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Academic Digital Badges: Industry, Employment, and Prospects

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Academic Digital Badges: Industry, Employment, and Prospects

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Business Administration
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ABSTRACT

Digital badges are becoming more prevalent in the credentialing sector yet there is limited understanding of how the industry is developing or how digital badges influence the hiring process. This study employed an exploratory case method to make known the development of the badging industry. This dynamic new educational technology has a wide range of stakeholders working at establishing standards to ensure consistent and effective application across the badging ecosphere. To understand academic badging further, the researcher conducted a type of field experiment called a résumé audit study. In the late Spring of 2019, the investigator applied to 1,848 unique entry-level jobs using one of three versions of a fictional résumé. One résumé displayed badges in business skills, another résumé showed identical skills but without badges, the third résumé was a control with no added business skills. The results show that a recent graduate without a business degree significantly increases the likelihood of employer interest if digital badges associated with business skills appear on the applicant’s résumé. Whether academic digital badges become a transitory technology or transformational one depends on promotion and policy. Badging needs a champion to support increased awareness to help stakeholders understand the benefits of credentials that are secure, verifiable, and rich in data. Decision makers at all levels of government and education need to ensure educationally related policies support badging as a viable 21st Century credential.
CHAPTER ONE:
AN OVERVIEW OF THE OPEN EDUCATIONAL BADGE MOVEMENT:
POSSIBILITIES AND PITFALLS

Abstract

Educational stakeholders have little understanding of the value of digital badging as a tool for preparing students to be “job ready” and attractive to employers. This exploratory case study provides an overview of the developing global educational badging ecosystem, key terminology, advantages, challenges, and examples of badge utilization. It creates a record of the evolving digital badge credential, providing insights to educational stakeholders. This research addresses how theories of adult education relate to digital badges. If existing challenges can be overcome, this emerging adult learning tool may improve access to higher education, reduce credential fraud, decrease concerns about vague transcripts, and support customized learning. The challenges include understanding the value of a badge, establishing global standards in a dynamic environment, and creating awareness and buy-in among employers of a global badging ecosystem. A primary goal of this study is to identify future research for this promising innovation.

Introduction

Higher education is on the cusp of disruption; from 2013-2016, 35 title IV, four-year colleges closed (U.S. Department of Education, n.d.). Iowa Wesleyan University’s plight is a micro-example of the macro changes occurring in the U.S. higher education industry. In 1842, four years before Iowa became a state, Iowa Wesleyan University began operations in Mount Pleasant, Iowa, while John Tyler served as the 10th U.S. President (Jaschik, 2018). In the past
177 years, this small prairie school has produced numerous notable graduates, including Dr. James Van Allen (’35), who discovered the earth’s radiation belts, knowledge vital for moon travel, and North American Space Agency (NASA) astronaut Peggy Whitson (’81) who became the first female commander of the International Space Station (Iowa Wesleyan University History, n.d.).

Iowa Wesleyan was the first higher education institution to establish pedagogical practices such as coeducation, service learning, and using the laboratory method for sciences. Despite the success of its graduates and innovations in pedagogy, Iowa Wesleyan is facing closure due to a lack of capital resulting from years of low enrollments. Jaschik (2018) notes that should Iowa Wesleyan close, it would become the eighth post-secondary school to do so since 2017 and one of more than 1,000 universities predicted to close in the next decade (Christensen & Eyring, 2011).

A pedagogical outcome of the changing higher-education industry is the development of the digital academic badge. Although new to academia, physical badges used as representations of rank, experience, or achievement are well known throughout the modern world. Though badges are often associated with Boy or Girl Scout merit badges, historians have dated badge-use to denote rank by Roman legions hundreds of years B.C. (Speidel, 1996). Only since 2011 have digital academic badges appeared on the higher-educational landscape (Gibson, Ostashewski, Flintoff, Grant, & Knight, 2015). Surman (2018) posits that millions of badges have been issued by governments, industry, and educational institutions since 2013. Fong, Janzow, and Peck (2016) found that 20% of U.S. colleges have issued badges since 2016. Technavio analysts forecast the global digital badge market will see a compounded annual growth rate of 31% from 2018-2022 (as cited in Technavio, 2019), which translates to a $205 million digital badge market.
by 2023 (Marketsandmarkets, 2019). Research by Raish and Rimland (2016) posit that Human Resource (HR) professionals welcome the idea of badges, providing more granular information on a job candidate’s skills and knowledge. Yet, most HR managers were unsure of the validity of open educational badges. Liyanagunawardena, Scalzavara, and Williams (2017) acknowledge limited research exists on open badges and the peer-reviewed research that does exist fails to address the development of the emerging global ecosystem associated with the badging movement.

The purpose of this research is threefold: discover knowledge, disseminate knowledge, and identify future research needs. The goal of this research is to answer three questions: What developments are occurring with the global digital badging ecosphere? What are some key opportunities and challenges of having a global badging ecosphere? What are the research needs associated with digital badging? This research provides an overview of the emerging global badging ecosystem, highlights key terminology, addresses the main advantages offered by badges, discusses some challenges facing open badges, provides examples that demonstrate how organizations are utilizing badges, and emphasizes future research needs associated with this emerging technology.

What follows is an overview of academic badging, its purpose, processes, oversight, and current and potential role in higher education. The article provides an assessment of the opportunities and challenges of using badges. It also identifies future research needed to further understand the systemic effects of this developing educational technology as well as help to narrow the gap between academia and the workplace.
Research Methodology

The research approach used is best described as an exploratory case study (Yin, 1993). Yin argues the exploratory approach is ideal for background investigation, making known the unknown, before engaging in formal social research via explanatory and descriptive case studies. Yin (1994) argues that using varied sources of evidence ensures validity of the exploratory construct with the badging industry serving as the unit of analysis. For this study, the workings of thought leaders for academic badges has not been captured in the academic literature yet. Hence, the research in this report involved accessing peer-reviewed studies and open source information. Since much of the research associated with the Instructional Management System (IMS) Global Learning Consortium’s (e.g., Global) effort for establishing global badging standards is not in scholarly literature, the author used media reports, corporate websites, trade outlets, press releases, and personal communications to gain insights regarding how the global badging ecosystem is maturing. The author used the University of South Florida’s online database and its version of Google Scholar for scholarly, peer-reviewed research. Keywords included digital badges, open badges, digital badges, and badging; sometimes, these terms were paired with specific secondary terms such as employment, platforms, and ecosystem. Yin (1994) espouses that external validity is more difficult with exploratory cases; however, it is possible through the use of theoretical connections and the ensuing generalizations that could be made. This research includes variations of adult learning theories as they relate to academic digital badges. Other theories, including learning theories and human capital theories, are possible considerations with respect to academic digital badges.
Theoretical Framework

A theoretical framework is useful in that it provides a foundation to support the purpose of this exploratory study. It clarifies how the insights derived from this work contribute to the body of knowledge related to adult and personalized learning. Also, the theoretical framework serves as a guide for the direction of the research and provides rationale for the findings, the possibilities and pitfalls of badges as well as considerations for future research.

Like many industries, education is seeing demand from its stakeholders for more customized learning versus the one-size fits all factory model of education that has been the standard for more than 150 years. Bulger (2016) conveys that personalized learning is the buzzword in education circles; however, scholars cannot agree on a shared definition as the concepts of personalized learning are broad (see Figure 1.1). Self-directed and self-paced fall within this broad range of terms. Knowles’ (1990) theory on adult learning, andragogy, includes the ideas of self-directed and self-paced learning.

![Figure 1.1. Personalized learning terms (Bulger, 2016)]
Knowles (1990) argues that six foundational assumptions are related to how adults learn differently than adolescents:

1) They have a need to know; they understand the benefits of acquiring new knowledge or skills or understand the drawbacks of not knowing or lacking a certain skill
2) They possess an independent sense of self-understanding that makes them self-directed
3) They have more experiences than young learners
4) They develop a sense of willingness to learn based on the knowledge and skills they need in their current situations
5) Their orientation to learning is life-centered, which is different from the subject-centered orientation by younger learners and
6) Adults have different motivators for learning, such as work promotions, career changes, improving self-esteem, better quality of life, etc.; a course consisting of a range of badges where learners choose which subjects to focus on more intently based on their current situation may be appealing for adult learners

In addition to Knowles, numerous other adult learning theories are worth considering with respect to digital badges and personalized learning. See Table 1.1 for a brief overview of some select adult learning models.

The highlighted theories of adult learning suggest that learning for adults is a highly personalized event. Badges support this notion by allowing scaffolding of badges that is personalized to the learner, which means an adult working in healthcare who wants to learn about operations management might create an operations course based on personal experience in healthcare operations as well as select badges in areas of operations management tailored to his/her unique background and life/career needs.
The idea of highly personalized learning pathways will change how faculty think about curriculum design. Standardized approaches to learning will become outdated. For example, operations management courses in university business programs vary from one school to another. In a badged future, operations management knowledge and skills likely will vary from one adult student to another while both are enrolled in the same course. Outcomes will differ depending on the student’s self-direction, experiences, characteristics, willingness, and life or career-stage. Two students might have different operations management experiences, which should be expected as operations vary by company and industry. Operations in a manufacturing facility are quite different from a hospital setting. Like any developing technology, badging is highly dynamic; however, to understand what is happening, one must first become familiar with the phenomenon and its vernacular.

**Table 1.1. Selected learning theories**

<table>
<thead>
<tr>
<th>Author</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jarvis (1987, 2006)</td>
<td>Learning process theory. Experiential learning depends on post-experience outcomes involving the inter-association between a person’s personal store of knowledge, the nature of the person, the nature of the experience, the nature of the interaction, the social context, and the chronology of events related to the experience. Not all experiences are important, some are insignificant.</td>
</tr>
<tr>
<td>Cross (1981)</td>
<td>Characteristics of the learner and the learning environment influence the learning process. Adult characteristics such as employment status, marital status, parenthood, age, etc. combined with learning style influence adult learning.</td>
</tr>
<tr>
<td>Caffarella (1993)</td>
<td>Self-directed learning theory. Adults initiate learning; adults plan and manage their own learning with a balance between autonomy and reliance.</td>
</tr>
<tr>
<td>Kolb (1976)</td>
<td>Experiential learning theory offers a 4-stage model that begins with concrete experience (stage 1) as the foundation for observation and contemplation (stage 2) which are then formed into ideas and generalizations (stage 3) resulting in guides for generating new experiences (stage 4).</td>
</tr>
</tbody>
</table>
Badges Defined and Described

**A Digital Badge Is:**

A digital representation of a skill, learning achievement or experience. Badges can represent competencies and involvements recognized in online or offline life. Each badge is associated with an image and some metadata. The metadata provides information about what the badge represents, and the evidence used to support it. (Mozilla, 2014).

Learners earn educational digital badges through short courses, online, in-person, and hybrid formats, allowing greater access. They provide more information than a traditional transcript because they contain rich metadata, such as the issuer of the badge, standards alignment, evidence of learning, learning objectives, and could even include Uniform Resource Locator (URL) links to short videos of the student communicating what s/he learned (see Figure 1.2). A significant advantage of academic badges is the ability for the learner to transport, display, and share badges. Furthermore, the digital securing of badges allows potential employers the ability to verify the authenticity of the credential with a mouse click. A robust effort is underway by an assortment of stakeholders from education, industry, and government to assist with the implementation of this new educational product.

**Figure 1.2.** Badges contain metadata (Mathers, n.d.)
The IMS Global is a non-profit collaborative consisting of more than 500 organizations focused on creating and guiding the future EdTech system; it serves as the organization providing the oversight, policy, and guidance on badging standards for the Academy (IMS Global, 2018b). IMS understands that because future digital credentialing (not just badges but also micro-certificates, continuing education certificates, business-application specific certificates, nano degrees, etc.) is verifiable, portable, transcriptable, exchangeable, and managed by the learner, it will require a set of open standards to provide better value by avoiding high-cost, single-proprietary integrations. With this goal in mind, IMS manages the Open Badges Infrastructure (OBI) standard for a specific type of digital badge, the open badge.

**Open Badges**

Learner-agency principles serve as the foundation of the open badges concept (IMS Global, 2018b). Learner-agency means students assume control of their credentials; they can claim and display badges across a range of digital mediums (e.g., LinkedIn, Facebook, Twitter, etc.). Three key roles (issuers, earners, displayers) pertain to OBI and its overarching goals center on building an adaptable, decentralized framework that captures learning wherever it takes place, allows anyone to issue badges, and provides earners control over how they characterize their learning (Mozilla, 2014). More formally, Hickey and Otto (2017) cite the Bologna Open Recognition Declaration created during the ePortfolio & Identity (ePIC) Conference in Bologna, Italy, in 2016, which espouses:

Open Badges, the open standard for the recognition of learning achievements, has proved the power of a simple, affordable, resilient and trustworthy technology to create an open recognition ecosystem working across countries, educational sectors, work, social environments and technologies. Open Badges have demonstrated that we have the means and the opportunity to put an end to the disparities of the recognition landscape. Connecting and informing competency frameworks, they become the building blocks of an open architecture for the recognition of lifelong and
life-wide learning achievements. They create the conditions for individuals to be in control of their own recognition, to establish their identity and agency, whether formally (within institutions) or informally (across communities). (1st paragraph “The Importance of Open Recognition” section)

Open badges are also open because they do not rely on one system, such as a single learning management system, social media platform, or badging site, which means open badges provide greater freedom of badge issuing and application of badges by organizations and individuals. Understanding the developmental history and origins of the open digital badge provides insight into the evolving badge ecosystem and brings to light other concepts associated with this unique credentialing model.

The concept of alternative credentials first surfaced in the early 1980s (Green, 1980 as cited in Grant, 2016). Moodie (2011) raised awareness about the digital badging ideal and the MacArthur Foundation’s $2 million competition for designing an open badging standard that could be used by a wide range of stakeholders to verify accomplishments and experiences of individuals. This competition eventually led to the first open badges coalition.

The first Open Badges system was initiated in 2011 by a network of partners with the non-profit Mozilla as the key coordinator. The effort, funded by the MacArthur Foundation, was based on a 2010 white paper titled “Open Badges for Lifelong Learning” by Knight et. al. (Openbadges, 2016; The Mozilla Foundation, 2012). From 2011-2013, Mozilla developed the badging infrastructure then launched Open Badges version 1.0 in 2013 (Openbadges, 2016). In the spring of 2014, a group of business and education organizations made public assurances to support the distribution of educational digital badges, which later formed into the Badge Alliance (Jade, 2014). The Badge Alliance created 11 working groups focused on badging infrastructure and ecosystem. On January 1, 2017, Mozilla and the Badge Alliance transferred the
responsibility for the progression of the open badges’ technical standards and communities of practice to IMS Global, which, along with the Mozilla Foundation and Collective Shift (a non-profit focused on social change and owner of the LRNG learning platform), serves as the Badge Alliance Steering Committee (IMS Global, 2018a; Badge Alliance, n.d.) to provide oversight and guidance for the evolving badge ecosystem.

