



Tricks of the Trade: Using Digital Portfolios and Reflective Practices to Develop Balanced Graduate Student Professional Identities

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Abstract

Graduate teaching assistants (GTAs) play important instructional roles in undergraduate science, technology, engineering, and mathematics (STEM) education. However, current practices within graduate education do not reflect the importance of this teaching role. This missing support for developing professional identities that include teaching roles within graduate students is a driving factor for this paper. To this effect, we review recent literature related to graduate student development, provide background on ePortfolios, and suggest tips for utilizing ePortfolios as a reflective space for graduate students to track and monitor their own development as teachers and researchers.

To that end, this paper presents a brief literature review of the current reflective practices used to develop professional identities of graduate students as teachers, researchers, and learners. The literature search focuses on two key themes – first, the typical professional practice of valuing research over teaching is explored and second, the creation of electronic portfolios is examined to determine their potential applications for teacher identity development in the face of this adversity. An electronic portfolio, or ePortfolio, is a digital archive or collection of artifacts (audio/video clips, text, and graphics are typical examples of the types of media incorporated) that represent its creator. Personal reflection on one's own work and the process of selecting the artifacts for inclusion are key elements in many ePortfolios.

Findings from this review show that portfolios have previously been used in educational settings for a wide variety of purposes – among these are assessment, learning development, and professional presentation. Portfolio creation has also been used extensively for assessment purposes within student-teacher training programs, but only modest work has been done within a research-based framework for identity development for graduate students. Within engineering settings, portfolio research and practice has been mainly focused on the undergraduate population, not on graduate students. Therefore, our tricks of the trade focus on the use of ePortfolios specifically within the graduate student population, using it as a reflective space for development within professional roles.

We argue that the potential uses of ePortfolios as a method for graduate students to develop integrative professional identities through the use of a narrative process would combine the theories and practices of teacher education programs with students in engineering disciplines; as these students are the future of the STEM professoriate, it is important that they develop as reflective practitioners who are able to use their multiple professional identities (in this case, focusing on being both a researcher and a teacher) together in order to accomplish the performance of professional tasks. Furthermore, the practice of creating an ePortfolio prompts graduate students to reflect on their actual achievements within each professional role, further developing their identification within those roles. Applying ePortfolio practices to graduate

students can open a new avenue for future research into graduate professional identity development practices.

Introduction

During the 1990s, a multitude of reports and conferences voiced concern over whether and how American doctoral education should evolve to meet changing priorities. The National Academy of Science, the National Science Board, the Association of American Universities, and other professional organizations issued the views of higher education leaders, highlighting the increasing production of Ph.Ds., the shrinking academic job market, and difficulties transitioning into the academic workforce ^[1]. More pertinently, these organizations also noted that the emphasis on research training leaves future faculty unprepared to perform other faculty roles, and the need to improve teaching to improve undergraduate education ^[1].

However, these reports were based on the views of organizational leaders about doctoral students' needs; "none took the point of view of students" ^[1]. When doctoral students in the arts and sciences were surveyed, findings indicated that the training received is not what is desired, and it leaves them unprepared for future careers ^[1]. Engineering doctoral students play different roles while in the process of earning their doctoral degrees, performing research and teaching while still students themselves, yet treating these as separate roles without any seeming overlap. Examining the current state of teaching and research at the graduate level is a fundamental step in explaining why both should receive focus when preparing doctoral students to create a professional and cohesive faculty identity.

Although research exists on the mixed messages sent to early career faculty members about the promotion and tenure process ^[2-4], there have not yet been similar studies on the messages sent to doctoral engineering students. Though they are not yet worrying with getting tenure, they are concerned about building their curriculum vitas in order to get hired.

We propose to investigate the roles of doctoral students within engineering fields, focusing on the potential of reflective practices used with ePortfolios to develop both the researcher and the teacher while transitioning to faculty careers. Graduate students and faculty must move away from performing research at the expense of their other roles due to a belief that time spent in teaching is *lost* time. Or, as Tierney and Bensimon [3] state, that "time consumed by [teaching] is time away from activities that have greater relevance to their quest for tenure"^[3].

Literature Review

The following literature review centers on the research and teaching roles that doctoral students, the pre-faculty, have been expected to play – by their advisors, departments, and their universities. We provide a summary of the tasks and attitudes associated with teaching and research, as well as a brief overview of current ePortfolio practices. We then argue that the roles that graduate students inhabit can be integrated via the use of reflective practices embedded within ePortfolios to mirror the actual requirements of their future faculty careers when they are "under competing pressures for performance in multiple areas" ^[5].

Conducting this study fills a critical literature gap in engineering education research by focusing on the doctoral student population to establish the need for future research and research-based practices that serve to enhance pre-faculty development. Multiple criticisms of the current doctoral education process exist: students are trained too narrowly, they are poorly prepared to teach, and they lack the skills needed to work effectively in an organization^[6]. This is echoed by the common assumption that a Ph.D. is a research degree whose primary purpose is training novice doctoral students to conduct rigorous research^[1], which does not align with the actual work performed by faculty members; to that end, engineering disciplines must additionally determine how to train their novices to perform as teachers.

