

Using Reflection and Digital Storytelling via ePortfolios to Support the Professional Development of Engineering Graduate Students

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Abstract— This Innovative Practice Work In Progress paper discusses the pilot Portfolio to Professional (P2P) program at Stanford University which supports graduate students in engineering and other disciplines to create a professional ePortfolio and to establish an online presence. These guided activities draw upon the principles of folio thinking, storytelling, and digital presence. Throughout this process, students engage in an iterative process of reflection as they consider how they want to present themselves and their work by soliciting feedback using think-aloud protocols and peer review strategies. The P2P program is uniquely suited to the needs of engineering graduate students seeking to represent a broad set of skills and experiences acquired prior to and during their graduate education, as they seek to understand their own professional identities and as they explore both academic and industry career pathways.

Keywords— *ePortfolios, professional development, graduate students, digital presence, career pathways, storytelling*

I. INTRODUCTION

The pilot Portfolio to Professional (P2P) program at Stanford University supports graduate students in engineering and other disciplines to create a professional ePortfolio and to establish an online presence. The ePortfolio most often takes the form of a website which allows students to connect and communicate their own educational and professional identities, which can then aid students in achieving their research and career goals.

The P2P program is built upon the premise that engineering graduate students often come to graduate school with diverse backgrounds, interests, and skills developed in industry as well as their undergraduate education. Yet, there is growing recognition that the standardized formats of the traditional academic transcript, resumé/ CV, or even a LinkedIn profile are insufficient and limited in their functions to effectively support graduate students who wish to convey the learning they have acquired from course projects, internships and co-ops, specific contributions in publications

and articles, and meaningful teamwork collaborations, especially when on the job market [1].

Since 2013, P2P [2] has supported graduate students (Master's, PhDs, and Postdocs) from a variety of disciplines in creating a professional ePortfolio. Originally modeled after the "Portfolio to Professoriate" curriculum developed by Professor Lisa McNair of Virginia Tech University [3]-[4], the P2P program expands the scope from a solely academic focus to industry and "alt ac" pathways in order to accommodate the evolving needs and interests of graduate students seeking to explore both academic and industry career options.

Over the years, the P2P program has piloted and experimented with a variety of platforms and pedagogical approaches including online, face-to-face and hybrid formats of varying duration (i.e., lunchtime and daylong workshops and as a ten-week course). The current offering as a face-to-face course has allowed the instructors to further develop and refine a ten-week curriculum with modules focused on identifying your purpose and audience, telling your professional story, and integrating reflection and synthesis through iterative reflection and feedback with career mentors, peers, alumni, and other community members.

II. ORGANIZING FRAMEWORK

The organizing framework of the P2P course is focused on applying three theoretical areas: Folio Thinking within pedagogical scholarship, Storytelling within the business management scholarship, and Digital Presence within the digital identity scholarship.

A. Folio Thinking

The final deliverable of the P2P course is an ePortfolio which we define as a purposeful selection of artifacts, together with reflections, representing some aspect of the owner's learning [5]. While the "e" in ePortfolio has traditionally referred to the electronic medium, given the prevalence of today's technology, this is now assumed. Instead, [6] has reconceived the "e" to refer to: evidence, engagement, and experience. In P2P, this ePortfolio is typically either an outward-facing showcase portfolio or a reflective learning

portfolio consisting of a home page, “about me” page, and additional accomplishment pages that may feature activities related to topics, such as research, experience, service, projects or other part of the student’s educational or professional identity.

More than simply building a website, P2P guides students through a structured process of *Folio Thinking* which encourages reflection on one’s learning through the creation of a ePortfolio and through activities focusing on synthesis and integration. By engaging in these practices of Folio Thinking [5, 7], students participate in an iterative process of reflection as they consider how they want to present themselves and their work. They engage public audiences as well by soliciting feedback using think-aloud protocols and peer review strategies. This metacognitive process aims to empower students to gain a deeper understanding of their own assets and strengths which they can in turn, articulate to prospective employers and colleagues. Recognizing the evolving needs of the workforce and the fact that educators need to prepare students for future jobs that may not currently exist, P2P’s focus on students, rather than employers, is intentional since it is the learners who will ultimately be in the position to “make the case” for themselves, their skills, and their work.

