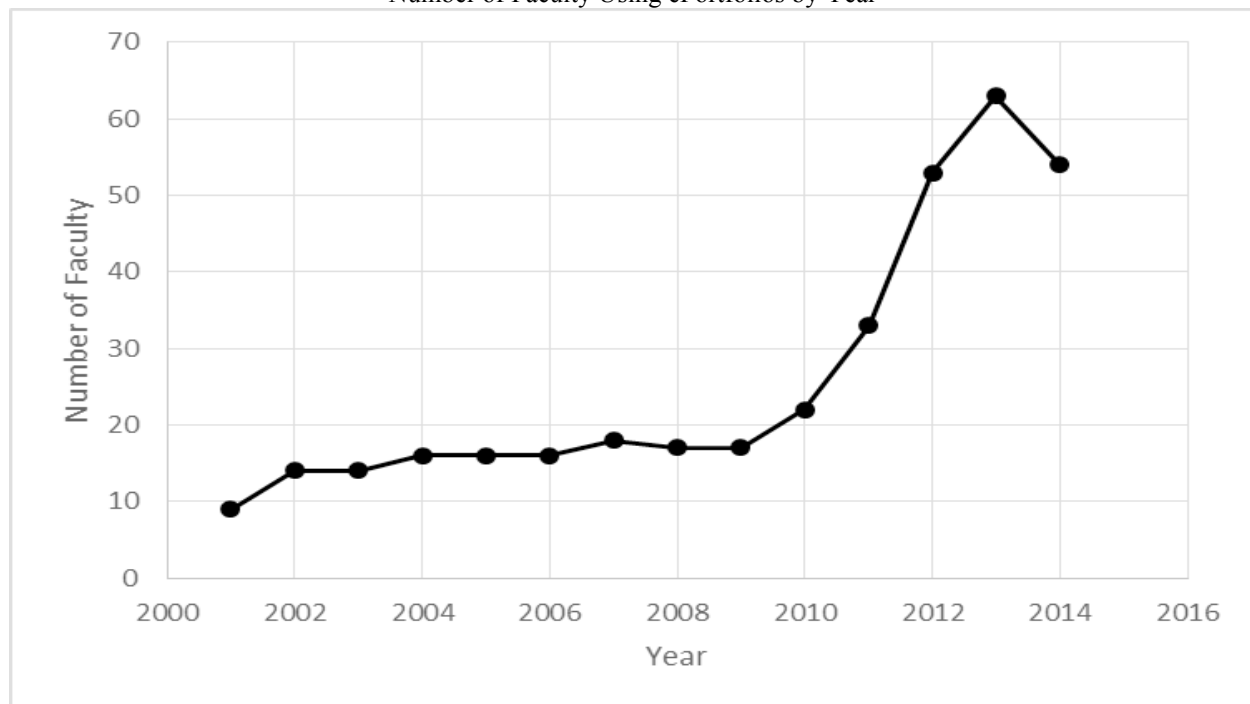
In 2011, it became apparent that the OSP tool was no longer going to be supported by the university, which necessitated the transition to another portfolio option. Google Sites was selected as the new option for a variety of reasons. First, UMD was already planning to transition to the Google suite of productivity tools so using Google Sites fit logically with that initiative. Secondly, Google Sites provided the SOE with an interface that was easy to learn and manipulate and that was familiar to a majority of faculty and students. Finally, Google Sites is independent of the university, unlike the OSP tool, which was directly tied to a student's enrollment status. By using Google Sites, students could continue to have access to their ePortfolios even after they graduated. The transition to Google Sites took place from 2011-2012 and at present, all faculty and students utilizing ePortfolios use Google Sites.

Shifting Paradigms

A major source of data was 13 interviews with faculty members who had implemented the ePortfolio. While the interviewees were selected using a convenience sample, an attempt was made to interview faculty who had implemented portfolios in different phases of adoption and came from different units on campus. The sample of faculty included three innovators, two early adopters, three late majority adopters, and five late adopters. Six faculty members were from the SOE, two from the natural sciences, one each from engineering, sociology, psychology, composition, and student affairs. An inductive analysis (Thomas, 2006) of the interview transcripts uncovered several shifts in how faculty members perceived their classrooms. Most notably, all interviewees found that implementing portfolios in their classrooms positively impacted their perceptions of students. As stated by a faculty member (who was a late majority stage adopter) of over 40 years,

All of the sudden, I am seeing students as live people with hobbies and interests and goals and I developed a respect for them, a new kind of respect. I always respect students, but it is a new kind of respect because I am aware of their aspirations. That alone is worth it.

Figure 2
Number of Faculty Using ePortfolios by Year



Or, from the perspective of a late majority stage adopter lecturer,

It gives me some insight into them personally so I can continue to make the connections. They may allude to a brother or sister who has autism or something like that. I connect with them and I also get a better feeling for students who are struggling to write.

Another faculty member of 20 years who was also a late adopter remarked,

You really can see their backgrounds and experiences and it just really made each of them seem somehow unique. And I think after a while you get to where you forget that and you can't as a teacher—you go up there and you do your thing and you get so burned out and you forget. To me at this point in my career, I really felt like that is a valuable thing for me.