Graduate Student Research

Doctoral programs in engineering concentrate on research training, creating graduate students who are focused on performing research as faculty members^[1]. Due to this emphasis, “US graduate [schools are seen] as the organizational pattern to link research to advanced research training”^[7]. The training in research consumes the majority of doctoral students’ time and efforts, creating expert independent researchers. These experiences prepare them for faculty careers at research universities, but not for the institutional “back and forth between teaching and research emphasis”^[5].

Doctoral students as well as faculty members ascribe to the “notion that research [is] more important”^[5] than any other role, which is reinforced through the rewards systems of tenure and promotions. Clark’s work^[8] describes the widening gap within academia that reflects the institutional rewards system: a more prestigious upper level fixated on producing knowledge through performing research presiding over a less regarded level of the faculty committed to teaching undergraduates. Some STEM faculty literally hold the opinion that GTAs are only important in that they “allow the research agenda to move forward”^[9].

For engineering faculty, having refereed publications, the “golden standard for research productivity”^[10], is seen as a marker of overall faculty productivity. The view that time spent on research and publishing is more valuable to graduate students and faculty members is reinforced on an institutional level by leading to higher pay, promotions, and tenure when compared to time spent on teaching or service^[11].

Graduate Student Teaching

The majority of current literature on graduate teaching assistants (GTAs) in engineering focuses on the logistics and structures of the courses taught^[12-14] instead of the development of the students as teachers; one notable exception is Kajfez’s^[15] dissertation work looking specifically at professional identity development of GTAs. Research on teaching also lags behind research on student learning; research on the actual teaching of engineering, as opposed to learning engineering concepts, is relatively scarce.

Graduate students’ views on teaching are in part a result of their departmental culture, revolving around the perceived status of who teaches and who doesn’t. Even though Feldon et

al.'s study on graduate student teaching presents “direct, performance-based evidence of improvement on specific research skills associated with teaching experiences that complement traditional graduate research training”^[16], teaching is still considered a separate role without positive impacts on research or the faculty career. In many engineering departments, there is a perception that teaching is “grunt work”, assigned to students who didn't make the cut for research assistantships; this corresponds to few opportunities existing for training on how to teach in STEM fields^[17].

This perception is only intensified by the fact that teaching is often seen as an inherent quality or something that can be picked up along the way^[9, 18], which means that “with rare exceptions, no one teaches college teachers to teach”^[18]. Although those exceptions do exist, for example, the University of Colorado requires all PhD students to fulfill an advanced TA position^[18] and the University of Michigan created the Engineering GIS Mentor program^[19], in most cases there is an absence of teacher training and feedback^[20].

Based on this lack of preparatory training, new engineering faculty members are usually ill-equipped to stand on the other side of the classroom when they are the ones leading lectures, answering questions, or passing out tests. *Preparing the Professoriate* programs^[21] across the country are beginning to address the need for graduates who are prepared to teach upon entering the professoriate^[22]. There are university-sponsored (as opposed to college or department level) workshops and seminars that new faculty can attend in order to receive teaching training that their doctoral programs did not provide. These can also be offered on a national level, including at the National Science Foundation's (NSF) *Engineering Education Scholars Programs*, the National Effective Teaching Institute (NETI), and at American Society of Engineering Education (ASEE) and Frontiers in Education (FIE) conferences^[18].

Such Preparing Future Faculty (PFF) programs provide a space for graduate students to discuss the expectations and relationship between teaching and research, encourage professional development, and value developing a professional portfolio and teaching related materials (e.g., teaching philosophy and strategies for teaching in different contexts)^[23]. A caveat to such programs, however, is that they are focused on the general needs of future faculty members instead of STEM-specific issues, such as running chemistry or engineering physics laboratories^[9].

Current ePortfolio Practices

ePortfolios are currently utilized to fulfill multiple roles^[24, 25] in a wide range of fields to assess programs, courses, and individual student progress^[24, 26-32]. Student ePortfolios are also used for evaluation and accreditation purposes^[33, 34]. They document student progress towards university-wide learning outcomes^[35]. They present audio and visual evidence of students' work, similar to artistic portfolios^[36]. They provide learning opportunities to explore software (e.g., Adobe Photoshop and Dreamweaver), practice communication skills, and increase digital literacy^[28].

They also provide a space for students to reflect, integrating teaching and research identities^[32]. Reflective practices in teacher preparation programs^[37] have been used to refine and improve teaching practice^[38]. For example, a study on the Integrative Knowledge Portfolio Process conducted at the University of Michigan showed greater self-assessed gains for those who engaged more deeply with core portfolio activities in terms of professional identity development^[30]. Constructing professional teaching and research identities as narratives allows students to claim them as their own; thinking about developing those same identities using the ePortfolio framework affords students a space to reconcile the external and internal forces that shape those professional roles^[29]. When used by graduate students, evidence-based growth can be seen via the use of baseline and post-baseline work showing their development as teachers and researchers^[39].