The relevant P2P curriculum modules include both a pragmatic discussion about choice of technology platforms and visual design but also how to effectively use artifacts of learning and skills as evidence to support the claims made in the portfolio. [1, 8]

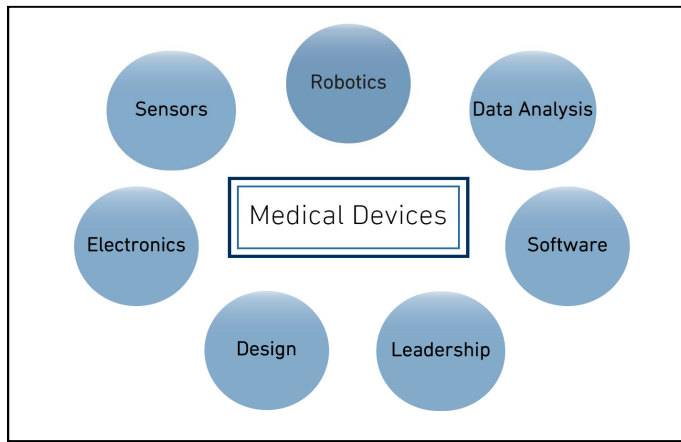


Fig. 1. Representation of skills and interests in support of pursuing a career in medical devices by a mechanical engineering PhD student.

Curation also becomes a critical activity as demonstrated in Fig. 1 from the ePortfolio of an Mechanical Engineering PhD student with diverse interests and experiences pursuing an industry position focused on medical devices. Each circle links to another page providing more details about the specific learning experiences that contributed to her knowledge and skills as shown in Fig. 2. This student’s intended career goal is used as a lens by which to organize and highlight key

experiences, educational and professional, that are relevant to employers in her targeted industry.

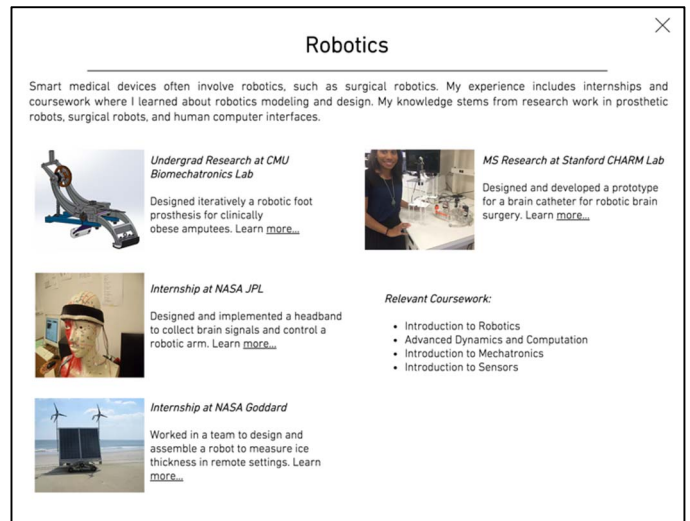


Fig. 2. Representation of artifacts as evidence of claim in professional experience related to medical devices in the area of robotics by a mechanical engineering PhD student.

In this regard, the ePortfolio is not intended to simply consist of copying one’s CV and pasting it into a website platform. Building a culture of Folio Thinking encourages a reflective practice around a portfolio that is never truly “finished” and is regularly updated, whether it be once a week, once a month or once every six months, with the intention of documenting growth over time.

B. Storytelling

The intersection of storytelling principles and ePortfolios has been a unique component of the P2P program. Building upon the work around storytelling in business management scholarship [9], specific approaches guide students in developing their professional brand story in the digital space. Storytelling in the context of business scholarship is a narrative with a beginning, middle, and end that defines and strategically clarifies a brand, in this case, a personal brand [10].

In P2P, students spend time scaffolding up to their brand story by first understanding their own values, experiences, and connections and themes within these areas. They are then introduced to specific storytelling techniques to experiment with and explicitly practice multiple ways to concretely craft a story for digital presentation through an ePortfolio (see Figure 3). It is emphasized that their story will change over time and different strategies may work at different periods in their life. An ePortfolio is therefore never finished, and constant updating is needed, as with any asset in their digital ecosystem. The following are descriptions of several of the P2P story strategies and illustrative examples from engineering students.

1) *Address and Directions:* In this strategy, tell someone in 2-5 words who you are (address) and then expand upon that phrase by giving them “directions” explaining how you represent that phrase, i.e. how you got there.

“I am an interdisciplinary Environmental Engineer and a researcher with a passion for tackling complex water issues. I use data-driven insights along with economic, hydrologic, and governance perspectives to explore innovative environmental policies, support informed decision-making, and incentivize supply diversification for more reliable and resilient water systems.”