The Developing Global Badge Ecosystem

The major pieces of the IMS digital badge ecosystem include platforms, open pathways, backpacks, CLR (Comprehensive Learner Record), and CASE® (Competencies and Academic Standards Exchange). The goal of the system is to capture all learning: formal, informal, and non-formal (Merriam, Caffarella, & Baumgartner, 2007), achievements, and experiences throughout a person’s life into a secure, verifiable digital record maintained by the student that allows for the stacking of micro-credentials from a wide range of trusted issuers into advanced credentials using an integrated data exchange system. A close look at each facet of the badging ecosystem provides a better understanding of the overarching system. The concept of badge platforms is a suitable place to start understanding the badging ecosystem as it provides a broad vision of the developing badging industry.

Badge Platforms

What started as a 2010 white-paper idea has grown to scale with an evolving ecosystem to include more than 15 million open badges issued by tens of thousands of issuers since 2013 (Surman, 2018). Issuers, which might be a worksite supervisor, a small business, a college department, or some other person or firm, are using a variety of badge platforms. Appendix 1.1 includes a list of the more well-known badge platform providers (Badge Wiki, 2018). Recognizing the rapid rise of badge platforms and a need for standardization and integration,
IMS Global established a certification program for badge platform companies to ensure interoperability between products and content.

Seventeen badge platforms (13 different organizations), certified to issue, display, and host badges, are listed in IMS Global’s (2018d) official list of certified open badges products (see Appendix 1.2). Certification by IMS is possible for badging systems that issue, display, or host badges (IMS Global, 2018e). Certification requires membership in the IMS alliance or affiliate, passing all tests associated with the service type (issue, display, or host), agreement to have the tests completed by a designated IMS representative and confirmation that the results are accurate and free of misrepresentation. The tests include proof of conformance to Open Badges specifications, which requires the candidate to issue a baked badge (see glossary) and demonstrate various functions, depending on the service type. Certifications to be re-run on an annual basis (IMS 2018, n.d. a). A recent development by Concentric Sky’s Badgr platform builds on the idea of learning pathways.

**Learning Pathways, Open Pathways**

The idea of scaffolding learning was first introduced by Whitehead (1929) and more recently, by van de Pol et al. (2010) and Coe (2011). Scott’s (1992) research into how students learn physics brought to light the notion of learning pathways; it is a course of learning, chosen by the learner, that includes a series of stages from pre-conception to targeted outcomes, where learning transitions are unique to each learner based on subjective experiences and abilities (Jih, 1996). Applying this idea to the badging ecosystem helps to understand the value of open pathways.

IMS Global (2018c) explains that open pathways consist of taking a competency framework or set of learning standards and converting it/them into a pathway, or a series of
pathways, to guide learners while earning badges and stacking them into more substantial credentials. IMS Global’s vision is for learners to be able to stack badges across platforms and institutions to allow greater flexibility in attaining one’s educational goals. The pathway would be shared in a digital portfolio showing earned badges as well as uncompleted badges.

The pathway in Figure 1.3 consists of badges from 10 different issuing agencies using three different badging platforms (Acclaim, Credly, and Badgr) (Skipper, 2018). The curriculum in the pathway shown aligns to California’s Career Technical Education (CTE) Model Curriculum Standards for Biotechnology. Students earn the Biotech Lab Assistant Certificate using badges issued from high school. The application of this certificate towards the Associate Degree demonstrates the cross-institutional stacking capability of the open pathway system. An interactive example of the open pathway shown in Figure 1.3 exists at: https://pathways.badgr.io/public/pathway/5ad8eee4c9494851f4893554.

Figure 1.3. Open pathway example (Skipper, 2018)
Given the plethora of experiences, achievements, formal and informal learning activities that are documented securely through a badging system, earners can create unique, personalized pathways. One goal of the Badgr pathway system is to highlight more substantial credentials available to earners once they earn a badge. For example, referring to the open pathway shown in Figure 1.3, once a student earned the 21st Century Skills: Critical Thinking badge, several pathways could appear on that student’s pathway dashboard, including the pathway to an associate degree in biotechnology. Such a system also allows for the potential push-pull signaling to employers once a learner earns a high-demand credential. BeCode, a Belgian non-profit that offers a no-cost six-month coding boot camp for those with no coding or developer background, is working towards such a push-pull badging system.

BeCode requires potential students to complete 25 badges related to code and web development from the Codeacademy’s free online platform (Digital Inclusion, 2018). The Chief Operating Officer (COO) of BeCode, Cedric Swaelens, envisions using badges to push a signal to employers when a student has mastered a high-demand programming skill and has begun beta-testing such a system (C. Swaelens, personal communication, July 2018). This system may allow students, most of whom are either unemployed or under-employed, to gain employment as a software developer while enrolled in BeCode’s boot camp, before completing the boot camp. For example, if a student earns her HTML5-programming badge while enrolled in the boot camp and employers are looking for HTML5-trained developers, once the student earns the badge, BeCode’s system automatically notifies employers, which may lead to an employment outcome. Likewise, in a badging ecosystem, an employer or potential employer could pull skillset data, based on earned badges, to match employees for specialized jobs or projects. A similar open pathway system could add value to U.S. higher education institutions.
Using badges as prerequisites for college programs or “badging-out” college courses by breaking the course content into a series of badges allows prerequisites more tailored to specific program requirements and greater transparency regarding the specific course outcomes as well as the student’s progress. Badging a course also allows greater customization with the curriculum. For example, an adult student enrolled in a business operations course who works full time might choose to tailor his operations management course with more focus on project management and less on inventory management if his full-time job requires him to manage projects, not inventories. This student’s business operations pathway might look different than a student more engaged with logistics or supply chain management.

Likewise, the operations management course badges may offer lessons more industry specific than the general approach used by most business programs. Hence, a healthcare worker completing a business degree may opt to earn healthcare related operations badges while a different student who works in retail may desire badges centered on retail operations. Both students will stack their badges to fulfill the credits in operations management as required by their degree program. Another advantage of badged courses is they allow students to stop a course mid-way, then begin at a different time without having to repeat the entire course. Badged courses also allow older workers to take focused lessons to update their skills instead of having to take an entire course. Additionally, open pathways allow for more flexibility with transfer students.

Prior Learning Assessments (PLA), where adult students earn academic credit based on lived experiences, has become commonplace for university admissions programs. However, PLAs are a challenge to manage. For a student who wants to earn credit for prior experiences, the school requires the student to submit a portfolio of evidence. Building such a portfolio is
onerous for the student while verifying the evidence is time-consuming for most universities. Organizations recognizing experiences using badges could make the PLA process more efficient with the metadata and verification baked into the badge. The student could share the badges with the university admissions department, and the department could verify the named agency issued the badges.

Consider a student who wishes to study in an engineering program that specializes in additive manufacturing (e.g., 3D printing). A student may include badges on her college resume that she has earned through volunteer work related to 3D printing, such as those offered by the e-Nable Community. e-Nable (2019) describes itself as “…an amazing group of individuals from all over the world who are using their 3D printers to create free 3D printed hands and arms for those in need of an upper limb assistive device” (para. 4). Volunteers can earn a range of badges (see Figure 3), including unique badges for fabricating each of the various hand designs, and distinctive badges for assembling each hand design (a different badge for each different design) (e-Nable, 2019b). Also, e-Nable offers badges for performing roles within the e-Nable community, forming an e-Nable chapter or working group, participating in community activities, completing design challenges for generating new assistive designs, and learning about the e-Nable community (e-Nable, 2019c). This type of flexibility and access in a badging ecosystem may prove useful to a wide range of learners and educational administrators.

Kazin and Clerkin (2018) posit badges could play an essential role in military members transitioning into the private sector and note the U.S. Army’s proto-type testing of such a system, MIL-CRED in 2017. A link to MIL-CRED information provided by Kazin and Clerking takes one to the Department of Defense’s Advanced Distributed Learning (ADL) Initiative webpage. According to an ADL message, the webpage no longer exists. Additional searches of the internet
and academic databases did not locate any information regarding the progress of the MIL-CRED or whether the program still exists. While an open pathway demonstrates some potential with digital badges, such as stacking, personalizing, and streamlining the PLA process, it also highlights a challenge: where to store the thousands of badges a learner collects over a lifetime of learning, experiencing, and achieving? The digital backpack is such a device.

Figure 1.4. Examples of e-Nable badges (e-Nable, 2019)
Digital Badge Backpacks

Mozilla released its backpack feature in 2013 with the Open Badges 1.0 release (Thompson, 2013). The backpack serves as a visual record of the student’s badges. Mozilla created its backpack as a digital storage area for learners to house the various badges they were earning from a wide range of open badging sites. The badge earner decides which badges to share with the public and which to keep private. Since its original release, most badging platforms offer some type of backpack feature, and many individual platforms work with Mozilla’s backpack, allowing badge earners to import/export badges seamlessly from Mozilla’s backpack to their platform backpack. However, Mozilla no longer manages its backpack feature.

In August of 2018, recognizing that IMS’ work with badging standards marks the next phase in the evolution of the badging ecosphere, Mozilla announced it was stopping its role as a direct service provider in the badging sector and migrating its Mozilla Backpack to Concentric Sky’s Badgr platform (Surnam, 2018). The backpack migration followed an earlier press release that the Instructure’s Canvas Learning Management System (LMS) would offer Open Badges through Badgr’s platform as a native feature within its LMS (Canvas, 2018). Badgr allows users to store any open badge in its backpack, not just those issued by Badgr (Hammond, 2017). Several other badging platforms have partnerships with Canvas, including Accredible, Credly, Canvasbadges, BadgeSafe, and Open Badge Factory (Heppenstall, 2018). Nearly all these other platforms have some kind of backpack feature and integrate with the original Mozilla backpack that is managed by Badgr. Developers at IMS Global recognize that not all achievements, experiences, knowledge, and skills will be badges, hence the need for the Comprehensive Learner Record (CLR).
**Comprehensive Learner Record**

Traditional academic transcripts, rooted in the 20th Century, paper-based information systems, provide limited information, such as course title and grades earned, about a student’s learning. These transcripts fail to reflect the wide variety of knowledge, learning experiences, competencies, and achievements of the learner. Conventional transcripts designed for one-time learning periods, such as four years at a university, do not work well for the modern world’s rapid pace of change and need for life-long learning. With support from the Lumina Foundation, the National Association of Student Personnel Administrators, and the American Association of Collegiate Registrars and Admissions Officers (AACRAO), IMS Global is advancing the CLR as the 21st-Century educational record (Educause, 2019).

The genesis for the CLR started in 2015 at an IMS Global CBE (Competency Based Education) Workgroup that included 35 C-BEN (Competency-Based Education Network) institutions that recognized higher education record-keeping must change to support the evolving educational landscape (IMS Global, 2019a). IMS Global created a vision of the CLR, formerly referred to as Extended Transcripts, as a secure, verifiable, learner-centered digital record. This digital record requires a standardized format that captures a more granular picture of a learner and supports a broad range of educational activities, including traditional educational courses, competency-based education, badges, technical skills, soft skills, experiential learning, achievements, and co-curricular activities. IMS launched its first version of the CLR in August of 2019 (Educause, 2019); examples of versions uploaded by institutions can be viewed at [http://projects.imsglobal.org/clr-viewer/](http://projects.imsglobal.org/clr-viewer/). The CLR is designed to work with open badges and open pathways, allowing for a record of learning that is easier to understand and more detailed for human educational stakeholders who read them. The Competencies and Academic Standards
Exchange (CASE®) extends access further by putting educational information in a format that is read easily by software.

**Competencies and Academic Standards Exchange**

The IMS is developing the Global CASE®, a set of technical requirements designed to make it possible to electronically transmit learning standards in a constant, referenceable manner by IT applications, tools, and systems (IMS, 2019b). Using common identifiers published in a dynamic database allows for the easy sharing of evidence between a range of educational systems, including learning management systems, rubrics, and curriculum management applications. This system allows for the more efficient and comprehensive development of badge pathways. To do this, IMS proposes a framework for CASE® that includes four items, 1) competency documents, 2) competency items, 3) competency associations, and 4) competency rubrics. The specifications for the CASE® framework were released in version 1.0 in July of 2017 (IMS, 2017).

CASE® aims to transform static documents, typically formatted in HTML, .pdf, or print format and designed to be read by humans, into a universal format compatible with a range of educational software to ensure the proper interpretation of learning standards by various educational organizations (IMS Global, 2017a). Competency documents act as the container for a group of learning standards, usually arranged hierarchically or by the classification system, which indicates expectations of a student’s competencies within a subject area comprised of one or more levels. Competency items include a statement linked with other statements or documents to form a construct. Items include things such as academic standards, competencies, sub-competencies, goals, skills, learning outcomes, objectives, etc. Competency associations indicate the relationship between competency documents or competency items delineated by being a
precise match of the source, related to, part of, replaced by, precedes, or as a prerequisite. A competency rubric expresses the expectations of excellence regarding an assignment, artifact, or act to define consistent grading benchmarks. IMS Global (2017a) notes four pilots involving machine-readable standards occurred in Texas, Georgia, and Wisconsin.

**Summary of the Developing Global Badge Ecosystem**

IMS Global is leading the development of the educational badging ecosystem. This system consists of badging platforms that bake badges to ensure they are secure and verifiable. The baked badges become stackable when placed in a badging pathway. Badge earners store their badges in digital backpacks retaining the right regarding which badges are or are not made visible. In a formal setting, the badges are recorded in a CLR (Comprehensive Learner Record) designed to provide human readers much more granularity of detail than traditional transcripts regarding the learner’s knowledge and skills. Finally, the CASE® (Competencies and Academic Standards Exchange) is an effort to develop machine-readable competency specifications that support digital standards to allow seamless interoperability between educational software. CASE® allows learners to customize their badging pathway independently through machine-enabled support. The overarching goal of the badging ecosystem is to capture all learning, achievements, and experiences throughout a person’s life into a secure, verifiable digital record maintained by the student that allows for the stacking of micro-credentials from a wide range of trusted issuers into advanced credentials using an integrated data exchange system. Understanding the badging system provides a useful foundation to comprehend the advantages and challenges of implementing and executing such a system.
Possibilities and Pitfalls

Given the newness of the badging concept, the industry is highly dynamic with the proliferation of universities using badges, badge company mergers, partnerships, and new feature offerings occurring at a hectic pace. Universities are rapidly implementing badging programs. Illinois State University, an early adopter, started issuing badges in 2015 and issued approximately 7,400 badges between 2015-2016 (Fain, 2016). In 2017, the California Community College’s Chancellor’s Office announced a badging strategy for its 114-community colleges related to the New World of Work’s top 10 21st Century Skills identified in a study funded by the Mozilla Foundation (Wells, 2017). This system consists of 2.1 million students. Strategic shifts by badge software companies provide further proof of the synergy within this industry.

Typically, acquisitions involve an established company acquiring startups, but in the spring of 2018, Credly, founded in 2012, purchased the Acclaim badging business of Pearson (a 174-year-old company). The press release did not include financial terms of the agreement, but it notes that Pearson took a minority share in Credly and garnered a seat at Credly’s board of directors (EdSurge, 2018). As noted earlier, in April of 2018, Badgr launched its Open Pathways application (Skipper, 2018), which provides a foundation for stacking badges into more meaningful credentials, and Canvas LMS designated Badgr as its native badging platform. In June of 2018, Credly announced blockchain integration into its platform (Credly, 2018).

