Mastery of Transferrable Skills by Doctoral Scholars: Visualization using Digital Micro-credentialing

Ambika Mathur, Mary E. Wood & Annmarie Cano

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In Short

- Academic institutions are excellent at providing disciplinary training for doctoral students. Employers, however, seek employees who also demonstrate mastery of transferrable skills.

- Professional organizations have created a set of competencies linked to these transferrable skills that apply across academia, for-profit, government, and not-for-profit career sectors.

- Acquisition of transferrable skills is not presented in the traditional academic achievement markers such as academic transcripts and dissertations.

- Digital badging, or micro-credentialing, authorized by academic institutions, is a novel way for doctoral students to demonstrate the acquisition of transferrable skills to potential employers.

Ambika Mathur is Associate Provost, Office of Scientific Training, Workforce Development and Diversity; Dean, Graduate School; and Professor of Pediatrics at Wayne State University (WSU). She served as Associate Dean, the first director of the WSU M.D./Ph.D. program, founding director of the Office of Postdoctoral Affairs, founding director of the Wayne Med Direct program and the Postdoctoral to Faculty Transition Fellowship programs, and is P.I. of both the NIH-funded WSU-BEST Program and the NIH-funded ReBUILDetroit Program that supports underrepresented students who seek to pursue careers in biomedical research.

Mary E. Wood is the Program Director for the Office of Scientific Training, Workforce Development and Diversity at WSU. In this role, she identifies potential external funding opportunities for workforce development and diversity. This includes preparing grants for submission to key federal agencies and working closely with faculty, key university executives and department chairs to identify opportunities, strengths and potential focus areas for training initiatives.

Annmarie Cano is Professor of Psychology and Associate Dean in the Graduate School at WSU. She oversees graduate enrollment management efforts including recruitment, admissions and competency-based professional development with micro-credentialing. She is the Wayne State co-PI of the NSF-funded Michigan Alliance for Graduate Education and the Professoriate to support women and underrepresented graduate students in STEM and the Social and Behavioral Sciences.

> *Ph.D. recipients across disciplines pursue careers in a variety of sectors, including academia, for profit, government, not-for-profit, and other areas. Alumni also change career paths, navigating between the sectors and job types over time. While these careers require distinctive disciplinary skills and knowledge, employers also seek to hire individuals with transferrable skills that transcend career types. These transferrable skills include important attributes such as written, oral, and visual communication skills; working in teams; building interpersonal relationships; leadership; and other professional competencies.*

In response to this increasing need for transferable skills national professional organizations and societies, most notably the Council of Graduate Schools (CGS) and the National Postdoctoral Association (NPA), have identified a set of competencies linked to these transferrable skills that are essential to the overall professional development of doctoral students. Doctoral and postdoctoral training institutions have begun to formulate professional development programming that deliver these skill sets.

While evidence of academic and disciplinary knowledge is easily available to potential employers of students in the form of academic transcripts and dissertations, institutionally authorized evidence of acquisition of transferrable skills by the student is not readily available. This disadvantages students as they attempt to convince employers that they in reality do possess the requisite skills. Use of digital micro-credentialing might well be the pathway to document graduate student mastery of competency-based, transferrable skills.

DIGITAL MICRO-CREDENTIALING TO DOCUMENT COMPETENCY-BASED SKILLS ACQUISITION

Interest in digital badges or micro-credentials has grown since their introduction in 2010 at the Mozilla Drumbeat festival (Olneck, 2015). Since then, badges have been used to demonstrate achievement in a broad range of areas, including informal and formal learning, professional development, and community and volunteer work (Loughlin et al., 2016; Ford et al, 2015). Digital badges have since been adopted by a number of colleges and universities to reward students for achieving undergraduate academic milestones (Illinois State University Honors Program), skills and knowledge mastered in graduate coursework (Stony Brook University School of Professional Development), co-curricular activities including projects and workshops (University of California, Davis), and competencies to support disciplinary work (Portland State University). The University of California at San Diego uses a system named Engaged Learning Tools to capture student activities outside the classroom to share

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with employers and graduate schools (Wienhausen & Elias, 2017).