As faculty gained insight into the aspirations of their students, over half of the interviewees commented on how their instructional practices changed to make assignments more applicable to students' goals. This was true regardless of what stage of innovation the

faculty member was in. The most common adaptation was integrating examples into lectures or handouts that were directly related to students' career goals. As an example, one engineering faculty member learned that his student was interested in helping remote villages have access to clean water. As a result, the faculty member modified a lecture to specifically include discussion of hydraulic engineering. One faculty member who was an early adopter was able to better align her teaching based on how her students perceived the value of assignments:

It's given me a much better thermometer to their experiences in my classroom, which is what I didn't fully expect . . . [W]hat I aim as the usefulness of something is not what they see as useful. I'm not saying that their [perspective] is wrong and mine is right, but it is a disconnect that I didn't see before.

The majority of faculty commented how metacognition and reflection became the focus of portfolio assessment. As expressed by an innovator stage Education faculty member,

What I'm hoping to see is kind of the ability to kind of connect the assignments to a broader theme

for the class so kind of what's coming out of it . . . to develop some metacognition. Moving from individual assignments to looking at all the assignments . . . that's a shift.

Or, as a late adopter recalled telling her students, "You're being graded on what you learned, how you framed it, and how you can come up with some sense of what you got out of that experience." This shift in expectations created the greatest challenge for nine of the interviewees, as they felt students struggled to reflect and make connections among their experiences. As summarized by an innovator stage Education faculty member,

I think reflecting is hard work. Worthwhile reflection, connection making is hard. They don't always come easy, a lot of times they almost come serendipitously, some investments of thought are important and it doesn't always feel good. It's fuzzy work. It's not passive task-oriented work. And yet we are trying to attach a task to it.

While the process of designing and implementing ePortfolios at the university progressed, a variety of issues arose that at times seemed to have conflicting goals. For instance, when the ePortfolio was used solely by the science education faculty and their students, it was possible to have one commonly agreed-upon goal for the portfolio, but as different content areas within SOE and later units within the university adopted the portfolio, the content and purpose of the ePortfolio needed to be expanded to meet the needs of a wider and more diverse group of faculty and students. Meetings between existing users of ePortfolios and other interested faculty/departments resulted in a single agreed-upon purpose for ePortfolios on campus: it was to be used as a tool for students to integrate program learning goals with experiences within and outside of UMD classrooms. The overarching goal, which is still in place today, is for students to gain a deeper understanding of their own learning and to be able to articulate the knowledge and skills they possess. This goal is broad enough to satisfy colleges within the university that must provide evidence of student learning to accrediting agencies, as well as to programs within the social sciences or even student leadership organizations.

Based upon the main campus goals, SOE faculty created a common rubric to help standardize and systematize review of student teaching ePortfolios. A rubric used with Science Education Portfolios in the early 2000s served as a starting point for the development of a college-wide rubric for SOE and as a model for other units needing a rubric model. Developing a common rubric occurred over the course of an academic year. First, governing faculty were

engaged in work sessions to identify learning outcomes that would be appropriate across a variety of content areas. Once common learning outcomes were identified, the criteria and scales for the rubric were established. The resulting rubric is used as a final assessment for student teachers and also has the core elements used in various SOE courses. This format provides faculty with the freedom to adjust the rubric as needed, while making sure that the final learning outcomes, as students progress through the teacher education program, are visible to all students and faculty. The SOE rubric illustrates how assessment of the ePortfolio contents can be efficient and outlined clearly for faculty, while still allowing for individual student expression. The SOE rubric has also helped align student expectations of their program and learning expectations, since the learning outcomes are presented transparently to them at the beginning of their program. Faculty in the other units have used the SOE rubric as a basis for developing their own rubrics, to reduce perceptions about the difficulty and time required to evaluate student ePortfolios.

This case study focused solely on data collected from faculty members using ePortfolios in their courses. Future research will investigate the impact of ePortfolios on students and their ability to better integrate their learning as a result of reflecting on their thinking within the portfolio. This line of research is a logical follow-up to the current study, as it will help to guide instructors more effectively in their use of ePortfolios and provide potential evidence to support the broader implementation of portfolios across all academic units.

Discussion

The first case study research question—"how was the ePortfolio implemented in a higher education institution with a strong shared governance structure?"—revealed that the Science Education Portfolio group served as the innovators who tested ePortfolios in their curriculum. As interest grew, the early adopters came on board, and interest in the new innovation grew (i.e., Educational Technology and Early Childhood Education). Adoption led to the early and late majority (i.e., other departments and programs) coming onboard with implementing ePortfolios. Resources and energy were devoted to supporting willing adopters rather than trying to convince laggards to integrate ePortfolios in their teaching.

The second research question asked how understanding the implementation of the ePortfolio in this case would enable the identification of features that would facilitate the implementation of the ePortfolio on similar campuses. This led to five recommendations for

similar institutions wanting to implement a reflective, integrative ePortfolio. They are:

First, recruit a small core of faculty who are dedicated to the project (i.e., identify and recruit the innovators and early adopters). Keep in mind that it only takes an adoption rate of 10-20% to constitute a critical mass and increase the likelihood that an innovation will be sustained (Rogers, 1995).

Second, identify core values of the ePortfolio as early as possible in the project. While the details may change depending on the unit or faculty, the core values and goals of the portfolio should remain the same. In addition to providing a common language and set of goals for students and faculty, it will also provide a framework that can be used to evaluate the impact of the ePortfolio, despite differing contexts.