Blockchain provides an additional level of verification that Credly markets as “…future-proof and tamper-proof” (paragraph 3). The vigorous activity within this industry reflects the many advantages badging technology offers to educational stakeholders. Chiefly, badging provides advantages in the areas of access, verification, transcript granularity, and customized learning.
However, Jovanovic and Devedzic (2014) posit numerous challenges related to pedagogy, motivation, technology, policies, legitimacy, and acceptance for implementing a badging system. The following discussing examines some key advantages and challenges this innovative approach is experiencing.

**Possibility with Badging: Affordable Access to Higher Education**

Many who wish to pursue post-secondary education opt not to do so due to the high costs. Public universities rely a great deal on diminishing support from state and federal governments while most private schools are financed primarily through tuition dollars (Snyder, de Brey, & Dillow, 2018). Government funding, which accounts for nearly 46% of total revenues distributed to public title IV colleges in 2014-2015, has been in decline for the past decade, leading to increased tuition rates. This shifting of cost poses a challenge to public colleges as more families find the price to be a barrier to a college education.

Adjusting for inflation, the average cost of tuition has grown 274% since 1973 while median household income grew by only 7%, resulting in a significant shifting of educational costs from the government to individual families (Mitchell, Leachman, & Masterson, 2016). Nationally, states budgeted an average of 28% less aid per college student in 2013 compared to 2008, and 48 of the 50 states are spending less per student on post-secondary education than they funded before the 2007-2009 Great Recession (Oliff, Palacios, Johnson, & Leachman, 2013). Webber (2018) posits that the annual net price for a student attending a four-year public college, including grants and scholarships, nearly doubled after adjusting for inflation when comparing average net prices from 1997-98 to 2017-18. These increases deter some students from enrolling in college (Mitchell & Leachman, 2015). To offset this issue, badges provide low-cost access to universities.
The University Learning Store (https://universitylearningstore.org/) (ULS), a badging-collaboration between six different universities (the University of Wisconsin Extended Campus, University of California Davis Continuing and Professional Education, the University of California Irvine Extension, The University of California Los Angeles Extension, Georgia Institute of Technology, and the University of Washington Continuum College) managed by the University of Wisconsin Extended Campus, started in the spring of 2016 and offers a competency-based curricula centered on workforce skills, such as running productive meetings, project management, leveraging supply chain tools, and engaging in effective business communication; the courses within the curricula are priced between $25-$150 and require 3-30 hours of effort to complete (Roscorla, 2017). Learners need to pass a summative assessment to earn a badge. These badges drew the interest of one cohort of learners, women in an abuse shelter, who otherwise would have not turned to a university to help them with their employment challenges.

McGovern (2018) reports how Madison Wisconsin’s Domestic Abuse Intervention Services (DAIS) viewed the ULS as a low-cost solution for abuse victims in the DAIS shelter who were seeking work skills development. Financial income is vital to victims of domestic abuse to gain economic self-sufficiency and independence from their abusers. The DAIS administrators viewed micro-credentials as playing a pivotal role in helping their clients improve career skills, communicate those skills through university issued badges listed on their resumes, thus making the DAIS clients competitive for better-paying jobs. Another example of the ways in which stacking badges and leveraging third-party endorsements are creating additional access to universities is found at Colorado State University (CSU).
CSU has 13 different badging programs (https://www.online.colostate.edu/badges/) in a range of programs, including communication skills for engineers, business management, innovation, 3D printing, and mindfulness. Students earn badges within a hierarchy that issues Trek badges for completing a single course; Quest badges for completing a single course or more courses depending on the program, and Mastery badges for completing all courses within a program. Many of these badges expire after three years.

In one CSU program focused on landscape technician training, CSU partnered with the National Association of Landscape Professionals (NALP) to create a 3-badge sequence related to landscape irrigation, installation, and maintenance that stacks into a landscape professional mastery badge that expires after three years (CSU, 2019). CSU posits the landscape badge program will prepare the learner to take the Landscape Industry Certified Technician examinations, and the badges qualify as prerequisites for the educational requirements as part of NALP’s Landscape Management Apprenticeship program. The cost for all four badges is $921. An interesting development in this program is that a Colorado landscaping firm requested a high-resolution digital picture of the badges as the landscaper wanted to enlarge the badges and have them printed as magnets to put on the side of his work trucks to promote the quality of his landscaping company (Credly, 2018b).

In another third-party endorsement, Northeastern University has partnered with International Business Machines (IBM) in a collaboration where IBM digital badges apply to three Northeastern professional master’s degree programs in data analytics, project management, and portfolio management (Leaser, 2017). This initiative is expected to branch into 51 additional graduate degree programs and 17 certificates offered by Northeastern. IBM issues digital credentials in more than 1,000 programs, claims learners from 190 countries, and states
over the age of 50 completed nearly half of the 26 million hours of learning. A learner earns an IBM badge by belonging to an organization registered with IBM’s Skills Academy (IBM, n.d.). The key to these partnerships is the ability for institutions to trust and verify the issuer of the badges.

**Possibility with Badging: Secure, Learner-Owned Credentials**

Trust in academic credentials becomes more important given the rise of globalization. A Harris Poll of 221 HR managers found that 75% of the HR managers reported having caught a lie on a resume (CareerBuilder, 2017). Embellishing one’s educational record to better compete for employment is one such lie that appears on resumes. Degree mills and diploma mills are a persistent problem for higher education across the globe. Conteras and Gollin (2009) argue that a diploma mill provides a fake degree from a real college whereas a degree mill provides a *real* degree from a fake college. The authors also note that as of 2009, only 10 American states had laws making it illegal to use credentials obtained from diploma mills. A Google News search using the term “fake degrees” with a search timeline of roughly two months (1 Dec 18 – 9 Feb 19) resulted in 282,000 hits. A sampling of stories includes:

- In India, the Maharashtra Medical Council suspended identified 57 medical doctors, who used fake Post Graduation credentials when registering with the medical council. The purchasers paid 300,000-500,000 rupees (approximately $4K-7K U.S. dollars) per degree (News 18, 2019).

- In Malaysia, its Deputy Foreign Minister, Marzuki Yahya, is facing pressure to resign after questions about his claims of holding a degree from the U.K.’s prestigious Cambridge University. He admitted to possessing a degree from Cambridge International University which is an unaccredited entity based in the U.S. (The Straits Times, 2019).
• In Pakistan, its Civil Aviation Authority suspended 16 pilots and 65 aircrew members for possessing fake degrees purchased from Axact (Khan, 2019). In September 2018 Axact’s CEO was sent to jail after being convicted by Pakistani authorities for selling fake degrees to 215,000 people in countries across the world and earning $140M in the fraudulent scheme (Farooqui, 2018).

• In California is a story about a woman who used a fake pharmacist’s license for over ten years while filling over 750,000 medical prescriptions. State pharmacy investigators discovered the fraudster after learning she issued controlled substances without the necessary security protocols (Pharmacy Times, 2019).

• In Phoenix, Arizona police arrested a dentist for using a series of fake degrees to obtain a 1301 General Anesthesia Permit. A former patient sued the dentist with issues related to procedures involving anesthesia (Biscobing, 2018).

In their 2012 book, Degree Mills: The Billion-Dollar Industry That Has Sold Over a Million Fake Diplomas, Ezell and Bear (as cited in New York Times, 2015) claim there are over 3,000 diploma mills worldwide issuing more than 50,000 fake degrees each year. Ezell is a former Federal Bureau of Investigations (F.B.I.) Agent who led the Agency’s efforts into diploma fraud in the 1980s and early 1990s. Digital badges, along with the CLR, open pathways, and CASE,® could play a significant role in helping to mitigate the global fake credential problem.

What makes fake credentials so easy to create is their 19th Century printed structure. Inserting badges into a CLR and open pathway will make it much more difficult for diploma and degree mills to generate bogus credentials due to the amount of content generation required per degree. Additionally, many badge platforms include verification links embedded into the badge,
enabled by algorithms, allowing someone viewing the badge to verify the badge’s issuing agency. An additional security feature coming to badges is block-chain encryption.

Tapscott and Tapscott (2017) argue that blockchain likely will have a much more significant impact on higher education than any other emerging technology, such as analytics, artificial intelligence, or machine learning, because of blockchain’s ability to provide secure data. Traditionally, transactions are validated online by a trusted third-party to assure both sides of a transaction of its integrity, such as a university assuring an employer that a student’s academic performance is valid. Blockchain, however, validates a transaction through the use of a vast number of eyes confirming the integrity of the transaction. This dispersed system of validation is much more difficult for a hacker to manipulate versus a single point such as a university database. Tapscott and Tapscott argue that pedagogy, costs, and highly networked universities will significantly change due to blockchain encryption. For a more detailed example of how blockchain works, see Appendix 1.4. There are several variations of the blockchain technology.

Bitcoin and Ethereum are two well-known types of blockchain software platforms. Jirgensons and Kapenieks (2018) discuss several universities in Europe and the United States experimenting with blockchains. They note M.I.T. created a Blockcerts chain using the bitcoin platform and the U.K.’s Open University’s Knowledge Institute created Ethereum’s Smart Contracts to document micro credentials, such as open badges. As of this writing, of the more popular badging platforms, only Credly is using blockchain to encrypt its badges. Credly (n.d.) uses bitcoin blockchain. In addition to providing security for open badges, blockchain is also permanent, which means a student’s academic records would no longer be at risk of disappearing should a university or other educationally related organization no longer be in operation.
trusted, permanent credentials online also allows universities to save money by not having to maintain and ship academic records as often is the case with paper-based transcripts.

Whatever the final version of security emerges for micro credentials such as badges, it will likely be more difficult to forge than the system of paper-based transcripts. Fake degrees also will be more difficult to pass off as institutions are easily able to verify the accreditations of issuers. Another advantage that badging provides over traditional transcripts is the granularity of information.

**Possibility with Badging: Granularity of Learning Record**

The president of the Association of American Colleges and Universities revealed that surveys of employers revealed traditional college transcripts are useless in evaluating job candidates (Fain, 2013). Parks and Taylor (2016) note the original purpose of a college transcript was not for employment purposes but designed to assess entrants for admission into academia. The authors’ research about college transcripts, which contains experiential information, found that 86% (n=288) of employers and students felt the more detailed records provided a more positive depiction of a job candidate than traditional transcripts; 74% felt the additional information improved the applicant’s probability of acceptance to or employment by the firm in question. The metadata embedded in badges provides employers with a much greater understanding of a candidate’s specific knowledge, skills, and abilities, which can help with better employment matches. Likewise, the metadata benefits students who fail to complete their university degree.

According to the U.S. Department of Education (2018), the six-year graduation rate for first-time, full-time undergraduate students who started working towards a bachelor’s degree at a four-year institution in 2010 was 60% (see Figure 1.5), which means 60% of the students who
started a bachelor’s degree in 2010 completed it at the same institution by 2016. The 40% who leave a university without a degree has little to show for their effort. By assigning badges to educational coursework, those who leave the university will depart with a more robust record of learning, experiences, and achievements than that of a paper-based transcript, which could help with employability.

Figure 1.5. Graduation rate within 6 years (Dept of Education, 2018)

Additionally, under the current system, a student who must withdraw from a course for extenuating circumstances must repeat the entire course to earn credit in many cases. A course, or parts of a course, broken into a series of badges means the student potentially would not have to repeat the entire course, but only those modules in which the student had not earned a badge. Badges make real the possibility of personalized learning, which may be of interest to adult learners.

Consider the following examples of how educational badges could impact adult learners:

- A three-credit-hour operations management course in a business school that covers 15 chapters of a book with a range of subjects from strategy, project management, inventory,
logistics, process improvement, customer relations, etc. The course may include one credit hour badge on the basic understanding of the 15 topics, but then students can complete badges worth one-half credit hour on those topics that most apply to their current situation. Hence, an adult student who manages many projects in her full-time job may choose to take three badges in project management where each badge includes more advanced skills and knowledge. Then, the learner may opt for the fourth badge in customer relations if her job includes customer support.

- An adult working as a registered nurse who is enrolled in a bachelor’s degree program in nursing may opt to focus aspects of her curriculum on geriatrics if her full-time job is in a senior care facility.

- A K-12 teacher pursuing a master’s degree in education may opt to tailor her courses with badges focused on topics unique to her school district based on socio-demographic attributes of her students.

Badging courses and creating a system where learners can earn stand-alone badges also supports life-long learning in that as an adult student’s career changes, she could earn badges focused on the knowledge and skills required for her new position. The focused badges will cost a lot less than taking an entire three credit hour course, allowing access to higher education for a larger number of adult learners. The granularity of learning also is useful in non-academic settings.

An educational record consisting of badges provides better support for tracking non-academic learning, such as organizational ancillary training programs (e.g., annual sexual harassment training, ethics training, computer security training, etc.), through the ability to inactivate learning badges in a person’s backpack when the badges expire. Assuming the
ancillary training programs align to a common standard, badges will save time for onboarding employees where routine training is required before starting work. A new employee may import his/her ancillary badges from the previous employer, allowing the new hire to onboard at a quicker rate.

Badging offers advantages in the areas of access, more secure, owner-managed credentials, and granularity of learning; however, this developing industry is not without its challenges. As a new technology, it is going through a hype cycle, and the value of any one badge is an enigma, which makes it difficult for badges to gain traction in the market. The process of maturing this innovative ecosystem means some starts and stops with features slowing its application. Also, badges are disadvantaged from a lack of awareness and understanding by key stakeholders, which runs the risk of this advancement being forgotten and replaced with the next cool thing.

**Badging Pitfall: Hype Versus Value**

Establishing agreed upon standards by an international body of stakeholders will prove difficult, but IMS Global is working the issue with the Open Pathways, CLR, and CASE® initiatives. As of this writing, lot of badge producers are in the market, but a funnel-effect has started with IMS certifications differentiating platforms (see Appendices B and C). As noted earlier, the value of badges remains a mystery (Raish, & Rimland, 2016; West & Randall, 2016; Gallagher, 2018), and some negative hype associated with badges is present (Kim, 2015; Mathews, 2016). As the badging ecosphere continues to develop, it must create policies and standards that allow for easy differentiation regarding the value of a badge. As a new approach, the badging ecosystem continues to evolve; the dynamics that accompany this state of on-going change presents another challenge.
Badging Pitfall: Global Badge Ecosystem in Dynamic Evolution

As the badging ecosystem undergoes its formation, many changes will occur throughout its development, which makes establishing a set of standards a challenge. Using blockchain, a newer technology going through its developmental challenges, to secure badges provides an excellent example of the challenge of progressing badges. Although blockchain offers many advantages, it is not perfect.