One of the advantages of badges is that they are portable and easy for employers to view on LinkedIn and other social media. Further, while they are not substitutes for conventional university degrees, they play an important role in certifying skills and demonstrating knowledge mastery. As noted by Cassilli and Knight (2012), badges serve to demonstrate valued skills, increase the student's competitive edge for employment, and encourage the value of life-long learning. For competency-based training, which has gained traction as a means of teaching transferable skills, digital badges certify skills which currently are not credentialed in formal systems (Finkelstein, Knight, & Manning, 2013), such as the diploma or even the CV.

Micro-credentials may be desirable to trainees for several reasons. First, micro-credentials have operant value because they reinforce desirable behavior (i.e., professional development training). Although one might argue that acquiring skills for may be rewarding in and of itself, the awarding of a micro-credential may increase the reinforcement value. Recognition of the micro-credential by peers, supervisors, and potential employers through "clicks" and "likes" also amplifies the strength of the reinforcement.

Second, micro-credentials may be attractive to students because of the 'gamification' of skills acquisition. The gaming element makes earning badges fun and competitive. Earners are motivated to complete one level before badges are unlocked from the next level (Lockley et al., 2016; Loughlin et al., 2016).

Third, micro-credentials may help students prioritize professional development activities as a valuable activity. Micro-credentials also assist potential employers who must

evaluate the validity of application materials. They signal to the employer that a skill has been mastered, and the micro-credential offers evidence of mastery that can be verified by a trusted badge issuer.

There is evidence to support the contribution of micro-credentialing to enhanced motivation, even though the bulk of the literature has focused on undergraduate rather than graduate education. For example, digital badges may contribute to retention of undergraduate students from their first to second years of study (Mah, 2016). Research has also shown that micro-credentials are desirable and can enhance motivation, especially when badging systems are tailored to meet students' specific abilities and motivation (Abramovich et al., 2013; Gamrat et al., 2014; Reid et al., 2015) and when badges are linked to career preparation and employment goals (Foli et al., 2016).

Career preparation micro-credentialing programs are on the rise. In one program in the United Kingdom, students were initially unaware of the badging movement, but quickly and enthusiastically embraced the concept and the potential for creating a digital portfolio (Loughlin et al., 2016). The "levelling up" structure, which involved acquiring badges at one level to unlock badges from the next level, excited and motivated students, who found the method for tracking growth and demonstrating continuous advancement to have great appeal.

WAYNE STATE UNIVERSITY'S MICRO-CREDENTIALING PROFESSIONAL DEVELOPMENT PROGRAM

Wayne State University Graduate School recently launched a seminar/workshop series, Graduate and Postdoctoral Professional Development (GPPD), based on national competencies that includes most of the transferrable skill-sets deemed desirable by potential employers of doctoral students. Borrowing from industry and undergraduate best practices, we adopted an innovative digital badging process whereby the student receives a micro-credential that can be added to an electronic portfolio or displayed on professional social platforms such as LinkedIn for easy viewing by potential employers and peers.

Since the badge is issued by the university, it becomes an authentic, validated way in which to demonstrate mastery of each skill set individually or as a set under each competency. A number of our sessions are recorded and available online, so we also encourage our doctoral alumni to take advantage of these offerings and receive digital credentialing as well.

In 2014, Wayne State University (WSU) Graduate School undertook a project to understand career pathways and trajectories of its 15-year doctoral alumni that involved approximately 3000 alumni from about 75 programs across all disciplines. From these data we learned that, mirroring national trends, WSU doctoral alumni were primarily pursuing careers in not only academia, but in for-profit organizations (such as biotechnology), government, and not-for-profit organizations (Mathur et al., 2018).

In surveys and conversations with our alumni, their employers, and faculty, we understood the need to provide

enhanced career development programming that would help our alumni succeed in their varied careers. As a first step, we identified a set of five competencies that are essential for doctoral and postdoctoral training. These competencies are based on those defined by the National Postdoctoral Association (NPA) (NPA, 2017) and the Council of Graduate Schools (Denecke et al., 2017) and aligned with WSU's mission. These five competencies include Communication, Leadership and Professionalism, Teamwork and Collaboration, Research and Professional Ethics, and Career Development.