Third, keep the ePortfolio work visible through faculty/staff brown bag lunches, student showcases, etc. Such events, where the adopters—whether students or faculty—describe in their own words how the ePortfolio has affected their learning/teaching generate enthusiasm for the ePortfolio. These opportunities also allow faculty to share models of implementation and develop best practices as a community.

Fourth, have a variety of resources available to teach students, staff, and faculty the technological skills needed to create an ePortfolio. We have found that faculty do not have or want to use classroom time to teach students how to set up their ePortfolios. Similarly, many students like to “mess around” on the computer and figure out the technology themselves or by watching a video or reading a handout. One technique we found helpful was to hire student workers to staff open ePortfolio studio hours for those faculty and students who learned best through individualized direct instruction or who had particular questions they wanted addressed.

Fifth, BE FLEXIBLE! Recognize that your ePortfolio is a tool and should not be dependent upon a single learning management system or software program. It is difficult to anticipate the technologies that will be available for future ePortfolios. During the past 15 years, we have used multiple programs and sites to host the ePortfolios. Once we became invested in the goals of the portfolio and less wedded to a particular host or program, the inevitable changes that occurred were less difficult to navigate. It does take time and effort on everyone's part to transition to new software, but if the ePortfolio goals are similar, students see that their prior ePortfolio work can be integrated into the new system, and faculty are able to adapt their instruction rather than having to start over.

It is worth noting that none of these recommendations mentions soliciting support and resources from administration. Case study analysis indicated that in an institution with shared governance,

the crucial driver for implementation and sustainability of ePortfolios is faculty buy-in. Once that is established, specific resource needs become apparent and can be communicated to the administration, along with ePortfolio artifacts that demonstrate the value of the portfolio. Basing the ePortfolio on faculty commitment also makes it less likely that the innovation will be seen as an administrator's “pet project,” destined to die when personnel change or priorities and political winds shift. This is not to suggest that administrative support is not necessary or important when implementing ePortfolios across an academic unit. Within all stages, the SOE faculty openly communicated with administrators and shared ideas on the use of ePortfolios within their classes and across the broader curriculum. In addition, the administration demonstrated support for ePortfolio integration through the development of an ePortfolio committee and allowance of ePortfolio related agenda items at governing faculty meetings. However, this initiative moved forward because a core group of faculty was interested in integrating portfolios in their courses and saw the benefit of expanding this integration more broadly across the entire School of Education.

The development and implementation of the ePortfolio over the past 15 years has not been a linear or even a continual process. There have been many periods of stagnation (e.g., during the middle phases of the science ePortfolio) as well as times of rapid change (e.g., when a new ePortfolio system such as Google Sites was adopted by UMD). But what has always been present is a commitment to the goals of the ePortfolio and faculty motivation to integrate the portfolio into their courses. The number of faculty involved in the project has grown steadily through word of mouth, from involved faculty to their colleagues seeking a venue to encourage their students to integrate learning experiences and develop reflective skills. The students' response to the ePortfolio has also been positive; in fact, students have asked faculty excitedly at the beginning of a term, “Will we use the ePortfolio in this class?” We have also discovered that students are motivated enough by the ePortfolio that they begin those assignments earlier than other assignments, since they want the portfolio to represent their best work to a wide audience. The examples of work on the portfolio are no longer viewed simply as assignments to complete for a class; rather, they are meaningful representations of what the students know and can do.

Although the administration provided staff support in the latest stages of implementation, the vast majority of the work was done, and is still done, voluntarily by the faculty. In fact, specific senior officers were quietly told to temper their enthusiasm for the ePortfolio so that the initiative would not be

associated with administration and thus become influenced by the politics present between the administration and faculty. Happily, the senior officers complied with the request, and the ePortfolio is viewed as a faculty-led initiative.

The bottom-up model of innovation implementation has proven to be successful and sustainable at an institution with shared governance since the model does not depend on administrative support, the commitment of a specific faculty member, or even a particular technology.

Surrey and Land (2000) identified categories of innovativeness in order to create a framework for supporting faculty in the implementation of new technologies. One of the key components they identified was an institutional commitment to change backed by ongoing training, financial support, access to relevant technologies, and a willingness to accept failure as new strategies and technologies are being implemented (i.e., creating a staff position to support ePortfolios). The widespread adoption of ePortfolios and other instructional technologies would be difficult to sustain in the absence of these supports, even in institutions employing the bottom-up model of innovation diffusion, as there are limits to the impact that innovators and early adopters can have on the momentum of a new innovation. The UMD case study supports the notion that adequate institutional support (training, pedagogical support, financial support, and access to technology) is necessary to deal with the inevitable issues and roadblocks that arise with any new initiative.

Conclusion

This case study has demonstrated that the bottom-up approach is an effective change management process to use in shared governance settings when implementing technological innovations such as the ePortfolio. Over the past 15 years, the ePortfolio has been integrated into the instructional practices of 89 different faculty members (15% of the total UMD faculty) in all four colleges, as well as in leadership programs facilitated through the Student Engagement Office. This number is squarely in the middle of what Rogers (1995) called the “critical mass” needed to implement and sustain an innovation.