Tricks of the Trade

Below, we offer tips for those who wish to create individual ePortfolios or who are considering developing an ePortfolio program at their institution. ePortfolios require commitment^[40] and support, but provide space to develop a professional online presence

Choosing a Platform

One of the first milestones in creating an ePortfolio is choosing an online platform. There are many available options, ranging in cost, design effort, and time commitment. Cost-conscious students can choose between platforms such as Google Sites, WordPress, Weebly, and Wix; some of these sites also provide paid premium services. An additional cost to consider is registering a domain name – instead of using a lengthy URL for an ePortfolio, there are options to purchase a more recognizable and specific domain name (e.g., the first author’s own ePortfolio at www.martinasvyantek.com) for personal and professional use.

Creating an ePortfolio

Developing ePortfolio content is the next step. The Portfolio to Professoriate curriculum^[41] does this by limiting the number of categories involved, focusing on research, teaching, service, and lifelong learning. The first three reflect academia-bound graduate students’ next job as faculty members; these are broad categories of achievement that prepare them to speak the language of their future work. Using an “Accomplishment List”^[42, 43] can speed this process along by providing a format for listing these accomplishments, in addition to collecting evidence for each of them.

Lifelong learning exists intentionally as a category to take people out of their comfort zone and encourage them to reflect on their other roles and accomplishments. This category examines how graduate students connect who they are and what they do between roles. Graduate students looking for a position outside academia potentially need to brainstorm different categories that relate to their future field of work instead of using research, teaching, and service.

Encouraging Participation

There are multiple methods available to encourage graduate student participation in ePortfolios. McNair and Garrison^[32] discuss different methods used in relation to their ePortfolio project: funding, coursework requirements, and assessment requirements. Funding is typically a modest stipend for participating or to purchase a dedicated URL; this method works, but simply throwing money at graduate students does not lead to increased participation or completion rate^[32].

Courses that include ePortfolio creation as part of course assignments that require people to do it in class have the highest participation from start to finish^[32]. Multiple universities and programs are also using ePortfolios to evaluate progress and development over time^[32]; for example, Clemson University has an ePortfolio program that is used to track student learning as they progress through their undergraduate degree^[44]. Badging is a more recent type of credentialing (e.g., Credly) that provides visible proof of participation, such as completing selected parts of the ePortfolio process^[45].

Promoting Feedback and Assessment

ePortfolios can be used to provide both formative and summative assessment to graduate students. A “meta-rubric” evaluating integrative learning is one assessment method that universities can adapt to fit their own needs^[46]. Formative assessments can be provided via peer review, which allows fellow graduate students to give feedback and observe elements in other ePortfolios that they could then incorporate into their own work.

Including the ePortfolio in coursework ties it into the overall curriculum, highlighting the relationship between efforts both in and out of the classroom^[32, 44]. Graduate students can also use their ePortfolios with advisors and mentors as a tool to highlight their current strengths and weaknesses, especially when nearing the job search stage.

However, it is critical to consider ownership issues, especially in ePortfolios that are designed to promote professional identity. Ideally, assessment is formative and not linked to high stakes academic consequences. In other words, students should create their ePortfolios as their own expressions rather than as tasks to meet external requirements.

Potential ePortfolio Applications

Work has been conducted by engineering educators in the past 10 years as ePortfolio programs have developed and spread across the country. Much of this work has focused on their use with undergraduate engineering students^[40, 47-49], while there have so far been few applications in graduate work^[50]. One example, Virginia Tech’s Department of Engineering Education, utilizes ePortfolios in its doctoral program, enabling students to review each semester’s progress before discussing with their advisors the direction to take in future work. The central feature of ePortfolio practice is realized through the students’ professional

development by connecting their work in different roles and creating relationships between those roles ^[51].

Summary

The ePortfolio is a platform where graduate students can balance their professional roles, such as teacher and researcher roles as future faculty, to construct a dynamic professional identity. In this multi-media application, graduate students can demonstrate their capabilities in multiple areas and create a cohesive faculty identity from these seemingly disparate roles. The use of ePortfolios affords academic and professional audiences an intentional portrayal of an individual's achievements and goals across multiple professional roles that make up a holistic, complex professional identity.

ePortfolios compliment traditional, structured delivery lists of accomplishments (e.g., the curriculum vitae and sites like LinkedIn and academia.edu), illuminating the connections between these roles as seen by the graduate student behind them. Though literature on ePortfolios rarely discusses how students are encouraged to discuss their growth within particular roles ^[52-54], they can be pioneered as a place to discover and create linkages between research and teaching.

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