Orcutt (2019) notes that blockchain hacking is happening more often. Of the reported hacks, hackers stole nearly $2 billion worth of cryptocurrency since 2017. Orcutt notes that well-organized cybercrime units are doing the hacking. The features that provide security for blockchain also give it susceptibilities. For example, the fact that blockchains cannot be reversed appeals to cyberhackers as their counterfeit transactions cannot be undone like those in conventional financial transactions. Zheng, Xie, Dai, Chen, and Wang (2018) found the Bitcoin blockchain faces many technical challenges, such as scalability, privacy leakage, and selfish mining.

Zheng et al. (2018) posit that as the number of transactions on the blockchain increases daily, the blockchain becomes cumbersome due to the storing of all previous transactions to validate the next transaction. These long chains cause a delay in validating badges secured with blockchain, which could mean days or weeks instead of instantaneous. Regarding privacy leakage, Zheng et al. note that part of what makes blockchain safe is users only make transactions with generated addresses instead of real identities. However, the authors cite research by Meiklejohn et al. (2013), Kosba et al. (2016), and Barcelo (2014) that found actual identities could be discovered, thus negating the privacy advantage of blockchain. Mining is a mechanism that permits the Bitcoin blockchain to be a distributed security. Selfish mining is a
strategy that allows people to earn more revenue, but it also makes the blockchain susceptible to attacks, resulting in the reversal of a blockchain and the transpired transaction.

Marr (2018) argues there are five main problems regarding blockchain, which are listed below:

1) Demanding energy costs--Bitcoin blockchain, the most widely used blockchain, requires a massive amount of computing power to keep the chain running; Bitcoin alone required as much energy consumption as 159 of the world’s countries.

2) No regulatory oversight--due to the lack of regulation, blockchain is susceptible to scams and manipulations.

3) Lacks value as determined by the end-user--because blockchain is so sophisticated, the ordinary person may not appreciate the utility of the technology and may not see it as a viable substitute for the current system of university recordkeeping and distribution.

4) It is slow--blockchains can take hours, potentially days, to verify if the chains become too extensive.

5) Established barriers to entry--sectors of industry that blockchain makes obsolete, such as financial services like banks and their automated teller machines (ATMs), are likely to oppose blockchain acting as barriers to its adoption. These industries have powerful political lobbying abilities that could limit the widespread adoption of technologies like blockchain.

Researchers, including Marr (2018) and Zheng et. al (2018), note that blockchain will continue to evolve and probably find ways to overcome these challenges. However, Skipper (2019) argues that because of these challenges to blockchain, a conservative approach with applying blockchain in education may be the more prudent route.
Skipper (2019), founder of Badge’s parent company, Concentric Sky, contends the existing system of blockchain relies on miners mining coins they earn for running complicated algorithms to verify blockchain transactions. Skipper suggests miners will only do this so long as the chain is profitable but has concerns for blockchains when the lucrative ness of the chain expires. Furthermore, Skipper espouses the existing version of blockchain is too slow, vulnerable to attacks, and could be made obsolete by newer technologies, such as quantum computing. Skipper notes that blockchain may have other vulnerabilities not yet detected due to the relative newness of the technology. Because of the uncertainty regarding blockchain, Skipper argues an open technology that combines public blockchains with private ones as well as off-chain storage kept in a decentralized system with a verification system not tied to currency is needed. Concentric Sky, BrightHive, and DXtera have proposed such a structure they call EdRec, which was identified by the Department of Education as one of the winners of its 2018 Reimagining the Higher Education Ecosystem Challenge and has attracted interest from institutions and large employers.

Securing badges with blockchains is one example of the challenge that comes with the maturation of the global badging ecosystem. Other features, such as seamlessly displaying badges across a range of media, creating a database of push/pull notifications to international employers when someone earns a badge, aligning badges to global standards, and creating a learner funding system similar to the U.S. Federal Student Loan system for college credit, are other areas of the global badge ecosystem that will be a challenge to establish. Overcoming all these challenges will be meaningless if educational stakeholders are not aware of the usefulness provided by a global badging ecosystem.
Badging Pitfall: Awareness of the Global Badge Ecosystem

As of this writing, the global badging system is developing chaotically with institutions and organizations creating different naming structures, distinctive hierarchies, and various levels of standards to earn a badge. Imagine an educational system where each university had a different name for an associate’s, bachelor’s, master’s, and doctoral degree and awarded degrees for everything from arriving on time to club meetings to spending hundreds of hours studying a focused topic. The current state of digital badging lacks regulation, standardization, shared language, and structure; it is in a state of disarray.

West and Randall (2016) argue the flood of lightweight badges into the marketplace, i.e. badges given for simple tasks and participation, creates a misunderstanding for those not familiar with badges, which undermines the value of badges. They argue for better rigor and assessment concerning badges. They believe if the badging community fails to establish a way to communicate rigor and meaning associated with badges, the badging movement will diminish into an afterthought with no impact on educational advancement.

Farmer and West (2016) maintain that open badges, like any new product offering, require brand awareness by stakeholders to gain cultural acceptance. The authors contend a lack of awareness and understanding of the usefulness of badges exists by academic, government, and corporate leaders. They believe the confusion with the competency approach used in badging pedagogy creates further misunderstanding. Competency-based education (CBE) uses a pass/fail grading system that incorporates a trial-and-error assessment that requires students to repeat work until achieving mastery. CBE’s approach is different from the conventional method of one-time testing and tiered grading scales. The authors agree with the need for a global badging ecosystem but acknowledge it is difficult to establish since institutions have standards that do not
align easily. The awareness gap points to another awareness challenge related to badging—the recognition of the work by IMS Global to put in place such standards internationally.

As the concept of badging becomes more widely understood, the value of the idea becomes confusing unless comprehending it within a system and structure that provides context and meaning. Researchers recognize that localized badging ecosystems have limited usefulness outside of their immediate area (Farmer & West, 2016; Raish, & Rimland, 2016; West & Randall, 2016). Carey and Stefaniak’s (2018) research included responses from some participants that badges need a shared framework if they are to last in higher education. With its OBI standards, certified platforms, backpack, Open Pathways, CLR, and CASE® efforts, IMS Global is laying the foundation for a global badging ecosystem. It will be a challenge to raise awareness about this effort and its importance to creating a badging system that is universally meaningful and valued.

**Future Research**

One goal of this exploratory research was to identify and prioritize future research needs. A clear need is research associated with how stakeholders value badges. A pivotal stakeholder to higher education is companies that hire the product of universities, the graduates. Understanding how employers value badges is essential for institutions employing a badging strategy. As of this writing, only two studies (Raish & Rimland, 2016; Gallagher, 2018) directly investigated how employers perceive badges. Gallagher’s research involving 750 HR managers discovered that 22% of those surveyed have never heard of badges while 34% heard of them but did not understand badges. Raish and Rimland’s investigation involved 114 HR personnel centers on their perceptions regarding information literacy skills and the use of badges to represent those
skills (see Figure 1.6). Nearly 95% of respondents had some interest in digital badges; only five percent indicated zero interest. A limitation of these studies is they involved self-reporting.

![Figure 1.6. HR personnel interest in digital badges (Raish & Rimland, 2016)](image)

What respondents say and do sometimes vary. Baumeister, Vohs, and Funder (2007) call for more research that examines behaviors of research subjects rather than relying on self-reporting due to research that shows people frequently behave differently than what they claim (West & Brown, 1975; Wilson & Gilbert, 2003; Holt & Laury, 2002; as cited in Baumeister et al. 2007). A limitation of the Raish and Rimland (2016) study is its small sample size. A field audit study focused on employment outcomes with a larger sample that uses fictional resumes, some with badges and some without, for actual jobs provides a better understanding regarding how badges are actually viewed by hiring managers.

During this research, the notion of displaying badges surfaced several times. Many learners who earn badges are not displaying them. This reality is an opportunity for grounded
research aligned with signaling theory (Spence, 1973) to understand what percentage of badge earners display them. Why are learners not displaying their badges? Several variables, such as the age of the learner, type of badge, issuing authority, whether the badge involves college credits, and subject matter, could provide useful information for institutions seeking guidance on prioritizing their badge portfolios.

Another area that needs research is badge platforms. To date, one study (Dimitrijević, Devedzić, Jovanović, & Milikić, 2016) examined this issue, which is an essential consideration for organizations considering a badging strategy. While many platforms are in the market, IMS Global did not certify all of them. Platforms not certified are likely to have interface issues in the global badge marketplace. A problem with Dimitrijević et al.’s work is the dynamics of the shifting industry means some platforms have merged, and one important platform, Badgr, was not included at all.

Several other areas associated with badging need research, starting with policy-making at the institutional, state, and federal levels. Questions need to be answered, such as: What new policies are needed to support a badging, open pathway system? What old policies must be adjusted or discarded?

Insights are needed to learn how universities are using badges. Questions to explore are: What are institutions charging for badges? What financial aid is available for badges? How do badges influence access to higher education where cost is a barrier? Similarly, a need exists for case studies regarding badge curriculum design, implementation, execution, and innovations to help faculty better understand how badging might work in different types of courses or course designs. Badge hierarchies and naming structures require additional investigation to answer question like: How will badges be universally understood from a hierarchical frame? What is
happening concerning adopting universal language associated with badge classifications? During this research, it was thought that one university was issuing badges to senior citizens who were completing one-credit hour audited courses (though the university was not issuing badges to senior citizens, they are considering doing so). In this case, research examining how badges interact with theories on successful aging, engagement/disengagement theories, and motivation theories related to seniors pursuing and displaying badges could prove fruitful.

Grounded theory research related to academic badging and professional development includes human capital theory (Schultz, 1961), signaling theory (Spence, 1973), and credentialism theory (Collins, 1979). Schultz’s idea of human capital included the stock of all previous knowledge and skills gained from work-related training, formal education, health, relocations, and other aspects that improve an employee’s productivity and, consequently, earnings. Schultz argues that laborers are capitalists by investing in knowledge and skills that have economic value. By earning an academic digital badge, an employee is increasing his/her human capital, but if no one knows about this investment, it has limited usefulness in the labor market, hence Spence’s signaling theory. Spence posits workers signal their degree of aptitude to an employer by obtaining education credentials that permit managers to distinguish low skilled workers from high skilled ones. Digital badges are designed to be displayed, serving as a signal to the labor market about a laborer’s knowledge and skill levels. Finally, Collins maintains that credentials do not necessarily portend more skills or greater productivity, but argues that employees with more education were being put into more lucrative careers mainly because they had more education. Since badges allow for documenting experiences, achievements as well as formal learning, research into badging may build on Collins’ work as badges provide a more detailed description of a person’s education, including experiential education.
Learning theory research including types of learning (Bloom, 1956; Anderson & Krathwohl, 2001), and scaffolding (Whitehead, 1929; Palinscar, 1986; Rosenshine & Meister, 1992; Pea, 2004; Reiser, 2004; Puntanbekar & Hubscher, 2005; van de Pol et. al, 2010; Coe, 2011) is also worth investigating in relation to academic badging. Bloom’s well-known taxonomy of learning, along with Anderson and Karthwohl’s insights on evaluation versus synthesis, is worth considering when engaging in badge curriculum design. Similarly, how badges are stacked to create larger credentials should be explored in light of the many scaffolding theories. Applying these aforementioned theories to cohorts of learners, such as transitioning military personnel for example, to understand how badges might prove useful to their professional development is worthy of future study.

**Summary / Conclusion**

The college transcript as proof of learning is a centuries-old concept. In the information-rich 21st century, paper-based transcripts are losing value. Digital badges hold much promise for delivering more information to higher education stakeholders in a more secure manner than what is available. Badges will allow greater access to higher education and a more personalized learning experience. Many issues require addressing before badges deliver on the hype that surrounds them. Creating universal standards and educating the educational community about the benefits of badges are challenges, however, not insurmountable. The ongoing work by IMS Global to create a badge ecosystem that provides a better picture of each person’s unique set of knowledge, skills, abilities, experiences, and achievements, recorded using open pathways and capable of being machine-read, is an effort that shows promise for this nascent technology. Continued research focused on aspects of badges will help us further understand their place in the future of learning.
References


Educause. (2019). 7 things you should know about the comprehensive learner record. Retrieved from https://library.educause.edu/resources/2019/1/7-things-you-should-know-about-the-comprehensive-learner-record


IMS Global. (2017a). IMS Competencies and Academic Standards Exchange (CASE) service version 1.0. Best practices and implementation guide. Retrieved from https://www.imsglobal.org/sites/default/files/CASE/casev1p0/best_practices/caseservicev1p0_bestpracticesv1p0.html

IMS Global. (2017b). IMS competencies and academic standards exchange (CASE) service version 1.0. IMS final release version 1.0. Retrieved from https://www.imsglobal.org/sites/default/files/CASE/casev1p0/information_model/caseservicev1p0_infomodelv1p0.html


45
Iowa Wesleyan University History. (n.d.). Retrieved from https://www.iw.edu/history/


Thompson, M. (2014, March 14). Introducing open badges 1.0: Get recognition for learning that happens anywhere. Share it on the places that matter. Retrieved from [https://blog.mozilla.org/blog/2013/03/14/open_badges/](https://blog.mozilla.org/blog/2013/03/14/open_badges/)


Appendix 1.1: Glossary of Terms

**Badge**: A digital representation of a skill, learning achievement or experience. Badges can represent competencies and involvements recognized in online or offline life. Each badge is associated with an image and some metadata. The metadata provides information about what the badge represents, and the evidence used to support it. (Mozilla, 2014).

**Badge backpack**: Digital storage area for learners to house the various badges they were earning from a wide range of open badging sites. Badge earners decide which badges to make public.

**Badge Baking**: The process of embedding verifiable information about a recipient’s achievement into a badge image so when a user shows a badge on a website, software which is Open-badges ready and automatically extract the data and verify the badge’s authenticity. A baked badge image must be either PNG or SVG format. (IMS Global 2018f).

**Badge Stacking**: The process of combining two or more badges to create a greater credential such as a certificate, license, college course, or degree program. Badge stacking is made visible via Open Pathways.

**Competency-Based Education (CBE)**: An educational construct that allows for greater student flexibility by permitting students to advance as they exhibit proficiency in the academic subject matter regardless of time, location, or rate of learning. This approach allows a range of ways that college credit can be earned or awarded which leads to customized learning opportunities (U.S. Dept of Education, n.d.). This approach arranges academic content and distribution based on competencies, that is what a student knows and can perform, rather than following a more conventional approach such as by a course; a CBE program measures progress using clock or credit hours (Mahaffie, 2014).

**Comprehensive Learner Record (CLR)**: The aim of the CLR, formerly referred to as Extended Transcripts, is to create a standardized format that captures a more complete picture of a learner and supports a range of educational programs to include traditional educational courses, competency-based education, badges, skills, experiential learning, achievements, and co-curricular activities in a digital and verifiable format (IMS Global, 2019a).

**Digital badge**: A digital representation of a skill, learning achievement or experience. Badges can represent competencies and involvements recognized in online or offline life. Each badge associates with an image and some metadata. The metadata provides information about what the badge represents, and the evidence used to support it. (Mozilla, 2014).