The ePortfolio even serves as a link between a local community college and the university, as the incoming transfer students who are part of the honor transfer program complete a class in which the ePortfolio is the tool used to represent student learning. Administrators did not prescribe any of these activities; instead, they all built upon positive past faculty experiences with the ePortfolio and required minimal staff resources to support and

sustain the work. For these reasons, it is highly likely that the use of the ePortfolio in the university will continue even with the inevitable changes to software, faculty, and staff. The university staff and faculty support the ePortfolio as a reflective tool, and that appears to be the core requirement necessary to sustain the use of this technology.

While there are other case studies that illustrate how ePortfolios have been integrated into many different types of educational settings, there are very few that describe how integrative, reflective ePortfolios have originated and been sustained using a low cost, bottom-up model of implementation. It is our contention that this case study provides a rich and motivating source of information for those who want to employ ePortfolios in their institution.

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Voicing the E in WOVE: Improving Reflection in ISUComm Foundation Courses ePortfolios

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Using the literatures of student personal epistemology and approaches to learning, this article describes one WPA's deliberate pursuit of a deep approach to her learning about reflection. Other WPAs and instructors who have encountered an unexpected gap in their programs' or classes' work with reflection can revise documents and re-tune pedagogy so that students are encouraged from the beginning of the course to think of their learning in terms of a narrative and not a container, seeing multimodal communication work in first- and second-year foundational courses as a developing network of understanding and ability rather than as an accumulation of discrete bits of skill and knowledge. We can do this by encouraging students to more meaningfully and concretely understand their learning processes as developing and their reflections as representations of those processes. The ePortfolio can provide the space and the occasion for such an understanding when it functions as more than merely a storage space and when accompanying curricula and pedagogy invite students to become self-aware learners through the powerful potential of their reflective work.

"Change merely for the sake of change is inappropriate, but an appreciation of *changing* as a curricular stance creates reflective and revisionist opportunities for teachers and administrators." (Graban & Ryan, 2005, p. 91)

Our long-standing multimodal ISUComm Foundation Courses program positions reflection, along with analysis and composition, as one of three essential communication abilities. In our program, students develop these communication abilities in the context of our WOVE curriculum, which attends to four communication modes: Written, Oral, Visual, and Electronic. ISUComm, as a communication-across-the-curriculum program, aims to engage a broad set of communication competencies. Rather than focus solely on written communication, ISUComm develops as well students' oral, visual, and electronic knowledge and practice. ISUComm Foundation Courses—the two-course sequence required of all students—is the critical launching pad for this communication learning. Using written, oral, visual, and electronic texts, students analyze, compose, and reflect as they learn and practice the flexible value of the rhetorical pentad: context, substance, organization, style, and delivery. Reflection therefore is one of the three essential communication activities in which students engage in our program and many like ours. Because we, like other programs, perceive reflection as integral to transfer and general development as a learner, both of the ISUComm Foundation Courses list reflection on communication processes, strengths, goals, and growth as course goals. Thanks largely to the long-awaited introduction of ePortfolios in ISUComm Foundation Courses, we have recently been able to examine more thoroughly what students are learning about and from reflection in our courses.

Using the literatures of personal epistemologies and approaches to learning, as the writing program administrator (WPA) of ISUComm Foundation Courses, my own learning about our programmatic use of reflection has revealed that our curricular and pedagogical attention to reflection will benefit from work that elicits potentially deeper representations of learning. As elaborated in this article's third section, the framework of learning approaches (Entwistle, 1988; Marton & Säljö, 1976), with its distinctions between surface, strategic, and deep approaches to and resulting representations of learning has been critical to our program's changes relative to reflections in ISUComm ePortfolios. By adopting a deep approach to my own learning about how our curricula and pedagogy guide our students' reflective work, I am better able to identify curricular modifications to meet ISUComm Foundation Courses' reflective goals and pursue change that is not just reactive or utilitarian but that provides us the "reflective and revisionist opportunities" characterized by Graban and Ryan (2005, p. 91).

Operationally, ISUComm Foundation Courses are guided most directly by Dewey (Dewey 1938; Dewey 1944) and Yancey (Yancey, 1998; Yancey, 2004) in the use of the term *reflection*: reflection is conceived of as both process and product, a simultaneous looking forward and backward while meaningfully integrating the learning of the moment. In ISUComm Foundation Courses, students are asked to communicate, clarify, and evaluate their composing and learning processes and resulting products by systematically noticing and thinking about patterns in their learning; connecting their processes and learning to course outcomes and terminology as well as to work in other contexts; and identifying growth—specifically, how that growth occurred and what work students may need to do in the future to continue to develop as learners and effective

multimodal communicators. Students are encouraged, as part of their reflective work, to take into account their own re-thinking of and others' feedback on their work, so that they gain increasing agency over their performance and their learning in general.

Voicing the E in WOVE

We have required paper portfolios in ISUComm Foundation Courses from the inception of the program, about 2005, but their practical usefulness as an evolving record of student learning, and reflection on that learning, was problematic, both for students and for the program. On occasion over the years, we had quipped that it seemed like the E in WOVE was silent, and certainly in terms of the dualism between consuming and producing electronic content, there was some programmatic frustration about that—a recognition that we were not providing all we could for students' 21st-century communication learning. While our curriculum does include student learning in basic graphic design for programmatic projects such as creating brochures, posters, and slideshows electronically, adopting ePortfolios in ISUComm Foundation Courses brought more technology affordances, including archiving, revising, sharing, and interactivity. Frankly, students also enjoy working in the digital space of ISUComm ePortfolios, and the idea that they exit our two classes with a website they can continue to add to—a benefit the paper portfolio did not provide. As the WPA, I had struggled with the feeling that the paper portfolio seemed less an authentic and genuinely useful project for students and more a simple compilation of one or two semesters of work; the likelihood of students revisiting and adding to a paper portfolio in later classes seemed remote. How could they readily use it another class, for instance, or as part of an employment package? On the other hand, as we know, ePortfolios offer potentially deeper learning, not just about the electronic mode, but about students' awareness of themselves as agentive learners.