Delivery of Competencies and Skillsets and Issuance of Micro-credentials

With input from alumni, employers, faculty, and current students, we created a series of interactive seminars to address each competency. A number of skillsets and learning outcomes were defined within each competency. (See Table 1 for the list of competencies, skillsets, learning outcomes and assessment of learning).

Each interactive seminar is one to two hours in length and is led by faculty experts in the domain. In line with best assessment practices, each seminar includes three to five

TABLE 1. INITIAL COMPETENCIES, SKILLSETS, AND LEARNING ACTIVITIES

Communication	Leadership & Professionalism	Teamwork & Collaboration	Research & Professional Ethics	Career Development
Sample Skillsets				
• Writing Skills • Oral Skills • Visual Skills	• Intrapersonal Awareness • Leadership	• Interpersonal Awareness • Diversity & Inclusion	• Responsible Conduct of Research • Workplace Ethics	• Career planning • Career preparation
Sample Learning Outcomes				
• Identify effective strategies for different modes of communication • Organize information into a logical well-paced presentations and written document • Communicate research effectively in writing, orally, and visually to diverse audiences	• Describe one's own individual differences personality traits, identities, and preferences that impact leadership behavior • Identify traits and behavioral patterns of successful leaders • Develop and implement plans to apply this knowledge to multiple settings	• Identify strategies to promote positive interactions in the workplace • Describe how intersectionality and cultural competence can inform interpersonal interactions • Demonstrate effective interaction strategies in a variety of settings	• Identify ethical principles in diverse settings • Describe the value of one's own personal responsibility and integrity to one's team • Adhere to a personal ethics code that is aligned with research and professional ethics guidelines	• Identify diverse career path-ways available to Ph.D. recipients • Describe technical and professional skills to potential employers • Engage in effective networking skills
Sample Assessments of Learning				
• Oral, written, and visual products evaluated by faculty, employer, and peer judging panels	• Facilitator evaluated essays of self-evaluations • Plans evaluated by faculty, employer, and peer judging panels	• Interpersonal skills demonstrated during role plays evaluated by faculty, employers, and peers	• Knowledge-based quizzes • Essays demonstrating knowledge and application of ethics codes as evaluated by faculty and employer judges	• Essays and career plan evaluated by faculty and industry panelists • Resumes and LinkedIn profiles evaluated by industry panelists and peers

**FIGURE 1. STEPS IN THE
MICRO-CREDENTIALING PROCESS**

- Attend interactive seminar

- Produce work that meets learning outcomes

- Presenter evaluates work

- If mastered, microcredential is issued

- Trainee claims microcredential

- Trainee shares to LinkedIn, other platforms

- Employers, peers, supervisors can click on verifiable microcredential to learn more

learning outcomes that students can expect to achieve by attending the seminar. Presenters are coached to provide opportunities for active learning during the seminar, including think-pair-share exercises, reflective writing, and other high impact pedagogical practices.

In addition, presenters are provided with guidelines for the assessment of the learning outcomes to ensure that evidence of skills mastery is adequately assessed. Upon completion of a GPPD seminar, students complete an exercise to demonstrate mastery of the subject. The work is then evaluated by faculty or industry experts.

Students who meet the learning objectives are awarded the micro-credential in that domain. This micro-credential can then be shared on social media platforms such as LinkedIn or personal or professional websites. Wayne State is the official issuer of the badge, which adds credibility and validity to the micro-credential. Since the badges are awarded for fulfillment of specific learning objectives, employers can be confident in that student's mastery of that particular skillset.

These credentials do not appear on official Wayne State transcripts. However, an authorized credentialing system licensed by Credly.com is in place to certify mastery of each skill that a student chooses to acquire. It also enables staff and faculty to track student participation by competency to determine which skills are viewed as most important to students preparing to enter the workforce. Figure 1 shows the steps that students take to earn a micro-credential for a given skill.

As an example of the micro-credential pathway, the Teamwork and Collaboration competency contains the two broad skillsets of Interpersonal Awareness, and Diversity and Inclusion. Skillsets recognized by micro-credentials within the Interpersonal Awareness competency include Negotiation Skills, Conflict Management, Empathy and Perspective-taking, and Building a Mentoring Network. Skillsets recognized by micro-credentials within the Diversity and Inclusion include Micro-aggressions, Bystander Intervention, and Cultural Sensitivity.

