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Badging Your Way to Information Literacy

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Badging Your Way to Information Literacy: A Comparison of Competency-based and Traditional Classroom Approaches

Abstract

Microcredentialing, or badging, has become a popular way to certify achievement in a variety of fields, perhaps most visibly in information technology. Higher education institutions have started to investigate badges as a way to certify curricular and co-curricular activities and provide a more detailed description of the skills, abilities, and experiences of students as they go through their college years. Microcredentialing also provides an opportunity to assess and recognize student learning outcomes across multiple courses, rather than requiring students to meet complex goals within one course.

At the authors' institution, the College of Technology recently formulated a competency-based degree program that includes information literacy outcomes for students. In order to track student progress, the college decided to use a badging system, and librarians were asked to create and facilitate an information literacy badge for the college's inaugural course for first-year students. The libraries have also been involved in working with a more conventional, i.e., credit-based, course for first year students in the college, which meets the university's foundational core curriculum requirements for information literacy.

This paper describes the process of developing an information literacy curriculum for a competency-based program and provides a rough comparison of student outcomes between the traditional and competency-based course offerings.

Introduction

Badging

Badges are the subject of many recent Chronicle of Higher Education columns[1], discussing the philosophical, practical, and institutional effects badging might have on the academy. Olneck, for example, describes badges as 'insurgent credentials' capable of subverting the traditional institutional monopoly on recognition of knowledge and achievement.[2] *Science*'s editor in chief has suggested a badge-like approach to creating a STEM challenge award program that "might provide 100 different challenges to choose from at each level of schooling…on subjects from reptiles to Web design,"[3] modeled loosely on the Boy Scout merit badge system that gives students a variety of options to demonstrate their mastery of a subject.

The Open Badge System Framework describes some of the core functions of badges: capturing an individual's learning path and signaling achievement at a granular level; providing intrinsic feedback, recognizing/rewarding milestones in development, and making learners aware of opportunities for further development; and building professional/personal identity, reputation and community membership. The authors state that badges "connect self-directed and interest-driven learning to a broader ecosystem of accreditation and recognition to enable each learner to capitalize on the learning experiences that they are already having, or to inspire and help them to seek out new ones, as well as to communicate their achievements and skills to necessary stakeholders."[4]

Simply put, badges, or microcredentials, are typically small-scale awards for demonstrating in some fashion, competency in a particular area. Often, this is accomplished by carrying out stipulated tasks (e.g., answering 20 multiplication questions correctly or programming a robot to carry out a particular function), but, badges can be awarded for 'soft skills' such as participating in online forums or providing leadership on a particular project, in ways that are more subjective and at the discretion of the awarder. Badges in general are not new, with, for example, the Boy Scouts and the armed forces having over a century of history awarding badges, ribbons, medals and the like to indicate participation, mastery, and extraordinary contributions. Video game designers also have embraced badges to encourage longer game play, providing recognition/rewards and the ability to show those badges to peers as a measure of achievement in the game.[5] The Open Badge Infrastructure (OBI), on the other hand, is an initiative to take badging into a truly internet-centric environment. In particular, the OBI is attempting to distill the most important characteristics of a badging system and creating open protocols that allow those who bestow credentials to communicate across organizations and communities.

According to Havalais the OBI "represents a framework for making badges (microcredentials with icons) machine-readable, portable, and verifiable in distributed digital networks… OBI-compliant badges provide pointers to the original work that demonstrates competence. No longer is the institutional endorsement the only source of certification; interested parties can assess the work directly."[6] All of these characteristics, readability, portability, verifiability, are crucial to microcredentialing having a role in traditional higher education. It opens new opportunities to assess and customize achievement, although the goal will be to not overwhelm the community with the number of badges available, and the ability to combine badges to 'tell the story' of the students' overall skill set from the collection of badges they've accumulated over their professional careers.

Due to the portability of the OBI, microcredentials can easily be awarded within or external to the traditional classroom environment. At Purdue, for example, students' extracurricular activities and their particular roles in them, are captured to show the depth of their experiences outside the classroom while at the university.[7] More generally, Havalais describes microcredentialing as providing a more granular credential than a degree, for example, and placing it in a digital microformat makes it "potentially much more easily shared, compared, aggregated, and investigated"[8] than traditional measures of achievement. Young states that badges provide a more individualized recognition of achievement, for example, instead of one grade for a course, the microcredentials can identify which aspects were mastered and to what level.[9] Additionally, badges can be given for work that has not been easily captured in a traditional undergraduate transcript, for example, showing leadership or ability to act effectively in different team roles as a project participant.