Lacking a university communication-across-the-curriculum director to spearhead an institutional ePortfolio initiative, developing and introducing ISUComm ePortfolios in ISUComm Foundation Courses took a great deal of political, technological, and personnel effort. Perseverance and a proof-of-concept presentation to an assistant dean garnered an enthusiastic go-ahead, and some Rhetoric and Professional Communication PhD students with enthusiasm, vision, and programming skills boosted ISUComm ePortfolios in ISUComm Foundation Courses to a three-semester pilot phase in 2013. Without question, launching ISUComm ePortfolios in our program was a significant milestone, and I eagerly anticipated the ways in which all aspects of student

portfolio work, and especially reflections, would reflect this change. After all, we had finally voiced the E in WOVE!

Piloting ISUComm ePortfolios and Taking Stock

With National Council of Teachers of English (NCTE) and Council of Writing Program Administrators (CWA) standards and statements guiding us with our course outcomes and best practices from the inception of ISUComm Foundation Courses, we looked also to the Association for Authentic, Experiential, and Evidence-Based Learning (AAEEBL) as we integrated ISUComm ePortfolios, “a meta-high-impact” practice (Kahn, 2014) into our program. We wanted more than better assessment ability and even more than being able to say we had fully implemented the E in WOVE. As Yancey (2004) asserted, ePortfolios allow students to represent themselves and their learning with more complexity than do print portfolios, thus facilitating student navigation in 21st-century communication environments by providing a “new kind of space for student work” (p. 747). Compellingly, this digital composing and metacognitive space “provides for the invention of a different particular kind of student: one who can make multiple connections and who creates *depth* [emphasis added] through multiplicity and elaboration, who can work in visual and verbal and aural modalities” (Yancey, 2004, p. 751). Three semesters of dozens of archived pilot ePortfolios, coupled with a state-mandated assessment report in academic year 2015-2016, allowed us to undertake a combination of informal assessments of ISUComm ePortfolios in conjunction with beginning to scale up to the more than 300 sections, several dozen instructors (predominantly adjuncts and graduate teaching assistants), and 7,100 students in our program. Aside from ease of use of the WordPress platform, provision of technical support and training, and the benefit to students of WOVE work within ISUComm ePortfolios, I was eager to examine ISUComm Foundation Courses students' abilities to reflect on their work in our courses—to demonstrate that they were gaining from the “fundamentally different intellectual and affective opportunities” ePortfolios provide (Yancey, 2004, p. 742).

Certainly, archived ePortfolios provide a window onto our program that paper portfolios never realistically permitted. We have been pleased, though not surprised, that student artifact and design work within ISUComm ePortfolios is easily competent, even good (no doubt due to the visual and graphic design work already integrated into the curriculum). But student reflections—their representations of their learning in our courses—only rarely articulate the depth of learning the students would seem to have engaged in to produce the various artifacts

in the ePortfolio, indeed, to actualize the digital composition itself. Reflections show students (mostly) diligently trying to deliver what they “think we want” in this part of their ISUComm ePortfolio—what they need to do to satisfy this element of the ePortfolio assignment; however, many conflate their reflective purpose with one or more of the forms Riedinger (2006) said are not reflection (e.g., summaries, lists, clichés; pp. 92-93). Indeed, as I have come to understand, a significant part of the shortfall in student reflective work has been precisely that students have tended to conceive of reflection more as a requirement to be satisfied and less as an embedded, systematic practice integral to their learning. Naturally, my concern as a WPA is that students’ insubstantial representations of their learning—the lack of evidence of their standing aside from it (Silver, 2013), abstracting from it, and connecting it to other communication contexts—render that learning less transferable beyond our two courses. Inasmuch as “learning occurs in the process of representing learning” (Moon, 2004, p. 147), more productive ePortfolio representations of learning are not merely desirable, they are essential. Because reflection is integral to “folio thinking” by functioning to “encourage students to integrate discrete learning experiences . . . enhance students’ self-understanding[,] promote students’ taking responsibility for their own learning[, and] support students in developing an intellectual identity” (Designing Education Lab, 2016), reflections that demonstrate honest self-examination and connection to prior and future learning are more effective than those that O’Neill (2002) characterized as “ritualistic.”