**Direct Assessment Competency-Based Education**: Another form of CBE that measures progress exclusively based on a student demonstrating mastery of a competency (knowledge or skill related to a specific subject); a direct assessment CBE program does not use credit hours to stipulate the amount of instructive activity is expected to complete in order to finish an academic program. The direct assessment program, however, must offer students educational resources,
which involves substantive interaction with instructors, for students to demonstrate command of each competency required for program completion (Mahaffie, 2014).

**Learning Pathway:** A learning pathway is a course of learning, chosen by the learner, that includes a series of stages from pre-conception to targeted outcomes, where learning transitions are unique to each learner based on personal experiences and abilities (Jih, 1996; Scott, 1992).

**Open Badges:** A unique type of digital badges that follows OBI standards maintained by the IMS Global Consortium. Earners control these badges in claiming and displaying them across a range of online sites. These badges are verifiable and transportable (rather than proprietary to one single system) and contain metadata about the issuing institution, the earner of the badge, and evidence that supports the person earning the badge (IMS Global, 2018).

**Open Pathways:** A competency framework or set of learning standards and converted into a pathway, or a series of pathways, that a learner would use as a guide while earning badges and stacking them into more considerable credentials. The vision is for learners to be able to stack badges across platforms, across institutions, to allow greater flexibility in attaining one’s educational goals. The pathway can be shared in a digital portfolio that shows earned badges as well as uncompleted badges. (IMS Global, 2018c).
Appendix 1.2: Badge Platform Providers (listed alphabetically)

1. Acclaim (purchased by Credly in Spring, 2018)
2. Accredible
3. Badgecraft
4. Badge List
5. BadgeFactor
6. BadgeOS
7. BadgeSafe™ for Canvas LMS
8. Badgetree™
9. Badgr
10. Bestr
11. CanCred.ca
12. Canvabrades
13. Credly
14. ForAllRubics
15. Makewaves
16. NOCTI and Nocti Business Solutions (NBS)
17. Learning Objects
18. Open Badge Academy
19. Open Badge Factory
20. Openbadges.me
21. Peer 2 Peer University (P2PU)
22. ProExam Vault
23. RedCritter
24. Remix Learning
25. Youtopia

(Source: Badge Wiki, 2018)
Appendix 1.3: IMS Global Certified Product Directory

1. Acclaim v20180221
2. Accredible v1.1
3. Badgr v3.1
4. C-box v1.1
5. Courserenetworking LMS v201712.14
6. Credly v1.1
7. Credly v2018-02-20
8. Digitalme Credly v2018-02-19
9. iQualify LMS v2018-02-21
10. Learning Objects v2018-02
11. LRNG v1.33
12. MyMantl v1.0
13. Open Badge Academy v2017.08.01
14. Open Badge Academy v2018-02-19
15. Open Badge Factory v2018.08
16. Open Badge Passport v2.6.0
17. Openbadges.me v.10\

(Source: IMS Global, 2018d)
Appendix 1.4: How Blockchain Works

Per Tapscott and Tapscott (2017):
Digital assets—everything from money, stocks, bonds, and intellectual property to music, art, loyalty points, and student records—are not all stored in a central place: they're distributed across a global ledger, using the highest level of cryptography. When a transaction is conducted, it's posted globally, across millions of computers. Around the world is a group of people called miners who have massive computing power at their fingertips—10 to 100 times bigger than all of Google worldwide. Every 10 minutes, kind of like the heartbeat of a network, these miners assemble all the transactions from the previous 10 minutes into a block. Then the miners compete to solve a tough problem; whoever solves the problem gets to validate the block and receives some digital currency as a reward. In the case of the Bitcoin blockchain, the winner gets Bitcoin. Then that block is linked to the previous block and to the block before that to create a chain of blocks. Every block is time-stamped, kind of like with a digital waxed seal. So if you wanted to hack a block and, say, send the same Bitcoin to several people, you'd have to hack that block, plus all the preceding blocks, through the entire history of that Bitcoin on the blockchain—not just on one computer but across millions of computers, simultaneously, all using the highest levels of encryption, in broad daylight. Tough to do. This is infinitely more secure than the computer systems that we use today. (pg. 17).
CHAPTER TWO:  
DIGITAL BADGES AND EMPLOYER INTEREST

Introduction

Higher education in the United States is a $463.4 billion-dollar industry (Sayler, 2017) that includes almost 20 million students (U.S. Department of Education, n.d.a). Like any business, universities depend on revenue (tuition, donors, and government funding) from investors (families, students, businesses) and customers (businesses and communities) for survival. Graduated students and research are the product of higher education institutions. The students are valued by the communities and businesses who benefit from their knowledge, skills, and abilities. However, due to shifting social and economic conditions, decreased funding and enrollments put the future of colleges and universities in jeopardy, especially for those with less than 1,000 students (Fain, 2017; Parthenon-EY, 2016). Nearly 40% of America’s 3,895 universities enroll less than 1,000 students (Selingo, 2016), which is a sizable portion of the sector facing pressure. The educational economic bubble has been building for nearly 40 years.

The college-age population is expected to decline by 15% from 2025-2029 and continue to decline at a similar rate for the following years (Grawe, 2018). This decline and the Academy’s 46% growth rate in the number of Title IV degree-granting schools between 1980-2014 (National Center for Education Statistics (NCES), n.d.) creates a difficult future for this industry. The steep rise in institutions is prime for a bubble-burst; in fact, research suggests nearly 50% of the roughly 4,700 degree-granting schools could be bankrupt by 2026 due to declining enrollments driven by smaller student populations and rising costs of attendance.
Emerging evidence of higher-education’s bubble-busting includes the University of Phoenix’s 77% drop in enrollment, from a high of 600,000 students in 2010 to 139,000 in 2016 (Flaherty, 2017). Higher education downsizing includes 1,100 campus/branch closings/stopping operations between 2014-2016 (Department of Education, 2017), and 61% of established non-profit liberal arts schools in the Midwest report declining enrollments between 2010-2016 (see Figure 2.1).

![Figure 2.1](image-url)  

**Figure 2.1.** Established non-profit university enrollment changes 2010-2016 (NCES, 2018)

Further indications of changes to the higher education industry is the reality of full-time MBA programs, once the gold-standard of business education and chief revenue-draw for major colleges, struggling to recruit eligible students. Major research universities, including the
University of Iowa, Virginia Tech, and Wake Forest, have opted to end their full-time MBA programs (Moules, 2018). The University of Wisconsin faculty voted to suspend their full-time, in-resident MBA program but halted discussion after public criticism (Savidge, 2017). Many law schools are waiving Law School Admission Tests (LSATs) and lowering entrance requirements to attract more students as enrollments have decreased by more than 50% from 2008-2016 (Kowarski, 2017).

The value proposition, concerning cost, access, and quality, by universities is called into question (Hersh & Merrow, 2015; Long, 2015; Benson, Esteva, & Levy, 2015; Bennett & Wilezol, 2013; Bradley, Seidman, & Painchaud, 2012; Christensen & Eyring, 2011). There are developing theories related to the changing nature of higher education, including the theory of academic capitalism (Slaughter & Leslie, 1997), the theory of academic entrepreneurship (Shane, 2004), and the theory of innovative disruption (Bower, & Christensen, 1995); some scholars argue these theories lack rigorous testing and robust evidence (King & Baatartogtokh, 2015; Markides, 2006; Metcalfe, 2010; Vestergaard, 2007).

Due to this industry-wide shakeup, the foundational assumptions, mental models, and traditional approaches to higher education are changing, including the rapid, wide-scale adoption of digital badges as an alternative academic credential (Craig; 2015; Maderer, 2017; McGee, 2015; Powell, 2017; Christensen & Eyring, 2011; Surman, 2011). According to Mozilla (2014), a digital badge is an electronic depiction of knowledge, skills, experiences, or achievements. It is linked to an icon that contains metadata in its digital form. The metadata includes information about what the badge corresponds to, includes evidence to support it, and may include an authentication mechanism to verify who issued the badge. Digital badges are gaining in
popularity in many sectors across the world, including business, academia, and governments. In the U.S. higher education system, badges have been prevalent since 2013.

Twenty percent of U.S. colleges have issued badges since 2016 (Fong, Janzow, & Peck, 2016). Surman (2018) estimates that more than 15 million badges were issued by over 10,000 institutions from government, industry, and education since 2013. Forecasters at the market research firm Technavio predict the global digital badge market will see a compounded annual growth rate of 31% between 2018-2022 (as cited in Technavio, 2019), which translates to a $205 million digital badge market by 2023 (Marketsandmarkets, 2019). Despite the rapid proliferation of digital badges as a new form of educational credential, scant evidence exists regarding the utility of badges in the employment hiring process.

**Literature Review: Digital Badges and Employer Interest**

Despite the spread of digital badges, it is unclear whether university-issued digital badges impact employer interest of badge earners. There is a growing body of research related to digital badges (Grant & Shawgo, 2013), but no current studies use field research to examine employer interest of badge earners. Much of the research centers on the pedagogical evidence related to academic badges.

Interest in digital badges began increasing in 2013 when the Open Badges standard was announced by a network of partners with Mozilla serving as the key project coordinator (Open Badges, 2016). Hickey and Otto (2017) posit that an open badge is considered open because it does not rely on one unique technological system, such as a single learning management system, social media site, or badging platform, thus allowing greater freedom in the badges’ issuing and application of badges. Open also means an open system of recognition where life-long learning is captured through a wide variety of means from the classroom to the workplace to the
community, and personalized learning experiences can be shared with a wide range of stakeholders. Google Trends (see Figure 2.2) shows how the interest related to badges in higher education started in 2013 and continues to grow as of 2019.

![Figure 2.2. Google trends of digital badges in higher education web searches 2010-2019](image)

In terms of scholarly research related to digital badges, Liyanagunawardena, Scalzavara, and Williams (2017) completed a meta-analysis of open badging research from 2011-2015. The authors focused on studies beginning in 2011 since that was the year Mozilla announced its call for an open badging standard using a grant from the MacArthur Foundation to fund its efforts. Using the search terms open badge, open badges, and open badging, the authors identified an initial pool of 247 publications, rejected 112 for various reasons, and focused on 135. These sources included 53 journal articles, 76 conference papers, five book chapters, and a research report. An updated search of the literature from 2016-2019 using the same search terms shows that academic interest in digital badging continues to grow.

Reporting on results, Liyanagunawardena, Scalzavara, and Williams (2017) completed a Google Scholar search (patents and citations excluded; title section only) on December 23, 2015, using the independent terms open badge, open badges, and open badging. The term open badge
yielded eight results, *open badges* returned 38 results, and *open badging* delivered five results. Updating their findings, I conducted a similar search on August 27, 2019, using the same terms in Google Scholar (patents and citations excluded, title section only) using a 2016-2019 search range. This inquiry resulted in the following results: *open badge* (16), *open badges* (65), and *open badging* (1). The more recent review shows an overall 62% combined increase in research related to open digital badges in the past 3.75 years (1 January 2016 - 27 August 2019) compared to the previous five years (see Figure 2.3).

![Figure 2.3. Open badge research activity Google Scholar 2015 vs 2019](image)

As of August 27, 2019, the five most highly cited articles in terms of research impact from the research terms *open badge, open badges, and open badging*, using the period 2011-2019, according to Google Scholar are:

**Term: Open Badge**


Term Open Badges


Term: Open Badging


5. The remaining articles had zero citations by other authors.

Research related to badges’ role in the employment process is scarce. Only two studies (Gallagher, 2018 and Raish & Rimland, 2016) consider badges through an employment lens. These studies consider the perception of badges as self-reported by sample populations of human resource officers and hiring managers.

Gallagher’s (2018) research investigated a range of educational topics, including micro-credentials and digital badges. Gallagher surveyed 750 human resource (HR) managers from across the United States in different industries and various sizes of organizations. The author discovered 14% of hiring managers reported hiring someone who had earned a digital badge, 26% reported seeing digital badges during the screening process, 34% of the hiring managers surveyed have heard of badges but do not know much about them, and 22% have never heard of them. More than half (53%) of the participants agreed the proliferation of new types of educational certificates (e.g. micro-masters, nano-degrees, Coursera or EdX certificates) makes it
difficult to determine the quality of the certificate. In terms of signaling quality, 33% of respondents reported the general reputation and brand of the credential issuer as being important, 33% felt it was very important, and 18% felt it was extremely important. Likewise, the issuer’s history and longevity in terms of signaling quality was extremely important to 16%, very important to 36%, and important to 33% of HR professionals who responded to the survey.

Raish and Rimland (2016) developed a 56-item, online survey designed to gauge employer perceptions of information literacy skills and the potential use of digital badges to represent those skills. Using a survey-research sampling group, 114 HR personnel from a range of industries participated in the survey. The researchers discovered nearly all respondents (95%) had some interest in using digital badges to assess skills of recent college graduates. Nearly all the respondents (96%) agreed that having a more specific representation of a student’s specific skills was beneficial for evaluation purposes.

While these studies point to an interest in and lack of understanding regarding digital badges, the research does not indicate whether the badges have any significance in helping a job candidate with employment. There is no evidence that earning a digital badge will make any difference with an employer outcome. Additionally, a critical limit to both studies is each relies on self-reporting of respondents.

Self-reporting can be problematic in research because what respondents say and do are not always consistent. Baumeister, Vohs, and Funder (2007) call for more studies that examine real-world behaviors of research participants versus relying on self-reporting because research has shown people behave differently than how they claim they will act (Wilson & Gilbert, 2003; Holt & Laury, 2002; West & Brown, 1975). Missing from the literature is a study that examines how HR personnel value digital badges based on their actions instead of their perceptions. The
purpose of this research investigation is to determine the value of academic badges in real-world hiring outcomes. This résumé audit study tries to answer the following research question: *Do university-issued digital badges influence employer interest for recent college graduates?*

**Résumé Audit Studies**

A résumé audit study is a type of field experiment that offers certain advantages over observational or self-reported data (Gaddis, 2018; Farber, Silverman, & Von Wachter, 2016; Nunley, Pugh, Romero, & Seals, 2016; Gaddis, 2015; Bertrand & Mullainathan, 2004). Audit studies allow researchers to identify actions that are a challenge to otherwise detect, such as discrimination and decision-making, in actual situations. The real-world nature of field experiments allows the investigator to raise additional questions and make compelling causative assertions that are not as easily done through laboratory observations or participant self-reporting.

The audit approach originally began in the 1940s when activists and private firms began in-person audits with help from academic scholars (Gaddis, 2018). Daniel’s 1968 study, which examined racial discrimination in the United Kingdom, is considered the first published audit of significance given its depth and breadth of scope (Gaddis, 2018). The first correspondence audit study took place in the United Kingdom in 1969 when researchers attempted to identify discriminatory hiring practices by applying for jobs using fictional résumés through the mail (Jowell & Prescott-Clarke, 1970 as cited in Gaddis, 2018). More audit studies began appearing in the literature during the 1970s culminating with research conducted by the Urban Institute working with the Department of Housing and Urban Development (HUD) regarding discriminatory landlords and employers (Wienk, et al., 1979). Wienk et al.’s study was the largest during this period.
Early audit studies primarily aimed to identify landlords and companies engaged in discriminatory behaviors (Baldassarri & Abascal, 2017). Since then, audit studies have included a wide range of topics, industries including education, healthcare, retail, transportation, and a broader set of research questions. The popularity of audit studies has grown exponentially; the number conducted between 2010 and 2017 has quadrupled compared to the number conducted between 2000 and 2009 (Gaddis, 2018). An audit study, also known as a correspondence study, was selected for this investigation to determine whether hiring managers value university-issued digital badges in the hiring process. Given the nature of a résumé audit study as a type of field experiment, résumés must be consistent with standard job application practices used in the real world.