Incorporating information literacy principles into a badging framework, then, offers new opportunities for libraries and librarians to certify student skill levels independent of a particular course. It can provide autonomy for librarians, in that they can set the parameters for success for students, and flexibility for students to demonstrate they have mastered information literacy skills in the context the students choose. For example, students could turn in a research paper from a particular course and receive a badge indicating that they conducted an appropriate literature review, but students would be given opportunities to submit their work on multiple occasions until they demonstrated mastery of the information literacy concepts. Currently, students may be given research paper assignments, but can conceivably fail the information literacy aspects of papers and still pass the class. Merely relying on grades from courses that require research papers does not ensure that students have any mastery of information literacy concepts, while a badge system would be able to independently certify such mastery without resorting to requiring a 'library class' focused exclusively on information gathering skills, which is frequently devoid of the context that provides motivation for information gathering.

With the development of a competency-based technology program at their institution, the authors had the opportunity to create badges for its first-year course. The authors have been involved with the traditional first-year course for technology students as well, so we wanted to do a preliminary comparison of the instruction in those two venues. Since the course structure, librarian involvement, and assignments differ markedly between the courses, a fine-grained comparison cannot be made. However, by evaluating the overall quality of examples of the student work, strengths and weaknesses of the approaches can be uncovered, and ultimately, help determine whether the core information literacy outcomes have been achieved, in both traditional and credentialed instructional settings.

Description of Courses

Competency Based Program

Overview of Program

The Purdue Polytechnic Institute (PPI) houses a recently formulated competency based degree program offered in the College of Technology. One guiding principle of the program is the development of the whole person as a complete learner, not just teaching skills in a particular technical field. This includes intentional integration of traditional technical and humanities subjects. The PPI degree plan has information literacy embedded in the outcomes and competencies the students are expected to achieve on multiple levels throughout the four year program. In the first semester, two learning experiences formed the core of the PPI experience; a seminar class called Culture, Communications, and Digital Narratives, which encompasses the content of the typical first year composition and the first year oral communication courses; and a Design Lab that encompasses the content of the introduction to technology class described above. Both learning experiences were designed around student-centered, studio learning models, where the students determine topics of interest for the work to be completed and were expected to refine and iterate on products until they demonstrate the course's required competencies.

Completion of work and subsequent achievement of competencies was managed through Purdue's Open Passport badging platform (http://www.openpassport.org). The badges present the challenges to be completed to demonstrate a desired competency. The PPI faculty requested that the Libraries develop an information literacy badge to complement the badges related to the English and Communications course content. The librarians created a badge with content equivalent to 1-credit hour of work, based on a one-credit 8-week course that the Libraries had traditionally provided as a General Studies course.

The badge contains five challenges: Exploring a Topic, Searching for Information, Evaluating Information, Using and Acknowledging Information, and Know Your Intellectual Property. Each challenge consists of introductory content, frequently including video clips, text, and example documents. The students must submit assignments through the badge platform, typically some preparatory work to demonstrate the concept followed by an integrative piece that shows application of the work toward a research project, in order to pass the challenge. While some in-class activities are designed to mirror the challenge outcomes, students have to actually submit a piece of work through the badge system in order for it to be reviewed and approved by the instructors.

Librarian Role

Librarians participated in both of the Seminar and Design Lab learning experiences. One librarian acted as one of the course instructors in the seminar course, which included providing several short lectures with related class activities on information search strategies and information use and acknowledgement. In addition, a guest lecture from a second librarian on idea generation was presented in the design lab.

Description of Final Deliverable

The information literacy badge was not required in order for students to successfully complete the course, but one challenge, where students need to demonstrate the proper use and acknowledgement of information, was a prerequisite to receive credit for one of the challenges in a written communication badge. The librarian who worked with the students as an instructor during the semester provided feedback and guidance for students to complete work for this challenge.

To complete the information use and acknowledgement challenge, students could submit work from the seminar, the design lab, or other coursework completed during the semester that they felt demonstrated the required knowledge.

Traditional Classroom

Overview of the Course

Design Thinking in Technology, TECH 120, is a core curriculum design course for College of Technology students at Purdue University. The course gives students exposure to the design process while critically analyzing real world problems and solutions. Students in the course cover topics like writing problem statements, ethnographic methods of evaluating problems, writing technical reports, and presenting findings. The course is a 3 credit flipped course with 1 hour face to face and the remaining content delivery hours online. Over the course of the 2 weeks, students are exposed to library research methods via both online tutorial and face-to-face librarian instruction. Over these 2 weeks, students are required to complete two bibliographies after the online tutorial and the face to face meeting. At the end of the course, students are expected to complete a end of course group presentation that includes a bibliography.