To address the difficulty with meaningful reflection that voicing the E in WOVE in our program laid bare for us (elaborated below), I turned to scholarship about personal epistemologies evinced specifically in the first year of post-secondary education (Brownlee, Walker, Lennox, Exley, & Pearce, 2009; Hofer, 2004; Schommer-Aikens & Easter, 2006), as well as the scholarship of student approaches to learning (Biggs & Collis, 1982; Entwistle, 1988; Marton & Säljö, 1976; Moon, 2004; Rossum & Schenk, 1984). These scholars showed that students’ personal epistemological assumptions affect their approaches to learning, and first-year students in particular will naturally rely on the approaches to learning with which they have experienced the most reinforcement: what has been sufficient in their schooling to date (Hofer, 2004; Rossum & Schenk, 1984). However, since students’ approaches to learning are connected perforce to their concepts of learning and to transfer potential, it is problematic that many first-year students’ representations of their learning suggest a view of knowledge as “an accumulation of discrete, concrete, knowable facts [rather than] an interrelated network of concepts that

are relative, contingent, and contextual” (Hofer, 2004, p. 143). Representations that fail to show knowledge as a developing network suggest that students tend to isolate and atomize skills and practices they perceive as specific to success in individual classes, but whose later benefit and role in their learning trajectory is unarticulated and perhaps not even recognized.

Hofer (2004) and others (e.g., Brownlee et al., 2009) highlighted an important consideration about the first year of post-secondary school, one that applies directly to WPAs’ and instructors’ efforts in foundational ePortfolio reflections. Encouraging representations of learning like Hofer’s networks of interrelated concepts is especially beneficial for first-year students, whose personal epistemologies may be at variance with those more optimal for effective learning during their university experience. Nelson et al. (2008) said of students’ pre-existing, “ill-informed preconceptions about . . . what it is to be an independent learner” that “it is the duty of universities to deal honestly with these expectations” (p. 9). Rossum and Schenk (1984) agreed, having noticed that beginning students’ views about learning need to be deliberately and purposefully addressed in curricula and pedagogy. Hofer (2004) added that, although restrictive and less adaptive student preconceptions are likely to appear in first-year and introductory courses, it is precisely because these courses “play a powerful part in students’ socialization to college study” (p. 161) that we need to ask students explicitly to recognize and articulate the meta-processes and meta-meanings of their learning, as well as the fact that their preconceptions about learning are amenable to change and not immutable personal characteristics. Certainly, Yancey’s (1998) assertion that “curricula are exercises in identity making” (p. 43) reminds us that intentional, scaffolded curricula and focused instructor development can help students rethink their preconceptions about learning as they revise the narratives of their learning.

A “Strategic” Approach Falls Short for a WPA

The framework of different approaches to learning (Entwistle, 1988; Marton and Säljö, 1976) was described by Moon (2004) as

probably a more helpful construct than any other in the realm of student learning . . . the background of much study of student or higher level learning, even though it is not sufficiently known by teachers or learners themselves. (p. 120)

I suggest that the framework of learning approaches—deep, surface, and strategic—is extremely helpful in teasing out a program’s understanding of reflection and how WPAs and instructors might take

steps to improve this important part of the curriculum.

Briefly, the framework shows that students taking a deep approach to learning engage with assignments and course goals holistically, acknowledging their complexity and interrelatedness with other material; this approach allows students to construct meaning rather than file away separate facts, thereby effecting significant and increasingly transformative revisions of their learning representations. These students recognize their learning as a journey, a narrative, rather than a destination point or a conclusion, and they see ongoing growth as foundational to this journey, rather than believing their learning is dictated by fixed personal characteristics.

A surface approach to learning, on the other hand, treats course content discontinuously, as discrete pieces of information to be memorized for later recall, independent of course learning goals and potential future use. The framework describes a surface approach to learning as the filing away of atomized bits of knowledge often embodied in rules and procedures. Surface student reflections show what Jarratt, Mack, Sartor, and Watson (2009) described as an understanding of learning as a container in which pieces of information are gathered in a process of accretion, rather than as “a narrative constantly under construction within changing contexts” (p. 49). As a result of taking a surface approach, students can have “difficulty in making sense of new ideas presented” (Moon, 2004, p. 122).

A third approach to learning is the “strategic,” in which the learner determines the amount and kind of effort required to produce a desired result (for students, this may be “what the teacher wants” or “what I have to do to get a good grade”). The strategic approach is motivated by pragmatism and single-minded focus on a utilitarian outcome, without specific attention to its connection to a larger network of understanding. Because the strategic learner’s goal is to accomplish immediate goals efficiently, it is not reliably conducive to student representations of learning that achieve a “meta” level of understanding about that learning.

Sampling reflections from the pilot semesters and an additional small-scale assessment, we used the framework of approaches to learning to sort and analyze what is and is not satisfying about students’ ISUComm ePortfolio reflections. These examinations showed me that, as the WPA in a large program, I have focused pragmatically on a result; I have wanted student reflections to be produced regularly throughout the course so that students have a record from which to write an overarching reflection for their ePortfolios at the end of the semester. The curriculum has attempted, pragmatically, to elicit these products with routinized reflection prompts after each assignment, intending to make reflection habitual for our students. While our students have indeed been producing representations of

their learning, these have not been systematically reflective of deeper learning; in other words, we have work to do to offer consistently optimal conditions for creating Yancey’s (2004) “different particular kind of student” (p. 751) in the many sections we teach. This student is one who not only has insights into present learning challenges and connections but is also prepared for future learning, ready to flexibly adapt their learning to new settings.