As shown in Figure 2, the hierarchy of this badging system allows skills to be "staged." That is, it allows students to build on their badges within a certain skillset, which in turn earns a higher order badge indicating that all identified skillsets in that domain have been mastered. Students who earn both higher order badges in Interpersonal Awareness as well as Diversity and Inclusion are then awarded the highest order "overall" badge in Teamwork and Collaboration. Such a system also motivates students to acquire increasing levels of skills since there appears to be a tangible and visible "reward" that can be displayed beyond the obvious need to build the skills. Our entire set of competency-based badges can be viewed on our website where we catalog <u>WSU core competencies for micro-credentials</u>.

Utilization of Competency-based Micro-credentialed Professional Development Program

This innovative micro-credential program has been well received by both students and faculty. One key piece of evidence supporting this is an example of "head-to-head" comparison of attendance at the same GPPD seminars delivered prior to (Fall 2016) and since instituting the micro-credentials (Fall 2017). In addition, since instituting micro-credentialing, both the overall attendance as well as per session attendance has more than doubled as compared to the entire previous academic year (2016–17) (Table 2).

In addition to the quantitative data, surveys reveal that students report a number of benefits, including assistance with goal-setting and career preparation. As one student states: "The process is very clear, and the organization of the badges into the various competency areas helps guide my professional development and set future goals. I was able to claim my badges instantly and share them on social media to enhance my CV/resume. In the past, I have used traditional approaches to building my resume. I have learned that more and more employees even in academia are using professional job sites on social media to select candidates. Micro-credentialing is an exciting way for me to build a portfolio

Figure 2. Teamwork and Collaboration Competency
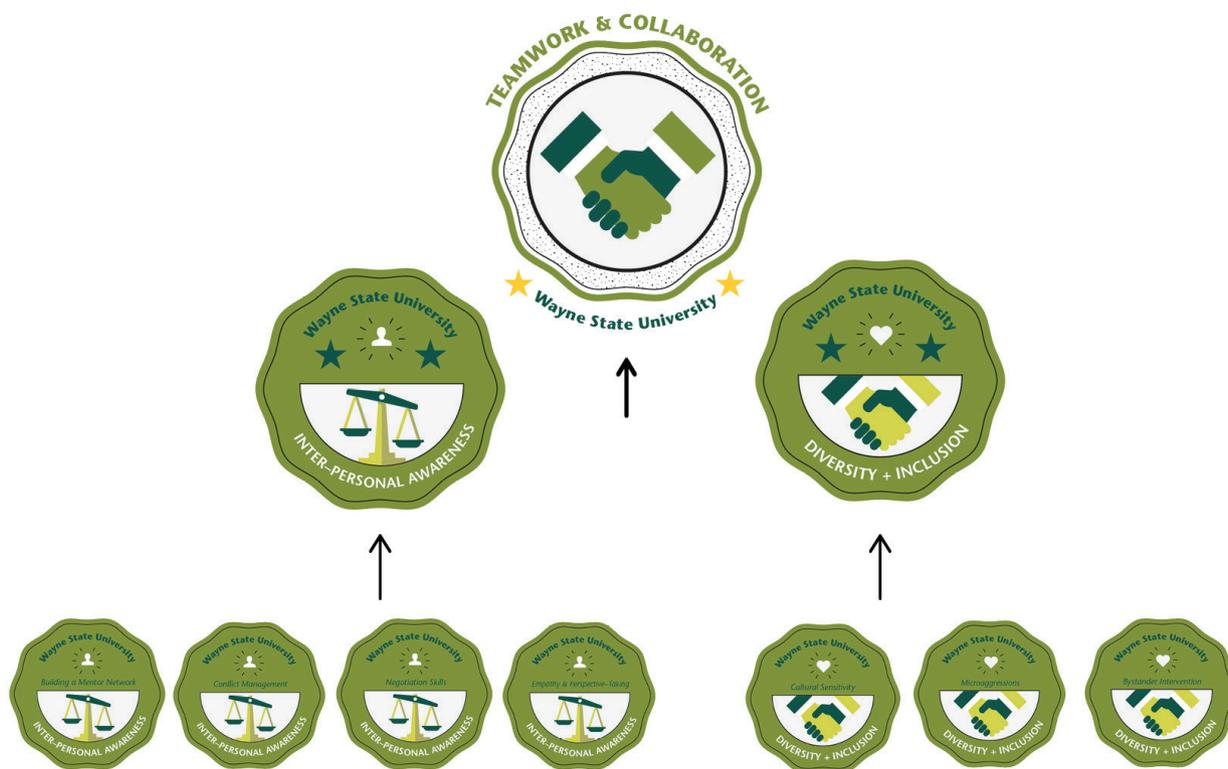
of digital badges which will benefit me when I am on the job market."