Audit studies may be paired or non-paired designs; each approach has advantages and disadvantages (Gaddis, 2018). Paired design involves sending multiple résumés with slight variations to the same hiring firm. Non-paired designs involve sending a single résumé to a single organization. My study used a non-paired design.

Gaddis (2018) posits that a paired design is more efficient because it requires less time for collecting data, which might lead to a larger sample size. A drawback of the paired design is the experiment more likely will be revealed because hiring personnel will possibly notice the résumés of two job seekers who are very comparable. Gaddis reports another challenge to the paired design; by introducing multiple applicants into a firm’s candidate pool, the fictional résumés unintentionally may influence the outcomes as employers will compare résumés to other résumés submitted for the same job.

Although not as statistically efficient, I chose the non-paired design for this correspondence study for the following three reasons: 1) reduce the opportunity for detection; 2)
avoid influencing the application group; and 3) I was interested in conducting the experiment on a wide range of industries and jobs to learn how academic issued badges influenced employer interest across a diverse range. While the paired and non-paired approaches have independent methodological shortcomings, the audit design also has limits.

One problem with using résumés in the experimental design is the possibility of unintended signaling of race through names (Gaddis, 2018; Gaddis 2017a; Gaddis 2017b; Gaddis 2017c; Gaddis 2015; Pager, 2007; Bertrand & Mullainathan 2004). The names used in this study may have signaled race, which could have influenced the employer interest. Another shortcoming of paired and non-paired audit involves unobserved variables that may factor into the hiring decision but are not controlled for by the experimental design (Heckman, 1998; Siegelman & Heckman, 1993). Hence, items that do not appear on résumés could be essential factors in the employers’ decision making. The unseen deliberations of decision-makers could result in an over-estimation or under-estimation of the effect being investigated by an audit study. Additional limitations to résumé audit studies are addressed in the discussion section of this report.

**Theories on Credentials and Employment**

The connection between education and employment has a complex history. Given the low unemployment rates in the United States in 2019 (see Figure 2.4), the disruptive state of the higher education industry (Fain, 2017; Parthenon-EY, 2016; Moules, 2018; Grawe, 2018; Christensen & Eyring, 2011), the public questioning of the value of a college education (Hersh & Merrow, 2015; Long, 2015; Benson, Esteva, & Levy, 2015; Bennett & Wilezol, 2013; Bradley, Seidman, & Painchaud, 2012; Christensen & Eyring, 2011), and new educational credentials such as digital badges, the relationship between educational attainment and employer interest is
even more challenging to understand. Scholars offer several theories to explain this multifaceted relationship.

Becker (1964) argues through human capital development theory that knowledge and skills of workers are a form of capital acquired naturally or by deliberate actions that make employees more productive. Spence (1973) suggests through signaling theory that human capital alone is meaningless unless hiring managers have some proxy indicators to determine a potential hire’s knowledge and skill levels. These alternate measures include broad items, such as earning a degree or having experience, to more specific markers, such as grade point averages.

![Figure 2.4. 2018 Unemployment by education level (Bureau of Labor Statistics, 2019)](image)

However, with his theory of credentialism, Collins (1979) argues that workers with more education found better jobs, not necessarily because they were better skilled or more industrious, but chiefly because they merely had more education. Collins espouses that because educational credentials had become the means for employment, students should obtain a certain amount of
the credential to gain access to good jobs. Similarly to Collins, Bills (2003) and Stiglitz (1975) put forth screening theory, which posits measures like academic performance and earned credentials serve as qualifiers and stratifications when assessing populations of job candidates. College credentials provide a screening system for qualifying one job candidate over another.

The different theories regarding education, credentials, and employment illustrate the divergence of scholarly thought on the topic. Since micro-credentials, namely open badges, are innovative for higher education, they are not a focus in the theoretical dialogue. The limited research regarding employer perceptions of badges (Gallagher, 2018 and Raish & Rimland, 2016) does not explain how open badges are understood as evidence of human capital as a signal, a credential, or qualifier in terms of the hiring process.

**Research Methodology**

Do university-issued digital badges influence employer interest for entry-level jobs of recent college graduates? A résumé audit study that used three versions of a fictional résumé, with virtually identical information, was undertaken to answer this question. In the late spring of 2019, a popular time for recent college graduates to be job hunting, the three résumés were used to apply to 1,848 (616 jobs per résumé) unique, real-world entry-level jobs that preferred or required a college degree using a widely known online job-posting website. The résumés were designed to be gender-neutral and above average (not elite) in terms of academics and experiences. Human resource professionals, career advisors, and business owners were consulted in preparing the résumé to confirm the gender neutrality and quality of the candidate. The résumé included demographic information as well as sections that addressed education, honors, experiences, and skills. A description of each follows.
**Demographic Information**

The demographic information was identical on each version of the résumé used in each state. Since the applications were submitted to unique jobs, there was no need to alter the names on each résumé. Although the first and last names were identical within most states, the middle initial varied by résumé type to help organize submissions and responses. In terms of the first name, I sought to reduce selection bias related to gender, so I searched for gender-neutral names (names that could reflect a male or female applicant). Names were chosen by identifying the most prevalent baby names given in the mid-1990s. Once obtained, the top-five most popular gender-neutral names were selected, and one was randomly chosen using a random number generator. The surname was selected in a similar process after reviewing the most popular surnames in each state within the continental United States.

Actual physical addresses were located in the same metro area as the jobs. The addresses were apartment buildings selected based on the median rental rates for the area. Although the buildings were real, the apartment numbers were fictional. Individual email accounts and personal phone numbers were generated for each résumé. The online phone service included the ability to accept text messages and voicemails. A computer-generated audio message was used to greet the hiring personnel to minimize gender selection bias.

**Education**

The résumé shows the recent graduate having earned a Bachelor of Arts (B.A.) degree in biology. Biology was chosen based on gender neutrality. Using data from the National Center for Education Statistics (NCES), Joy (2000) lists biology as a gender-neutral major noting that 51% of the majors in biology were female. England and Li (2006) found biology to be the most gender-neutral, non-business major based on their analysis of majors by gender from 1971-2001.
It was decided not to use business as the major of study because many badged skills already would likely be expected to be on a business major’s résumé based on traditional business coursework. Although biology has almost a 50/50 split in terms of male/female majors, it may not be perceived as gender-neutral by individual hiring managers. The choice of major may have penalized or benefitted the applicant due to conscious or unconscious gender bias by employers. It is likely the choice of major had a positive influence with some types of jobs (e.g. laboratory), but the search terms used in this audit study generated few biology-specific positions.

Although a B.A. in biology is considered a Science, Technology, Engineering, and Mathematics (STEM) degree by Department of Homeland Security (2016) in making determinations for foreign students studying in the United States who are seeking a STEM extension, the application of a B.A. versus a B.S. in the labor market leads to different career fields. The B.A. in biology differs from the Bachelor of Science (B.S.) in that the B.A. typically requires less physical science and math courses. Students may pursue a B.S. in biology as a pre-medical or specialized biological field, such as micro, genetic, or molecular biology, since the B.S. curriculum includes sciences and math knowledge and skills required in these fields. The B.A. in biology, with its curriculum typically involving more humanities and social science courses, might lead a recent graduate to pursue general entry jobs requiring a college degree, work as a general lab assistant, or with the right certification (in most states), teach at the high school level.

The effect of college major on employment prospects is a complex issue (Nunley, Pugh, Romero, & Seals, 2016; Oreopoulos, & Petronijevic, 2013; Altonji, Blom, & Meghir, 2012). Kim, Tamborini, and Sakamoto (2015) found that degree choices could impact the long-term earnings of a college graduate. The authors found that men and women majoring in business or
STEM fields at the undergraduate level had the highest collective earnings over their careers compared to other undergraduate majors. For example, the researchers found that females with a bachelor’s degree in business had a 40-year cumulative net earnings difference 88% higher ($1.38M vs $735K) than a female with a high school education. However, a bachelor’s degree in liberal arts/humanities, arts, or architecture had only a 33% net earnings difference over 40 years versus a high school diploma. For my population, I was interested mainly in recent college graduates to investigate whether academic digital badges influenced employer interest as badges might offer a conceivable way for recent graduates outside of traditional STEM and business to enhance their résumés in a cost-effective manner to compete better in the labor market.

Deciding on how to manage the grade point average (G.P.A.) involved many considerations given the complicated issues of the university G.P.A. and hiring decisions (Sulastrī, Handoko, & Janssesn, 2015; Thompson, 2014; McKinney, Carlson, Mecham, D’Angelo, & Connerley, 2003). Issues such as grade inflation, hiring manager unique perspectives on the value of the G.P.A. as compared to other applicant attributes, various grading scales used by different institutions, varying opinions of career advisors on listing the G.P.A. on a résumé (e.g. only list if it is above a certain threshold, only include major-GPA, etc.), the context of the G.P.A. given the reputation of the institution, and the fact that no universal agreement exists regarding what marks a good G.P.A. from one not so good one. After reviewing the grading policies of the universities used in this study, it was clear that a 4.0 scale was appropriate. Furthermore, since most universities used in this study had established the Dean’s List for students who earned above a 3.5 in each term, it was decided that anything above a 3.5 would be considered excellent whereas between 3.0-3.49 would be considered good. Using a random number generator with a minimum of 3.0 and maximum of 3.49 as the parameters, the
number 3.22 was generated; this G.P.A. was posted on the résumés. Displaying such a low G.P.A. possibly may have hurt the applicant’s employer interest with some companies. However, other attributes, such as an internship and work experience, combined with a 3.22 G.P.A. may have improved the applicant’s prospects with other companies. In the pretesting, reviewers found the G.P.A. to be good but not elite.

The universities listed on the résumé varied from region to region. The selection criteria for the universities was to avoid elite schools as ranked by U.S. News and World Report’s annual rankings because the top-ranking status of the school could skew the hiring process. Likewise, I avoided using institutions that might be perceived as lacking in quality for similar concerns as to what the school might signal to employers. Also, it was decided not to use private schools because of the unintended signals that might be associated with private education. Therefore, this study’s résumé listed large public schools with relatively modest admissions standards located in the same state or a nearby state of the hiring firm. These schools were ranked between 45 and 100 by U.S. News and World Report. The fictional student résumé listed May, 2019 as the date of graduation.

**Honors**

The résumé listed being named to the university dean’s list three times during the student’s time at university. Although the resume did not indicate when the student started college, the dean’s list achievements were identified as taking place one time in the three years previous to graduation. Distributed honors accolades were intended to signal the student’s academic ability as being good but not consistently excellent.
Experiences

The experiences included the following five items: 1) an internship with a non-profit 2) part-time employment during the school year as a member of a restaurant wait staff 3) a tutor in biology 4) a team captain on a university intramural soccer club that won a campus championship and 5) a student government representative. In the pre-testing of the résumé, it was agreed these experiences were typical of a good college student but not an elite graduate. More prestigious experiences were expected of an elite employment candidate while fewer experiences were expected of a less than desirable potential hire. Soccer was chosen because of its popularity among Millennials and Generation Z as compared to the general population (Nielsen, 2017). I had concerns about listing the soccer experience since research has shown people across cultures perceive athletes who play soccer as being masculine (Plaza et al. 2017; Fontayne et al. 2002; Koivula 1995; Csizma et al. 1988). During pretesting, however, not a single reviewer mentioned soccer participation as a suggestion of masculinity.³

Skills

Résumé type served as the independent variable for this research study. For the control résumé, listed as résumé A, only three lines of skills were listed. These skills were proficiency with common software, including word processing, data spreadsheet, and presentation software; customer service soft skills related to the student’s work as a wait staff member (e.g. patience, poise, tact, and problem solving); and leadership skills earned through experiences (communicating, delegating, resolving conflict, and motivating).

The second version of the résumé, referred to as résumé B, was identical to the first except the skills section included university-issued digital badges obtained through the University Learning Store (ULS). The ULS was chosen because of its unique offering as an
online, university-issuing badging site available to the general public. The ULS
(https://universitylearningstore.org) is a consortium effort between six major U.S. universities
(Georgia Institute of Technology, University of California-Davis, University of California Irvine,
University of Wisconsin, University of Washington, and the University of California-Los
Angeles) where anyone with internet access can obtain a digital badge on a subject area for a
modest cost (most badges charge $25 to access content and $25 to take an assessment).

The ULS has 32 badges, and the site is maintained by the University of Wisconsin
Extended Campus. Badges in project management, teamwork, and business communications
were selected for the résumé (see Table 2.1 for details of the badges) since these areas often are
mentioned as desired skills in surveys of workplace managers. URL links to the ULS were
included on the digital résumés so that hiring managers could click and verify the authenticity of
the badge and a description of its requirements. The badges selected were based on skills, not
issuing institutions. Although the badges listed on the résumé may seem to favor the University
of Wisconsin disproportionately, this representation is partly because 24 of the 32 badges on the
ULS are issued by Wisconsin institutions. On the résumé, five of the nine badges related to
project management and two others focused on teamwork, so seven of nine badges were
generated by University of Wisconsin institutions. The remaining two badges were issued by the
University of Washington and the Georgia Institute of Technology.

The third version of the résumé, referred to as résumé C, included the same list of skills
as the résumé B (the one with the badges); however, version C of the résumé listed the same
skills using the same short descriptions with no mention of a badge, nor were there any links to
any source of verification. The three versions of résumés were used to apply for jobs.
Table 2.1. Résumé audit badges (Source: [https://universitylearningstore.org/](https://universitylearningstore.org/)).

