WIP: Micro-Credentialing for the First Year: Creating a Digital Badge for Engineering Information Literacy

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WORK IN PROGRESS – Micro-Credentialing for the First Year: Creating a Digital Badge for Engineering Information Literacy

INTRODUCTION

The use of digital badges as microcredentials has become a popular topic of discussion and research in education over the past fifteen years. Academic librarians are often involved in this innovation. Since the topics taught by librarians are not usually full semester courses, they lend themselves well to shorter, add-on material that can be easily tailored into a multi-level badging system.

As engineering librarians at the Pennsylvania State University, we ensure that students can find, evaluate, and use information effectively for their research projects. Currently, there are over 8,200 undergraduate students in the College of Engineering, and with the current approach to teaching, most students never receive formal library instruction.

Academic libraries have long been promoters of using digital badges to supplement coursework and introduce students to information literacy skills. Badges are often used in coordination with classroom learning and usually require collaboration between librarians and teaching faculty. The library badge itself is never the point of the course but assists the student with learning skills that they would not normally have time to learn during the regular course period [1]. It is even possible for libraries to meet accreditation requirements via the creation of badges and embedding them into their learning management system (LMS) [2].

Badges have some advantages. They can extend the regular library "one-shot" session to provide more information and learning experiences that just cannot be accomplished during a 50-minute class period. A second advantage is that badges can be used to scaffold learning and allow students to "level-up" to more advanced topics once they complete basic credentials. It is to a student's advantage to reach those higher-level badges – many employers prefer to see a couple of high-level ones rather than a bunch from lower levels. They can also be designed to motivate students to complete them, especially if the librarian collaborates with the teaching faculty to create the badge. Completing the badge could result in extra credit or be part of the overall class participation grade [3].

Research published in 2016 showed that many employers are interested in the use of digital badges to prove learning outside of the classroom. They also found that the surveyed employers rate "ability to demonstrate extra learning beyond the classroom" much higher than grades, internships, or standardized test scores. Over 95% of the 116 employers surveyed said that they believed that the inclusion of digital badges as a part of a potential employee's application packet would help them better understand the skills that person may have coming into the job [4].

BADGING AT PENN STATE

The Penn State University Libraries were early adopters of digital badging. In 2014, the Libraries Learning Services Department created a multilevel badge system based on three main topics: "Savvy Searcher", "Questioner of Information", and "Organizer of Information". Each of these

"meta-badges" had several smaller badges underneath them (ten in total), and to qualify for the chance to earn the meta-badge, a student had to successfully complete the smaller badges first. If all three main badges were completed, then students could attempt the overarching "Information Literacy" badge. Each badge had its own requirements and image, with students having the choice as to how far they wanted to go and which badges to earn. Unfortunately, the badging platform was decommissioned in 2023 and the Libraries currently have no replacement system operational [5].

Meanwhile, the College of Engineering has created a very robust badging system of its own. Unlike the library badges, built around a leveled system, the engineering badges are mostly unrelated and cover many topics, including everything from lab safety to staff professional development. In the past few years, over 130 different badges have been created (95 are currently offered) and almost 8000 badges have been awarded. All badges are built using an approved LMS (such as Canvas) and are awarded via Credly [6].

For this project, each student will work independently to earn the credential, even though they will be working in groups during the course for other assignments. In this way, each student will gain a basic understanding of the research process and the skills they need to use information independently and tailor their responses to their own interests.

We decided that the best way to get students to attempt the badge would be to embed it into an existing required course. Engineering Design (ESDGN 100) – Cornerstone Engineering Design – is a mandatory course for all students who wish to major in an engineering discipline and is normally taken some time during a student's first year. For an average academic year, there are approximately forty sections (with 32 students each) in the fall and 25-30 sections in the spring, meaning that by embedding the badge into the course, there is an opportunity to reach over 2,000 students per year. Since one of the learning outcomes for the course is to teach engineering students basic research skills, our proposed badge will fit perfectly into the preexisting curriculum.

The modules themselves have a standardized format. They begin with an overview of what the students are expected to learn and how they are going to learn it, followed by a short demonstration (taught by an actual undergraduate student in the College) of how to accomplish the task at hand. For the module pictured above, the demonstration would be on how to use Engineering Village, one of the best databases we have for finding peer-reviewed journal articles and conference proceedings on engineering topics. After the demonstration, using a subject that they've previously chosen for prior activities, they will run a search on their own to find a specific article relevant to that area. To get credit, they will have to share what they have found as well as explain the process they used to find it. A short quiz and conclusion will end the module and allow them to continue.

The module lists the name of the previous one they must complete to move on to it. Some modules only have an activity while others only have a short quiz-type assessment. This all depends on what has been determined to be the best way to assess student understanding of the topic discussed. In total, there are fourteen modules, with nine required and five optional.

Students need to finish three of the five optional modules to earn credit for full badge completion.

The activities and examples within the modules are linked using shared topics across the badge. Each topic is based on an actual problem or current issue in engineering that the student may encounter during their academic career. These themes are:

- Renewable Energy Sources
- 3D Printing (Additive Manufacturing)
- Artificial Intelligence
- Fluid Mechanics (anything from fuel flow to stormwater run-off)
- Human-Machine Interface

These themes were chosen because they are major areas of research for the College of Engineering, meaning that there is an excellent chance that students will do either in-lab or field research on one of them before they graduate.

Once a student completes all required modules successfully, they are awarded the badge through the College of Engineering's badge system. Students can post the badge's image to LinkedIn and other online resume and career resource sites. Potential employers and graduate schools will be able to gain more information about the badge (and the process the students had to go through to earn it) by either clicking on the image or a link next to it.

If all goes well with the testing and implementation process over the next few years, there are plans to create an "advanced" badge for students in senior capstone design courses, which will expand upon the topics in the "basic" badge and show them how to use what they have learned with the same information sources they would have access to in their post-college careers.

CONCLUSION

By grounding our badge in learning theory, we hope to provide our students with a fun, meaningful way to learn important skills that they will need both as student researchers and after graduation. Instead of trying to "shoehorn" extra material into an already over-stuffed curriculum, using a badge will enable- students to learn on their own time and in a manner of their own choosing, giving them some control over their educational experience. By presenting the information in this way instead of in a rushed classroom environment, we believe that they will better retain the knowledge and be more likely to use what they've learned in later research projects – which is the entire purpose of teaching them these skills in the first place.

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