Reflections in ISUComm ePortfolios: Student Representations of their Learning

In addition to our perusal of archived pilot ISUComm ePortfolios, we took advantage of another opportunity to examine our most recently produced ISUComm ePortfolios. Three years ago, the state of Iowa mandated a process called Continuous Improvement Plan (CIP), requiring program directors at the state universities to conduct simple assessments based on our program outcomes (Rosacker, 2013). The mandate is unfunded so while I am more than willing to collect data that will tell me something useful about the program (I can choose what ISUComm Foundation Courses outcome to evaluate, for instance, and how we will determine levels of achievement), I do not have resources to make this into a major programmatic assessment project. This academic year, my CIP for ISUComm Foundation Courses examined how students were meeting the outcome of reflection in each of the two courses.

Looking at a random sample of 15% (about 200) of ISUComm ePortfolios for Fall 2015 and Spring 2016 (remember that we have not yet achieved full implementation of ISUComm ePortfolios in every section of ISUComm Foundation Courses), we used criteria suggested in the literature (e.g., Rickards et al., 2008) about successful student reflections: the degree to which students (a) make and support claims about their processes and work; (b) make connections between their learning in ISUComm Foundation Courses and other projects, classes, contexts; (c) articulate the use of peer and instructor feedback; (d) analyze their process and work, not merely recount it or refer to its completion as evidence of meta-understanding; and (e) use transferable rhetorical terminology and concepts from the course materials in their reflections (e.g., audience, delivery, cohesion). A simple sorting of students’ reflections was carried out using a scale of 1-3 (1 = *low* and corresponded roughly to a surface representation of learning; 3 = *high* and suggested a deeper approach to learning).

The CIP assessment showed approximately 25% of reflections scoring at a Level 1 and another 25% scoring at Level 3. This obviously left half of our students in Level 2, where they were not consistently

making connections or articulating agency but rather writing reflections that, by their strategic and utilitarian characteristics, would be less useful to students than would building the networks of understanding via deeper approaches to learning and its representation. Level 1 reflections can be exemplified by statements like the following: “I did a power point, so now I know how to use visuals” and “I was very satisfied with my presentation to the class.” Level 2 might include statements like these: “I knew I needed at least five sources and I needed to cite them correctly. So I found five and looked in the handbook to see how to cite them” and “My peer responder said I needed transitions, so I put some in my paper.” Level 3 statements indicate metacognitive awareness of real growth as well as how that growth came about and how it might be applied in future settings. For example,

By doing my presentation for this class and watching others’ presentations, I learned that less text and more well-chosen graphics can convey a message better to an audience of a visual argument. This will help me with the poster session I will have to do for my major.

Another Level 3 example is, “I read my paper aloud and realized that without stronger transitions, my paper made sense to me, but an audience would have some trouble seeing how my ideas relate to each other and to my main point.” Note that both surface and strategic reflections suggest students believe they have reached a destination point, tending to show an “I-followed-the-directions-and-rules” representation of learning.

The reflections examined in the three previous (pilot) semesters showed similar characteristics, although we were not yet using the approaches to learning framework to help us fully understand what we were seeing. Ours were admittedly small samples somewhat cursorily analyzed, but as the WPA, I am not satisfied that roughly one-fourth of the students, even in this small sample, meet the course and program outcome for reflection at only a surface level (clichéd, ritualistic, atomistic). In this sample, three-fourths of the students represented their learning at less than a Level 3, falling short of representations that suggest a deep approach to their learning. Although disappointing, our students’ reflections do resonate with what the literature says about students’ personal epistemologies and their emergence in the first year or so of post-secondary school—as a mismatch of assumptions about learning that, as Nelson et al. (2008) argued, can and needs to be addressed. Understanding the likely approaches to learning taken by many of our students has become central to my deeper reflection on—my standing-aside from and evaluating—the curricular tasks we have

been asking students to complete, so that ISUComm Foundation Courses are better able to work effectively with the problematic fit between first-year students’ sometimes surface or strategic approaches to learning and the deeper ones that lead more reliably to transfer and successful future learning.

In the remainder of this section I share some examples of how our program’s work with reflection, coupled with characteristic student approaches to learning in the first year, may have tended to produce surface or strategic representations of learning; other programs and instructors may recognize some of their practices here. For instance, we have been asking students to respond to a fairly generic reflection prompt after every major communication assignment. This prompt is presented as a list of unvarying questions: (a) “Has your essay/project fulfilled the purpose of the assignment?” (b) “How did you come up with your thesis and develop support for it?” (c) “What do you think are the strengths of this essay/project?” (d) “What problems did you face while preparing this essay/project?” (e) “What solutions did you find for those problems?” While not misguided or ineffective questions, without an overarching understanding of how the reflection relates to their learning in the course, unvarying questions like these can turn reflection into a rote exercise after the first couple of assignments. As we know, students respond to our cues about what is valued in the coursework and how it relates to the other learning in the course. If instructors are inconsistent about providing feedback on student reflections or about devoting class time to a wider range of reflective work, we cannot necessarily expect students to represent their learning in ways other than surface or strategic. Moreover, we have seen that some students and instructors have tended to view the ePortfolio as an end-of-semester project, as evidenced by the number of requests for course sites that our English Online Learning Team receives relatively late in each semester (sometimes within the last 3-4 weeks). This tendency risks making the ePortfolio seem like just one more assignment, and a rushed one at that, if it is introduced or worked on in earnest primarily near the end of the semester.