<table>
<thead>
<tr>
<th>Badge</th>
<th>Issuer</th>
<th>Cost</th>
<th>Estimated Time to Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Defining project requirements and scope</td>
<td>University of Wisconsin Extended Campus</td>
<td>$25 content $25 assessment</td>
<td>12 hours</td>
</tr>
<tr>
<td>2. Developing a project charter</td>
<td>University of Wisconsin Extended Campus</td>
<td>$25 content $25 assessment</td>
<td>12 hours</td>
</tr>
<tr>
<td>3. Creating a stakeholder management plan for projects</td>
<td>University of Wisconsin Extended Campus</td>
<td>$25 content $25 assessment</td>
<td>15 hours</td>
</tr>
<tr>
<td>4. Performing a cost benefit analysis in project management</td>
<td>University of Wisconsin Extended Campus</td>
<td>$25 content $25 assessment</td>
<td>N/A</td>
</tr>
<tr>
<td>5. Creating a work breakdown structure (WBS) in a project</td>
<td>University of Wisconsin Extended Campus</td>
<td>$25 content $25 assessment</td>
<td>N/A</td>
</tr>
<tr>
<td>6. Forming strong work teams</td>
<td>University of Wisconsin Extended Campus and the University of Wisconsin La Crosse</td>
<td>$25 content $25 assessment</td>
<td>6 hours</td>
</tr>
<tr>
<td>7. Managing team conflict</td>
<td>University of Wisconsin Extended Campus and the University of Wisconsin La Crosse</td>
<td>$25 content $25 assessment</td>
<td>8 hours</td>
</tr>
<tr>
<td>8. Creating meetings agendas and announcements</td>
<td>University of Washington Continuum College</td>
<td>$25 content $25 assessment</td>
<td>5 hours</td>
</tr>
<tr>
<td>9. Business presentations: The persuasive speaker</td>
<td>Georgia Institute of Technology</td>
<td>$99 content $49 badge</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Job Application Process**

Using a popular online job posting website, the job search terms included *entry level, full-time, within 50 miles*, and the key words of *bachelor, bachelor’s, bachelors* were used to apply to jobs located within 29 large metro areas dispersed throughout the Northeast, Northwest, Southeast, Southwest, and Midwest regions of the United States. This search resulted in a pool of nearly 60,000 jobs at the start of the application process.
For assorted reasons, many jobs within the pool did not meet the study’s criteria for applying. General, entry-level jobs were chosen as they likely would be positions that college graduates without focused professional majors, such as engineering, accounting, nursing, etc., would qualify for and receive consideration from a potential applicant. Only full-time jobs were considered. To maximize the pool of available jobs, a search locale within 50 miles of a metro area was used and jobs posted within the past 30 days were qualified. The assumption was a new college graduate has little in the way of possessions, making the job seeker mobile within a metro vicinity and willing to move for a full-time position. A unique random order was established for each metro area, and applications were submitted in batches of 10.

The keywords used in the search terms related to a bachelor’s degree were suitable given the jobseeker had earned a bachelor’s degree; one would expect a recent graduate to pursue jobs requiring or preferring a bachelor’s degree. Although this study did not include essay responses, several questions from employers required quantitative or binary responses. The same response was used consistently for each résumé. See Table 2.2 for a list of employer questions, the standard response, and the rationale for the response.

Feedback from the pilot study and discussions with corporate recruiters resulted in not choosing to include cover letters in this audit study. Reviewers felt cover letters were not worthwhile for entry-level jobs where the candidate had limited real-world experience. Recruiters provided similar feedback but noted that cover letters might be appropriate for top-tier entry-level jobs at prestigious firms. Schullery, Ickes, and Schullery (2009) found that 56% (n=140) of Fortune 500 employers preferred cover letters. Results from this audit study showed that employer thoughts on cover letters may be changing; this issue is discussed in the results section.
Table 2.2. Standard responses to employer questions

<table>
<thead>
<tr>
<th>Employer Question</th>
<th>My Response</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>When can you start?</td>
<td>14 days from hiring</td>
<td>It is a frequent practice for new hires to begin within a 2-week period.</td>
</tr>
<tr>
<td>Are you willing to undergo a background check?</td>
<td>Yes</td>
<td>Some jobs require a background check due to the nature of the job; unwilling to submit to a background check may end the hiring process.</td>
</tr>
<tr>
<td>Some employers asked about salary expectations</td>
<td>$40,000</td>
<td>The National Association of College and Employers (2017) reports the average starting salary specifically for someone earning a degree in biology at $34,440. I opted 14% above this average to reflect wage increases due to the tight labor markets in 2018 and 2019.</td>
</tr>
<tr>
<td>What percent are you willing to travel?</td>
<td>75%</td>
<td>I assumed new graduate likely has fewer outside family responsibilities and wants to perform well, hence is more willing to engage in work related travel.</td>
</tr>
<tr>
<td>How many years of time management experience?</td>
<td>4</td>
<td>This applicant had to have some level of time management skills to balance part-time work, extracurricular activities, and academic coursework.</td>
</tr>
<tr>
<td>How many years of experience with Microsoft office products?</td>
<td>4</td>
<td>Microsoft office products are widely used on college campuses, I assumed this student used the products each year at university.</td>
</tr>
<tr>
<td>Are you able to work in a nearby town?</td>
<td>Yes</td>
<td>Assume the applicant wants to make a good impression with a new employer and is willing to be flexible in working locations.</td>
</tr>
<tr>
<td>Do you have a driver license in good standing?</td>
<td>Yes</td>
<td>Assumed the applicant did not have a history of poor driving.</td>
</tr>
<tr>
<td>How many years of social media experience?</td>
<td>8</td>
<td>As a millennial, I assumed the candidate would have had access to social media content businesses might be interested in (Snapchat, Twitter, Instagram, FB) starting around the age of 14 / freshman year of high school.</td>
</tr>
<tr>
<td>How many miles are you willing to commute to work?</td>
<td>25</td>
<td>I chose this as my search area was a 50 mile radius within a metro area so a 25 mile driving radius is reasonable for a new hire.</td>
</tr>
</tbody>
</table>

**Employer Interest**

While most résumé audit studies use callbacks or interviews as the dependent variable, I chose to use employer interest. I am interested in learning about employer attention in a candidate, even if it is subtle. I am not as concerned whether this interest leads to an interview or
formal call back. Frequently, in the hiring process, the exchange between candidates and employers involves direct signals, such as callbacks, but it also involves employers providing indirect signals of interest.

For this study, a positive employer interest is an action by an employer that shows interest in the candidate and continues the application process. This interest usually includes a direct signal, like a callback requesting an interview, or a request for more information beyond what was provided by the applicant. I discovered that some employers used the online job posting site as an initial screening device for potential candidates, which was initially noticed when independent branches of the same company, located in different cities, had different employer interest (i.e. one directed the candidate to continue to the corporate website to fill out a more detailed application, but other branch offices did not respond). Because of this, I viewed the request to continue to the corporate site as a request to continue the application process, a request for additional information, and an indicator of interest in the candidate (i.e. a positive employer interest). I did not consider form-letters acknowledging or thanking the candidate for applying as employer interest. Nor did I count companies that noted an incomplete application submission as an employer interest. In most cases, if employers were not interested in the applicant, they simply did not reply. It is possible that late replies happened outside of the recorded window of time allocated for employer responses (7 weeks). More details on employer responses are included in the results section.

Descriptive Results

In the late spring of 2019, I applied to 1,848 unique jobs using three unique résumés (616 jobs per résumé) in five different regions of the United States involving 29 different metro areas. The geographic area where the jobs were located was somewhat evenly dispersed (see Figure
I did not target any specific industry; however, five industries accounted for 83% of the jobs (see figure 6). Industry sectors are based on the Bureau of Labor and Statistics’ (BLS) (BLSb, 2019) categorizations. BLS’ (BLSc, 2019) classification of job types also was used to delineate the job groups in this study. No specific job type was targeted, but 54% of the jobs fell under the office and administrative support category. Office and administrative occupations include a diverse mixture from customer service representatives to office clerks to bank tellers. Another 32% of the jobs fell under sales jobs or business and financial occupations (see figure 7). BLS includes retail sales workers, insurance agents, and cashiers among its list of sales jobs. Some of the business and financial professions include analysts, claims adjusters, event planners, personal financial planners, and training/development specialists.

**Figure 2.5.** Percentage of résumés submitted per region (n=1848)

When searching for jobs, I focused on entry-level work that required or preferred a bachelor’s degree. The number of employers who no longer mandate a bachelor’s degree was
surprising. The majority (61%) of the 1,848 positions listed the bachelor’s degree as preferred but not mandatory. Many of these employers noted they considered a set number of years of experience (e.g. 5 to 10 years) as the equivalent of a bachelor’s degree.

Although this audit study did not include cover letters with submitted applications, I tracked which jobs listed cover letters as an option, which required them, and which did not provide any manner to submit a cover letter. A vast majority of the jobs (96%) listed a cover letter as an option. Roughly 2% of the jobs listed a cover letter as mandatory and a similar 2% did not provide any method to include a cover letter with the online application.

In terms of responses, most employers (61%) expressed their lack of interest in the candidate by not responding (see Figure 2.5). Only 12% of employers not interested in a job seeker sent an email to the applicant informing the candidate of the decision not to pursue. No employers used text messaging or voicemails to inform a candidate they were not interested. In terms of expressing interest in a candidate, most employers used email (75%) while smaller percentages used voicemail (21%) and only 1% chose to use text messaging. Employers who left voicemail or text messages usually also sent emails.

Figure 2.6. Jobs applied to per industry (n=1848)
Figure 2.7. Jobs applied to per occupation group (n=1848)

The total employer interest results are displayed in Table 2.3. The overall employer interest for all résumés was 27.59%. This rate is higher than callback or interview rates in other recent audit studies (Quadlin 2018; Nunley et al., 2016; Gaddis, 2015) but consistent with other audit studies that followed a more broad definition of employer interest (Verhaest, Bogaert, Dereymaeker, Mestdagh, & Baert, 2018). Higher positive results were expected as employer interest includes other indicators of employer interest in a candidate beyond a formal callback or the scheduling of an interview. Other possibilities for this higher rate are addressed in the discussion section. A Chi-squared test revealed a significant association between resume type and employer interest ($x^2 = 6.5484$, $df = 2$, $p < .05$).

Table 2.3. Employer interest by résumé type

<table>
<thead>
<tr>
<th>Résumé Type</th>
<th>Yes</th>
<th>Grand Total</th>
<th>% positive outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (control)</td>
<td>161</td>
<td>616</td>
<td>26.13%</td>
</tr>
<tr>
<td>B (badges)</td>
<td>193</td>
<td>616</td>
<td>31.33%</td>
</tr>
<tr>
<td>C (skills, no badges)</td>
<td>156</td>
<td>616</td>
<td>25.32%</td>
</tr>
<tr>
<td>Grand Total</td>
<td>510</td>
<td>1848</td>
<td></td>
</tr>
</tbody>
</table>
Employers in the MW (35%) showed the greatest interest in badged résumés, followed closely by companies in the NE (33%) and NW (33%). Hiring managers in the SW (31%) showed a little less interest, but companies in the SE (24%) showed much less interest in badged résumés (see Figure 2.8). A Chi-squared test failed to reveal a significant association between resume type and region ($x^2 = 3.8469, df = 5, p > .05$).

![Bar chart showing interest in badged résumés by region](chart.png)

**Figure 2.8.** Positive employer interest of badged résumés per region (n=616)

**Results**

A bivariate logistic regression equation predicting odds ratios controls for all observed features provides weighted estimates. Using a Variance Inflation Factor (VIF) above 3 as an indicator of multicollinearity, none of the model terms posed a concern with respect to multicollinearity (see Table 2.4). The results of a main-effects binary logistic regression for
employer interest by resume type, region, degree preference, job type, and industry revealed significant overall model fit ($X^2(18) = 33.42$, $p = 0.015$) (see table 5). A marginally significant effect of resume type on employer interest was observed ($p = 0.055$), indicating that not all the resume types result in the same likelihood of successful employer interest. In terms of covariate effects, job type was significant, industry was marginally significant while region and degree preference could not be assumed to predict employer interest.

**Table 2.4.** Model coefficients and variance inflation factors

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Term</th>
<th>Coef</th>
<th>SE Coef</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.099</td>
<td>0.187</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resume type descriptor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.239</td>
<td>0.128</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.048</td>
<td>0.132</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-0.147</td>
<td>0.178</td>
<td>1.43</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.256</td>
<td>0.163</td>
<td>1.47</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-0.213</td>
<td>0.166</td>
<td>1.47</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-0.182</td>
<td>0.153</td>
<td>1.56</td>
<td></td>
</tr>
<tr>
<td>Degree preference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>-0.167</td>
<td>0.109</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Recoded Job Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.228</td>
<td>0.139</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-0.026</td>
<td>0.217</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-0.322</td>
<td>0.180</td>
<td>1.12</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.380</td>
<td>0.223</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>Recoded Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.378</td>
<td>0.199</td>
<td>1.60</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.276</td>
<td>0.210</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>-0.317</td>
<td>0.399</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.103</td>
<td>0.272</td>
<td>1.28</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.434</td>
<td>0.169</td>
<td>2.07</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0.373</td>
<td>0.192</td>
<td>1.79</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>0.036</td>
<td>0.224</td>
<td>1.38</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2.5. Deviance table for all observed features (n=1848)

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Adj Dev</th>
<th>Adj Mean</th>
<th>Chi-Square</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>18</td>
<td>33.42</td>
<td>1.8569</td>
<td>33.42</td>
<td>0.015</td>
</tr>
<tr>
<td>Résumé Type</td>
<td>2</td>
<td>5.78</td>
<td>2.8920</td>
<td>5.78</td>
<td>0.055</td>
</tr>
<tr>
<td>Region</td>
<td>4</td>
<td>2.99</td>
<td>0.7482</td>
<td>2.99</td>
<td>0.559</td>
</tr>
<tr>
<td>Degree Preference</td>
<td>1</td>
<td>2.34</td>
<td>2.3440</td>
<td>2.34</td>
<td>0.126</td>
</tr>
<tr>
<td>Recorded Job Type</td>
<td>4</td>
<td>10.67</td>
<td>2.6682</td>
<td>10.67</td>
<td>0.030</td>
</tr>
<tr>
<td>Recorded Industry</td>
<td>7</td>
<td>12.36</td>
<td>1.7662</td>
<td>12.36</td>
<td>0.089</td>
</tr>
<tr>
<td>Error</td>
<td>1829</td>
<td>2143.93</td>
<td>1.1722</td>
<td></td>
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Tables 2.6, 2.7, and 2.8 show the odds ratios at various CI’s (95%, 99%, 90%, respectively).