Librarian Role

A librarian is considered an (asynchronous) instructor and contributor to the course. That is, the librarian is a part of the development and implementation of the course from inception to execution. The librarian attends the weekly instructional meetings with the course coordinator and the other instructors and graduate students affiliated with the course. The librarian creates online course content with an assignment, and also coordinates library face to face instructional time in all of the course sections (about 25 sections per year). For this course, there are two major foci for the information literacy instruction. First, students learn about the library search process, including selecting keywords, databases, and suitable journal articles. Second, students are asked to evaluate sources on the facets of currency, relevance, audience, authority, and purpose. These outcomes were guided by the Association of American Colleges and Universities Value Information Literacy rubric, which informs the university's core curriculum[10].

Description of Final Deliverable

After one asynchronous online library instruction session and one 15 minute synchronous activity in the classroom, the students are expected to integrate the targeted information literacy concepts into their final project. The final project is a poster presentation of an original engineering design solution to a real-world problem. As a part of a well-executed design process, practitioners are expected to assess current solutions in a process called benchmarking. The students are expected to document their process and any sources for the problem solved and the solution. The final project is designed by teams of 3 to 5 students who present their final work in class.

Methods

While the courses have very different structures, roles for librarians, and final deliverables, the overall learning outcome is the same, which is for students to learn the foundational information literacy skills required by the core curriculum standards of the university. For the purposes of this paper, the authors wanted to explore within the context of the different learning environments, the evidence of student achievement in each of the course offerings. Since the offerings were developed independently and organically, it is difficult to extract effects of specific interventions across the environments. Rather, the purpose of the study is to look at the aggregate effect of the different learning environments and expectations and see the effectiveness of the environments as a whole.

In order to make a comparison of the performance of students, the authors used a common metric, rating on a three-point scale, the facets of Currency, Relevance, Appropriateness/Authority, and Purpose, a revised version of the CRAAP test.[11]

Twenty documents with bibliographies were randomly selected from each of the TECH 120 course and from the PPI Seminar learning environments. In order to make meaningful comparisons, the final projects from TECH 120 without bibliographies were not included in the sample. In order to assemble 20 bibliographies from the TECH 120 course, 36 posters were examined, so only 56% of the final projects contained bibliographies. In the PPI course, out of 33 enrolled students, 23 students submitted work to meet the 'information use and acknowledgement' challenge. Thus, the work examined represented a 70% completion rate among the PPI students. The average participation for the combined sample was 63%. For ease of analysis, only the first five sources from each bibliography were analyzed.

Results

Across the 20 assignments selected for review from each class, the average number of references per assignment was 4.2 in Tech 120 with a range of between 1 and 5 references on a poster; the average number of references per assignment was 7.2 for the PPI course, with a range of between 2 and 21 references included in an artifact (see Table 1).

Table 1: Variation of Number of Sources in Student Bibliographies

References	Mean	Min	Max
TECH 120	4.2	1	5
PPI	7.2	2	21

Evaluation of the references was completed using a 3 point rating scale on 4 factors (Currency, Reliability, Accuracy/Authority, Purpose), see Table 2. Each reference was evaluated, and then all of the scores from the evaluated references were averaged together, giving a final evaluation rating between 1 and 3 for the quality of sources used by the student or team (final column of Table 2). Overall references average by assignment for Tech 120 came out to 2.21 , while the average for PPI was 2.43. The librarian associated with each class evaluated all 20 of the assignments for the course they taught.

In order to ensure interrater reliability, the librarians exchanged 2 anonymized artifacts from each class and then compared their ratings. After two rounds of calibration to resolve differences between the raters, in the final round, out of 80 total ratings (4 factors * 5 sources * 4 papers) the raters scored 72 items the same, for a match rate of 90%. Thus, we believe the scoring method is quite consistent between populations of students.

Table 2: Quality of Sources in Bibliographies, Total of 40 (3 point scale)

	Currency	Relevance	Authority	Purpose	Average
TECH 120	2.2	2.3	2.2	2.3	2.2
PPI	2.4	2.6	2.2	2.5	2.4

Discussion / Findings

Each of the PPI students received at least one round of specific feedback on the use and acknowledgement of information in the submitted assignment, but not the quality of the sources selected (they would have received feedback on quality of sources for assignments submitted for that challenge of the badge). The quality of resources used was addressed generally in class, but not specifically addressed in feedback since it was clear the students were still struggling with some of the basic mechanics of citations and references. In the self-paced learning environment the students who finished in time to have materials included in this evaluation were the higher achieving students, so there may be a bias toward quality in the artifacts available for analysis. Traditional TECH 120 students were not provided any feedback on the sources used for their final project. However, they were given feedback about the quality of sources in the two earlier assignments that required bibliographies. The poster presentations that were rated were the semester's culminating assignment after a several-week design project.