2) *External Empathy and Internal Story: The goal of this strategy is to have someone empathize, connect with, or relate to some element of your story. By creating empathy up front, your audience is more likely to be interested in what you have to say and want to learn more. Once an initial connection has been made, you can then move on to tell your own story.*

“Do you remember the last time your cell phone battery lasted you through the week? If you’re a smartphone user like I am, you probably don’t. Similar problems arise with batteries in electric cars, causing a need to replace them every few years. My research focuses on the processes that make your battery lose capacity over time, and the reason it eventually stops working altogether.”

3) *Elevator Pitch: Many people are familiar with an “elevator pitch,” where you have just a few seconds in an elevator to pitch an idea to someone. Think through your own story in a similar way through the following structure: tell someone who you are, what you do, why you are unique, and your goal for telling them your story.*

“I am an engineer who wants to improve environmental management outcomes. To inform decision-making and improve environmental management outcomes, I create and use computer models that describe how environmental systems work. Currently pursuing a PhD in civil & environmental engineering, I am planning to enter a career that capitalizes on my analytical, management, and communication skills to help solve pressing environmental issues.”

4) *Idea/Mission/Vision Statement: Stating a belief or mission of your work can be powerful. If you have a specific idea or mission of your work or a vision of where you want to be, state it.*

“I’m a designer with a ferocious curiosity — the type that will disassemble anything to learn how it ‘ticks.’ Through destruction, design, and fabrication, my mindset has been reshaped from ‘How does this work?’ to ‘How can I make this better?’ to ‘Let’s reimagine what’s possible.’

5) *3 Words or Adjectives: In this strategy, you use 3 words only to describe your story. The rest of your ePortfolio then goes on to prove how you are those three words. Everything you show should be related to those three words. You need to live those words, so to speak. [12]*

“I am a scientist, a team builder, and an explorer. I am passionate about: turning data into good human and artificial intelligence, working across disciplinary boundaries, diversifying science and engineering.”

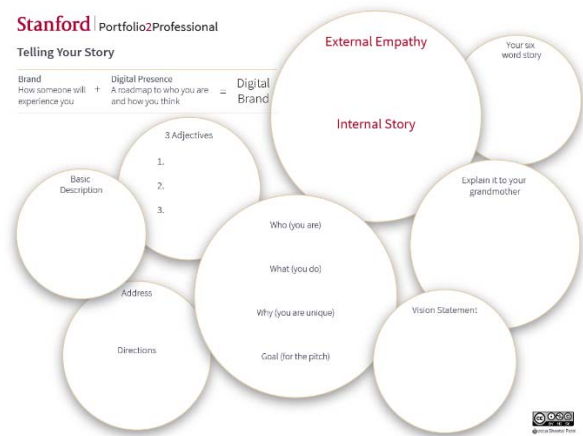


Fig. 3. P2P Storytelling Worksheet

C. Digital Presence

The foundational premise of digital presence is to provide a roadmap for how others will experience the various components that make up your identity in an online platform [10]. Creating a digital presence requires an understanding of the environment and the space and tools where one’s story is disseminated. This discussion begins by acknowledging the digital ecosystem in which an ePortfolio resides and may include many other components such as online profiles like LinkedIn, Google Scholar, as well as blogs, websites, and/or social media participation via Facebook, Twitter, etc. [11]. The emphasis in P2P is on the development of a professional digital presence and how tools, such as a professional ePortfolio, can serve as a more effective platform for effectively communicating one’s background, expertise, and goals. Visual trends and graphics, how different audiences read and perceive information online, and strategically designing one’s own digital ecosystem are addressed in relation to understanding the digital environment in which students may present their stories in an ePortfolio.

III. EVALUATION

Of the approximately 800 students who have participated in the P2P program over the last five years, over one third have been graduate students from engineering departments and programs. There has consistently been a strong representation of engineering students in most offerings, particularly in courses and workshops. The value of the program has been assessed both quantitatively and qualitatively. Using the Net Promoter Score (NPS), a common marketing measure, which asks respondents “On a scale of 0 to 10, how likely would you recommend this course to a friend?” The score is used to find out who would be willing to promote a particular service, in this case the class. In other words, the participant finds the course so valuable, they would tell a peer about it. In higher education, peer-to-peer feedback is often what will engage students. In this case, anyone who rates the question from 0-6, is considered a detractor or someone who would may actually speak negatively about the course/workshop. Those that rate 7 or 8 found value in the course, but may not actively promote it to peers. Those students who answer 9-10 are those that found enough value in the course that they would promote it to their peers [12]. The NPS is than a specific calculation of your promotors minus

detractors with a range from -100 to 100. Across all formats (e.g., workshops, courses, etc.), the NPS scores ranged from 21 to 83 with an average of 47. For students who completed the ten-week P2P courses, an average NPS of 68 was reported demonstrating that many students found the concepts to be valuable enough to promote to their own friends. In educational environments or education focused companies, the benchmark for NPS is 69, show that the course ranks well for NPS [12]