Students also describe the verifiable certification of skills mastery as a benefit: "I am a lifelong learner. I am eager to learn as many as skills I can in my career and life. GPPD seminars give me the opportunity to learn from experienced professionals in the area ... To show my accomplishments, I

can easily add the certificate to my LinkedIn and the employer can also see and verify them much faster."

These sample comments echo those of studies that have found that more employers are using badges to save time in the recruiting and hiring process. Surveys of Fortune 500 hiring managers indicate that badges help employers to quickly narrow a pool of applicants to those most likely to have the specific skills for a position (Catalano & Doucet, 2013). One-click verification of the claimed credential, including confirmation of whether the credential is current, is another attractive feature.

Table 2. Attendance numbers compared by academic year

GPPD Topic Delivered in Both Years	Academic Year 2016–2017 (16 sessions)	Academic Year 2017–2018 (17 sessions)
Research Statements	14	45
3MT	16	29
Abstract Writing	35	44
Landing a Career with LinkedIn	66	84
Poster Design and Presentation	14	77
Human Resources for Postdoctoral Scholars	5	16
Visual Communication in Science	9	32
Attendance is all GPPDs	374	839

Lessons Learned from WSU Graduate School's Experience

The development of a competency-based micro-credentialing program requires attention on multiple fronts in terms of stakeholders, process, and outcomes. Key to the success of this program is that the competencies are identified with attention to national trends but also (1) local needs of the students; (2) perceptions of faculty who recommend that their students attend the seminars; (3) feedback from employers who value the skillsets and are seeking validation of competencies; and (4) alignment with the university's strategic plan.

After serious consideration of the competencies and identification of the skillsets within each competency, a marketing and communication plan enabled the Graduate School to communicate the new program to students and their advisors. The program was explained at several faculty

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and administrator meetings, at graduate teaching assistant orientation, through faculty and student listservs, and social media platforms.

As noted above, panelists who deliver the workshop/seminar, are instructed that the assessment-based seminars must ensure that students are not simply rewarded with a credential for attending a seminar. Ongoing communication with panelists is critical to ensure that quality remains high and that the micro-credentials indeed recognize mastery of skills. In addition, ongoing feedback for continual program improvement assists session presenters and program organizers with information to improve credentialing, seminar content, and expansion of programming to meet newly developing competencies.

Finally, the design of micro-credentials and identification of the appropriate credentialing platform requires research, staff, and time. We worked with a graphic designer using an iterative process to design sets of badges for each competency to ensure a consistent visual design that aligned with the university's style book and appealed to our various stakeholders. We also worked with Credly. com to host our micro-credentialing system and handle the technical issues relating to the issuing, claiming, and tracking of badges.

With this and other platforms, students can also create a profile that can be shared with employers. It is also possible to track the sharing and viewing of credentials that have been earned to assess effectiveness and reach. Universities and programs that decide to credential professional development programs must attend to these technical and design issues to ensure a smooth rollout and to measure the effectiveness of their programs.

The badging movement is young and has been used primarily in industry and at the undergraduate level in higher education. There is virtually no literature on digital badging in graduate education. More work is therefore needed to pinpoint the kind of competencies valued by employers for students with advanced degrees. Collection and analyses of more data will inform us whether students with extensive digital portfolios experience greater success during their academic training, in gaining employment, and achieving greater success on the job. Finally, we need to learn whether digital badges can be promoted to employers as a valid, portable, and flexible method to determine an applicant's fit for the job. Badges clearly have great potential to provide graduate students with customized portfolios which highlight accomplishments in new and meaningful ways for the 21st-century workplace. [C]

Resources

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