Practice that occurs in ways or for reasons other than those intended by the program, and too much of it based on assumptions not explicitly consonant with knowledge about student epistemology and approaches to learning, means that reflection ostensibly can be part of curricula yet not function effectively to encourage “students to participate with us . . . as agents of their own learning” (Yancey, 1998, p. 5). We all recognize that the potential of ePortfolios

is better realized when they are neither “one last assignment” nor just storage.

Curricular Changes

While on the one hand, I am able to interpret our need for refocus on reflection as the manifestation of well-documented issues attendant upon adopting and scaling up classroom technology, on the other hand, as a WPA who has waited long and worked hard to implement ePortfolios in our multimodal communication program, I return to a bluntly stated reality: “Without reflection, the ePortfolio is merely storage” (Riedinger, 2006, p. 91). Making an integrational leap I suspect is not unique to ISUComm Foundation Courses, we may have been idealistic about how students at the start of their academic communication trajectory are realistically prepared to represent their learning in the coherent and long-range way we want, especially in light of the literatures on first-year students’ common personal epistemologies and learning approaches. Like students elsewhere, in their first two years of college ours have taken few other university courses to which to connect their ISUComm Foundation Courses’ learning, and these other courses offer few communication projects and few of a (WOVE) multimodal nature. For all these reasons, reflection must be foregrounded if ePortfolios are to provide not only the electronic space but the cognitive developmental opportunity for representations of students’ deep learning—“the evidence of the identity and learning that are transferred across situations” (Yancey, 1998, p. 35). In the spirit of Graban and Ryan’s (2005) encouragement to move from “What is” to “What is possible,” in post-secondary communication programs, we are working to achieve a critical mass of sections that not only incorporate ISUComm ePortfolios but use finer-tuned pedagogy to accord more closely with most promising practices for meaningful reflection. Such programmatic goals are essential to making ISUComm ePortfolios both effective and sustainable for student learning. To move more deliberately toward what is possible, we are incorporating at least four changes into ISUComm Foundation Courses, changes that necessarily occur incrementally as we revise materials and continue to extend professional development to the various groups of instructors in our program.

Like most WPAs, I agree with Qualley (2002) that instructor preparation “turns out to be the occasion that ensures [a] program remains dynamic” (p. 279). Accordingly, our initial and most rapidly visible changes are to continue work with ISUComm ePortfolios in our pro-seminar for new ISUComm Foundation Courses TAs, as well as to write ISUComm ePortfolio work into the standard, required syllabus for

new TAs and new adjunct instructors. Secondly, for advanced graduate students and established adjuncts, we will continue to offer workshops and “expos” at which TAs and adjuncts already successfully teaching with ISUComm ePortfolios share their experiences, particularly with respect to reflective work. We have found that such events, at which those already practicing successfully are the expert presenters, highlight the community needed to sustain change. As the WPA, I encourage adjuncts to include their participation at these workshops on their annual reviews as evidence of professional development.

Thirdly, course materials in addition to the syllabus are under revision to include reflective activities beginning early in the semester. For instance, using the guidance of Brownlee et al. (2009), this academic year we are encouraging instructors to ask students at the beginning of the course to write about their usual process when approaching a communication project. Where did they learn that process? What about it has and has not worked in various situations? What kinds of projects have they done? This thinking about past experience can then be explicitly connected to written, oral, visual, and electronic course outcomes as students progress through the semester and see what is or is not changing about their processes and knowledge. We have also revised the reflection prompts themselves for the first of our two courses and will implement these in the coming academic year, as we revise the prompts for our second course. A notable refinement is that each prompt not only refers to specifics of each successive assignment, it also asks students in what ways their learning “story” is changing (going back to their initial responses to the process questions above) and to articulate changes and challenges explicitly using course terminology and concepts. The revised prompts ask students to specify what knowledge and/or practice was carried over from a previous learning experience or assignment (in this course or another), as well as to project what of their communication learning experience on a current assignment can be carried over to a future assignment or setting. Through these more nuanced prompts we expect to see students developing their own abstractions from their current learning and forging (even speculative) connections to their future learning. Coupled with asking students which of the activities and materials (assignment sheet, rubric, textbooks, peers) gave them the most guidance, we anticipate that this work will help students gain not only a sense of control over their learning but also a more concretized understanding that their approaches to learning need not be static.

Finally, we are experimenting with a simplified version of the reflection “sorting” continuum for student reflections we used for our CIP data analysis. We have prepared a version of this for instructors and

students, so that instructors can more readily provide useful feedback on reflections and students can better target their efforts in their reflections. We will use instructor feedback to determine the effectiveness of this response method, both in terms of instructor time and student benefit.

By deliberately pursuing a deep approach to learning about reflection (connecting to student personal epistemology and learning theory), WPAs who have encountered an unexpected gap in their program's work with reflection can revise documents and re-tune pedagogy so that students are encouraged from the beginning of the course to think in terms of a narrative and not a container, seeing their work in these first-year and introductory courses as a developing network of understanding and ability rather than as discrete bits of skill and knowledge. We can do this by encouraging students, in a number of ways, to look at "the trajectory of [their] development over time and across contexts" (Slomp, 2012, p. 82), an examination that ideally will also allow them to begin the shift to deep approaches to learning. The ePortfolio can provide the space and the occasion for such an examination when it functions as more than mere storage and when accompanying curricula and pedagogy invite students to become self-aware learners through the power of their meaningful reflections.

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