There are some differences in the nature of the work compared between the two settings, first that the Tech 120 work is tied directly to a design project, while the PPI work could be a design process artifact, but was more typically a longer written document, more like a typical first-year English paper. In addition, the Tech 120 artifact is the result of teamwork, so it is unclear if the bibliography is the work of a particular student, or a reflection of the skills for the whole team. Meanwhile, the PPI assignment is for the individual, so individual learning gains are being measured more directly, one of the stated benefits of badges in education.

For PPI the incomplete rate (30.3%) is indicative of a failure to complete the course and receipt of an incomplete grade, with Tech 120, the 42.9 % rate of missing bibliographies reflects those who just missed or chose not to complete one portion of the rubric. There was value placed on the inclusion of a bibliography within the rubric for the poster presentation. A majority of students who included bibliographies, also included appropriately used in-text citations, potentially highlight differences in students' understanding of the assignment and the purpose of a bibliography.

The incomplete rate is rather high for the PPI learning experiences from Fall 2014. While some of this can be explained by self-paced learning and the need for students to revise and continue refining skills until they demonstrate the skill or knowledge, there are also considerations of a completely new learning environment, one without hard deadlines and final grades as of a given date.

Conclusions

This paper examined two different approaches to teaching information literacy skills to first-year technology students. While comparisons are challenging, as the fundamental course pedagogy, information-intensive assignments, and evaluation and feedback mechanisms differed between the courses, overall, we found that the PPI approach led to slightly higher quality of sources, as evaluated using the CRAAP test. This is perhaps not surprising, due to the duration of library instruction and opportunities for refinement. The TECH 120 traditional course contains a single two week instructional module, and students submitted the final project analyzed in this paper several weeks after that module occurred. The PPI course, on the other hand, involves an iterative process of submission and revision, with a focus on acknowledgement and use, rather than source evaluation. So, what was analyzed of the PPI students was not their initial submission, and one might expect them to score higher based solely on that effect.

Perhaps most troubling was the large percentage of students who did not include the required bibliography in their final project (TECH 120) or who did not successfully complete the acknowledgement and use badge (PPI). Those who did submit the complete assignment were able to demonstrate reasonable effectiveness in using and documenting information appropriately, but the large number of students who did not submit needs to be improved in future instances of both courses. Further research is required to better understand whether those students, who, in a sense, did not engage with the project by including bibliographies or submitting projects, conceptually understand the skills but did not choose to apply them. Alternately, further research is required to understand whether those who did engage lacked the skills to acquire, integrate, and utilize information sources to develop an argument. In any case, the results of the TECH 120 course bear out the supposition that students can pass the course without demonstrating that they can integrate information literacy concepts into a final project. Also pointedly, further research is needed in the larger arena of higher education and the use of badges as suitable replacement for the credit-hour course. Traditionally, credentialing is more heavily used in industry, where skills and knowledge are more directly aligned with outputs and goals. Careful alignment of the skills and knowledge with traditional and nontraditional delivery and deliverables is required for a measurable argument for use of badges or not. This is especially important for libraries and information literacy as we continue to assess the measurable value of our contributions to our various campus constituencies.

Future directions

We would like to follow up with PPI students in subsequent semesters to review how well the competency measured with the challenge continues to be demonstrated. A quick review of the end of semester portfolio submission from the students indicates that the information use skills were not applied thoroughly to documents that were not submitted for review of this skill in both the PPI and TECH 120 cases. In some cases this may be an artifact of when work was completed and a lack of time or interest in improving materials prior to including them in a final portfolio, in others it may actually demonstrate a lack of internalizing the learning articulated in the specific challenge.

In addition, we would like to consider revising the course content for the TECH 120 course, to infuse more information literacy skill building throughout the course, rather than only near the beginning of the course. Additionally we are exploring opportunities to provide feedback or mentoring as students prepare their final presentations. Strengthening the course content requires negotiating with the disciplinary course coordinator and tailoring the content to meet the information needs of the design process which they are studying.

The results of this study have already provided input for revisions to the PPI and TECH 120 courses. In particular, the courses need to reinforce information literacy concepts and there must be an expectation that they will be used (and graded) throughout the semester. We hope that information literacy efforts made in these two courses will positively impact the quality of their work in subsequent classes as they matriculate.

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