In addition, for five of the workshop versions of P2P, where engineering students made up half of those in attendance, the results showed average ratings ranging from 4 to 5 on a scale of 1-5 for agreement that students felt they learned and were more confident in building their digital presence. More detailed evaluations were given for the 10-week course taught over the last 4 years, where students indicated unanimously that they agreed or strongly agreed that the course was a valuable experience.

In terms of qualitative data, students were asked in open-ended questions what value the course had for them. P2P course students found value in three key themes:

1) Being held accountable so students actually had the time to reflect on their education and write out their story:

“First, a forcing function for me to do it -- with instructors that cared about my process and results. Second, seeing other's eportfolios as examples. Third, little detail things like tips on what platform to use.”

2) The ability to gain feedback with different members of their community, including peers, alumni, employers, instructors, family, and members of their targeted audience:

“Reflecting on my trajectory and goals for presenting myself were very helpful (publicly and personally- that is, even if I "didn't show anyone," it would still be so helpful). The in-person feedback was key (both large group and 1 on 1). My biggest jumps in progress were around these.”

3) Receiving benefits outside just creating an ePortfolio, such as the ability to not only tell their story digitally, but also verbally and facing identity questions:

“It pushed me to create something valuable and important for my career development. The story framework was especially compelling.”

The following quotation sums up these themes:

“P2P was a valuable program for three main reasons: (1) it held me accountable for making progress on my website (which often got put last on my to-do list), (2) it provided plenty of opportunities for peer and professional feedback on my website, and (3) it forced me to think about a more creative way to present my work (telling my story, creating a narrative, and tying all of my work together).”

In addition, employers (both industry and academic), who are invited to the final showcase where students present their ePortfolios for feedback for their intended audiences, have indicated that the course and its end product were valuable for students as they translated and communicated their experiences to internal and external stakeholders representing their

particular desired job or career goal. Employers connected with students during the class and in some cases to speak to them about internships or potential job opportunities. In addition, students in academic positions often maintain their ePortfolios after graduating and transition them into their faculty or lab websites to support promotion and tenure applications or to seek out potential collaborators and other consulting opportunities.

“Each of these students had an entirely different approach to presenting themselves in their e-Portfolio. Putting together an e-Portfolio allows them to take inventory of their lives and see their accomplishments from another perspective. These students have poise and knowledge, and it comes across as they described their e-Portfolios. I must say I was very impressed.” [Alumnus and Employer from biotech/pharma, business development]

“Consider how you can use your digital presence to invite others to engage with your ideas, get feedback, and become a powerful and thoughtful voice online.” [Faculty member on the value of the ePortfolio course]

IV. IMPLICATIONS AND FUTURE DIRECTIONS

While there were many positives of the P2P program, the suggestions from students as well as alumni, faculty, and employers involved were topic-based. Students consistently want more training on specific technology platforms, graphics and visual design. Given that it takes students time to develop their story, reflect, iterate, and curate, balancing time within the course on these topics is complex.

Since this is a pilot, two elements for future directions are needed: 1) course revisions and 2) further evaluation. To address the student feedback points, the curriculum for the course will be revised to cover the essential material for storytelling, and require 1:1 conferences so that the instructors can move through the reflection and storytelling course modules more quickly, plus customize information for individual graduate students with diverse backgrounds and career interests. This will allow for more time to cover platform and visual design issues and allow the instructors to build in lab time into the course where students can discuss and review these elements with each other.

Future research on how program learning outcomes are evaluated is also needed. For example, employers and students have asked about the long-term influences of the P2P program. Efforts to actively tracking ePortfolio development and interviewing program alumni can provide information about the impact of the ePortfolio and the Folio Thinking practice as related to personal and professional progression.

At its foundation, P2P aims to provide students with a platform and a community to encourage reflection and metacognition intrapersonally and in conversation with others. Drawing upon the literature related to the pedagogy of ePortfolios and reflection, storytelling principles, and digital presence, the Portfolio to Professional program has value as an instructional case study to support the professional development of engineering graduate students

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