### Table 2.6. Odds ratio (95% CI)*

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<th>95% CI</th>
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<th>95% CI</th>
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*Note: Résumé Type 1 = control, résumé type 2 = badged skills, résumé type 3 = extra skills no badge; Regions MW = 1, NW = 2, SW = 3, SE = 4, NE = 5; Degree Preference 0 = degree preferred, 1 = degree required; Job Type 1 = office and administrative support, 2 = sales, 3 = management, 4 = business and financial, 5 = other; Industry education and health services = 2, financial activities = 3, information = 5, leisure and hospitality = 6, manufacturing = 7, professional and business = 10, trade, transportation, and utilities = 11, and other = 12

Table 2.7. Odds ratio (99% CI)*

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<tr>
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Table 2.7 (Continued)

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*Note: Résumé Type 1 = control, résumé type 2 = badged skills, résumé type 3 = extra skills no badge; Regions MW = 1, NW = 2, SW = 3, SE = 4, NE = 5; Degree Preference 0 = degree preferred, 1 = degree required; Job Type 1 = office and administrative support, 2 = sales, 3 = management, 4 = business and financial, 5 = other; Industry education and health services = 2, financial activities = 3, information = 5, leisure and hospitality = 6, manufacturing = 7, professional and business = 10, trade, transportation, and utilities = 11, and other = 12
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<th>Table 2.8. Odds ratio (90% CI)*</th>
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**Odds Ratios for Categorical Predictors**

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<th>90% CI</th>
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<table>
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<th>Level B</th>
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<th>90% CI</th>
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<td>(0.6483, 1.0725)</td>
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<td>0.8968</td>
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<td>(0.6888, 1.2738)</td>
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<td>0.9661</td>
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<td>3</td>
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<td>5</td>
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<td></td>
<td>1.0314</td>
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<td>4</td>
<td></td>
<td>1.0773</td>
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<table>
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<th>90% CI</th>
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<table>
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<th>Recoded Job Type</th>
<th>Level A</th>
<th>Level B</th>
<th>Odds Ratio</th>
<th>90% CI</th>
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<td>1</td>
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<td>4</td>
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<td></td>
<td>0.7249</td>
<td>(0.5396, 0.9739)</td>
</tr>
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<td>5</td>
<td>1</td>
<td></td>
<td>1.4618</td>
<td>(1.0131, 2.1094)</td>
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<td></td>
<td>0.7756</td>
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</tr>
<tr>
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<td>0.5772</td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td>3</td>
<td></td>
<td>0.7442</td>
<td>(0.4829, 1.1468)</td>
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<tr>
<td>5</td>
<td>3</td>
<td></td>
<td>1.5007</td>
<td>(0.9235, 2.4387)</td>
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<tr>
<td>5</td>
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<td></td>
<td>2.0166</td>
<td>(1.2867, 3.1603)</td>
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</table>

<table>
<thead>
<tr>
<th>Recoded Industry</th>
<th>Level A</th>
<th>Level B</th>
<th>Odds Ratio</th>
<th>90% CI</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>1.4600</td>
<td>(1.0520, 2.0261)</td>
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<tr>
<td>11</td>
<td>2</td>
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<td>1.4520</td>
<td>(1.0581, 1.9924)</td>
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<tr>
<td>12</td>
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<tr>
<td>6</td>
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<td></td>
<td>0.4988</td>
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</tr>
<tr>
<td>7</td>
<td>3</td>
<td></td>
<td>0.7593</td>
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</tr>
<tr>
<td>10</td>
<td>3</td>
<td></td>
<td>1.0576</td>
<td>(0.7872, 1.4209)</td>
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<tr>
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<td>3</td>
<td></td>
<td>0.9945</td>
<td>(0.7131, 1.3870)</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td></td>
<td>0.7103</td>
<td>(0.4802, 1.0506)</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td></td>
<td>0.5526</td>
<td>(0.2818, 1.0835)</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td></td>
<td>0.8412</td>
<td>(0.5251, 1.3476)</td>
</tr>
<tr>
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<td>5</td>
<td></td>
<td>1.1717</td>
<td>(0.8543, 1.6069)</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td></td>
<td>1.1018</td>
<td>(0.7798, 1.5566)</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td></td>
<td>0.7869</td>
<td>(0.5239, 1.1819)</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td></td>
<td>1.5223</td>
<td>(0.7351, 3.1526)</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td></td>
<td>2.1204</td>
<td>(1.1150, 4.0325)</td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td></td>
<td>1.9939</td>
<td>(1.0393, 3.8254)</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
<td></td>
<td>1.4241</td>
<td>(0.7157, 2.8336)</td>
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<tr>
<td>10</td>
<td>7</td>
<td></td>
<td>1.3929</td>
<td>(0.9099, 2.1323)</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
<td></td>
<td>1.3098</td>
<td>(0.8382, 2.0467)</td>
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Table 2.8 (Continued)

<table>
<thead>
<tr>
<th>Level A</th>
<th>Level B</th>
<th>Odds Ratio</th>
<th>90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>7</td>
<td>0.9355</td>
<td>(0.5682, 1.5401)</td>
</tr>
<tr>
<td>11</td>
<td>10</td>
<td>0.9403</td>
<td>(0.7098, 1.2457)</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>0.6716</td>
<td>(0.4737, 0.9523)</td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>0.7142</td>
<td>(0.4882, 1.0450)</td>
</tr>
</tbody>
</table>

*Note: Résumé Type 1 = control, résumé type 2 = badged skills, résumé type 3 = extra skills no badge; Regions MW = 1, NW = 2, SW = 3, SE = 4, NE = 5; Degree Preference 0 = degree preferred, 1 = degree required; Job Type 1 = office and administrative support, 2 = sales, 3 = management, 4 = business and financial, 5 = other; Industry education and health services = 2, financial activities = 3, information = 5, leisure and hospitality = 6, manufacturing = 7, professional and business = 10, trade, transportation, and utilities = 11, and other = 12

Based on the results, when considering the relevant factors used in this study, adding badges to a résumé increased the likelihood that a recent graduate gains employer interest with respect to entry level jobs. More precisely, the results of a binary logistic regression revealed that a recent college graduate using a badged résumé is 33% more likely to draw the interest of employers versus a résumé with similar skills that are not badged ($p < .05$) (see Table 2.9). The badged résumé (résumé B) was 1.27 times more likely to see positive employer interest versus a résumé with no additional skills (résumé A), but this result had weaker significance ($p < .10$). These findings are important for recent college graduates having difficulty attaining work in the business world.

There were no significant differences for a résumé that included no extra skills versus a résumé with extra skills that were not badged. This finding was surprising since most people would assume a résumé with more skills would attract more interest. The fact that it does not might speak to employers’ wariness regarding inflated and inaccurate résumés (see discussion section for further insights about this finding).

When considering industry, recent graduates applying to jobs in the Professional and Business industry were 54% more likely to draw a hiring manager’s interest versus hiring
managers in the Education and Health services industry \( (p < .01) \) (see Table 2.9). Applicants who submitted to jobs in the Professional and Business sector were more than twice as likely to interest an employer compared those who submitted to jobs in the Leisure and Hospitality industry \( (p < .10) \). If applying to positions in the Financial Activities area, a job seeker had a 46\% greater likelihood of increased notice by hiring managers than those applications in the Education and Health Services division. In Trade, Transportation, and Utilities areas, candidates received 45\% and nearly double probabilities of positive employer interest versus the Education and Health Services and Leisure and Hospitality industries, respectively.

When looking at specific jobs, a recent college graduate will see chances of interest increasing by 73\% when applying to Sales jobs versus Business and Financial jobs \( (p < .01) \) (see Table 2.9). New graduates applying to Other jobs (includes jobs in community and social service, computer and IT, education, training, and library, farming, fishing, and forestry, healthcare, life, physical, and social sciences, media and communication, and protective services) were twice as likely to see positive employer interest versus those applying to jobs in the Business and Financial job groups \( (p < .05) \).

**Table 2.9.** Odds ratio summary of significant findings \( (*p < .10; **p < .05; ***p < .01) \) using binary logistic regression model

<table>
<thead>
<tr>
<th>Résumé Type</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (badged skills) vs A (no additional skills)</td>
<td>1.2699*</td>
</tr>
<tr>
<td>C (non-badged skills) vs A (no additional skills)</td>
<td>0.9529</td>
</tr>
<tr>
<td>C (non-badged skills) vs B (badged skills)</td>
<td>0.7503**</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td></td>
</tr>
<tr>
<td>Professional &amp; Business vs Education &amp; Health Services</td>
<td>1.5441***</td>
</tr>
<tr>
<td>Professional &amp; Business vs Leisure and Hospitality</td>
<td>2.1204*</td>
</tr>
<tr>
<td>Financial Activities vs Education &amp; Health Services</td>
<td>1.4600*</td>
</tr>
<tr>
<td>Trade, Transportation, &amp; Utilities vs Education &amp; Health Services</td>
<td>1.4520*</td>
</tr>
<tr>
<td>Trade, Transportation, &amp; Utilities vs Leisure &amp; Hospitality</td>
<td>1.9939*</td>
</tr>
<tr>
<td><strong>Job Type</strong></td>
<td></td>
</tr>
<tr>
<td>Business &amp; Financial vs Sales</td>
<td>0.5773***</td>
</tr>
<tr>
<td>Other vs Business &amp; Financial</td>
<td>2.0166**</td>
</tr>
<tr>
<td>Other vs Office &amp; Administrative Support</td>
<td>1.4618*</td>
</tr>
</tbody>
</table>
Discussion

Higher education is experiencing an unprecedented period of uncertainty and dynamic changes. One outcome of this disruptive period is the proliferation of the digital badge. Since 2013, digital badges have experienced tremendous growth and industry experts expect badging to continue to grow (Surman, 2018). The relative low-cost and easy access to badging skillsets are important considerations for recent-college graduates trying to find entry-level employment. Since badges are a relatively new concept in higher education and the labor market, there are limited insights regarding their perception or value by hiring managers.

As of this study, only two studies (Gallagher, 2018 and Raish & Rimland, 2016) have investigated how badges are understood by employers. These self-reported findings show a strong interest in digital badges but a lack of understanding by most human resource professionals. The results of my audit study, the first to examine badges in a real-world setting, show that badges are vital factors when companies are assessing potential hires. Hiring professionals show they strongly prefer recent college graduates with university-badged business skills over candidates with similar unbaged business skills or those with only limited skills. These findings are statistically significant. The preferences for badged résumés appear stronger in the NW, NE, MW, and SW regions of the United States but markedly less in the SE region. The conclusions associated with regional preferences were not statistically significant.

A surprise finding in my research was the lower rate of positive employer interest regarding a résumé that included several unbaged business skills compared to an identical résumé that listed no additional business skills. Although these findings were not significant, they warrant more investigation as they were unexpected. Perhaps employers are skeptical of padded résumés that lack evidence to support claims. This distrust may be warranted as a
CareerBuilder (2017) study found that 75% of HR managers reported having discovered fraud on a résumé. Perhaps hiring professionals were more wary while this audit study occurred due to the widely published college admissions scandal involving Hollywood celebrities and wealthy families engaged in college application fraud. This recent effect of falsehoods on college applications may account for greater suspicion on job applications during this period. It could also be the résumé with the extra skills might be perceived as being over qualified for an entry-level position, but this reason is doubtful since a recent audit study found that over qualifications lead to higher rates of callbacks (Verhaest, Bogaert, Dereymaeker, Mestdagh, & Baert, 2018).

Education and Health services industry and jobs seemed less accepting of recent graduate applicants than other sectors (see appendix 2.1 and 2.2 for BLS listing of industry super-sectors). The lack of response by these industries might be due to the types of skills included on the résumés in this audit study. Possibly, licensing requirements for Education and Health jobs (e.g. K-12 teacher certifications and some medical certifications such as pharmacy technicians or dental hygienists) inhibit interest skills that do not align to the duties of health or education jobs. Or, it could be these industries do not see value in a bachelor’s of arts degree in biology for the types of jobs they seek to fill.

Similarly, the Leisure and Hospitality industry shows less interest in recent college graduates seeking employment. It could the types of jobs associated with this industry, such as performing arts and sports, do not see value in the advanced business skills used in this study, or the hiring managers in these industries looking to fill jobs like wait staff, bartenders, and hotel registration staff could have a bias against biology majors.
Limitations

Audit studies are useful for increasing the understanding of decision-makers without the limitations of self-reporting (Baumeister, Vohs, & Funder, 2007; Wilson & Gilbert, 2003; Holt & Laury, 2002; West & Brown, 1975). However, correspondence studies include their own set of constraints. Several of these limits already have been addressed in the previous sections of this report. Other challenges of audit studies include the incapacity to understand why hiring managers favored or did not favor one résumé over another. This audit study only accounts for initial interest; it does not address other steps in the hiring process, such as how employers might view badged candidates versus non-badged after interviewing the applicant. The audit study cannot provide insight regarding how the badged candidates’ skills are validated by employers (or not validated) during the hiring process.

Another drawback of the study involved the choice to use a job-posting website and apply to a broad range of jobs across a wide geographic area. This approach is not typically used by real world job seekers. When looking for post-college employment, most people will search within a particular industry, job type, and location, but this approach was not taken with this study.

An additional gap in this field experiment centers on the notion that many employers today use software and key word searches to filter the initial batch of résumés. It would be useful to know whether the badges played a role in the key word search. With an audit approach, it is impossible to know what role technology played in increasing the employer’s interest with the badged résumé.

Finally, with any audit study, the possibility exists that the employer suspects the résumés to be fictional. This suspicion may account for some of the non-responses by hiring personnel.
Although no employer inquired about the authenticity of the résumé, it does not mean a hiring manager did not suspect the genuineness of any of the résumés and rejected it because of that reason.

**Future Research**

As a new concept, much research is needed to determine the efficacy of badges in the labor market, including insights on badge design, curriculum models, type and amount of metadata contained with badges, verification process, and additional research regarding employer value and understanding as well as badge-earner perceptions related to valuing, obtaining, and displaying digital badges on social media.

Qualitative research is needed to understand hiring personnel perceptions of badges when presented on a résumé. Qualitative research should include interviews with decision-makers who show interest in a badged résumé as well as employers who do not favor badges. A mixed method study could involve human resource professionals rating badged versus unbadged résumés with a follow-up qualitative interview to gain deeper insights about their ratings. Further qualitative and quantitative investigation concerning digital badges and the hiring process by job type and industry is needed as well.

Also, this study discovered changes in hiring practices. Employers are not as tied to job seekers with bachelor’s degrees as most positions preferred a bachelor’s degree versus requiring one. Most employers noted they would accept experience in lieu of a degree when considering candidates. It is difficult to know whether employers are devaluing college degrees or if the low unemployment rate is causing them to be less choosy. Although popular media reports college degrees are being diminished by employers, little scholarly research supports this notion. It is an area in need of further research.
Another change in the hiring process involves the use of cover letters. A decade ago, the majority of employers preferred cover letters by job applicants (Schullery, Ickes, & Schullery, 2009). However, my research found that virtually all employers were indifferent towards cover letters as 98% made them optional or did not require a cover letter at all. This finding has important implications for university career centers that are investing resources into writing effective cover letters. This aspect of the hiring methodology warrants additional investigation to understand better whether cover letters make a difference with entry-level jobs.

In summary, this audit study furthers the empirical and theoretical knowledge concerning academic digital badges and what they signal, in terms of human capital, to potential employers. The insights are useful for universities considering badging strategies as well as recent college graduates who find it difficult to compete for corporate jobs because of a lack of business acumen on their résumés. Universities would be wise to understand the impact digital badges can have on employment opportunities for their graduates and investigate further whether this innovative technology is worth integrating into the academic programs and include in academic records for their students.

End Notes

1The surname was changed in California to be consistent with the most popular names within that state as the surname used in other states was not among the most popular names in California. The same process was used to select the last name of the applicant in California.

2Some job applications provided the option to gender identify, when faced with these I responded with ‘choose not to answer’ which was always an option on every gender identification question. Although steps were taken to conceal identity of the applicant, a small number of responses from some organizations included masculine or feminine pronouns when referring to the applicant. Most of the respondents used either first name or first and last name when responding.

3The Women’s World Cup was receiving heavy media coverage during the time of the pilot testing of the résumé, likely because the U.S. Women’s National Team was favored to win the international competition. Perhaps the coverage of women playing soccer had a recency effect on the participants in the pretesting, mitigating the notion of soccer as a male sport. The Women’s World Cup tournament was taking place when applications were sent, again the heavy media exposure may have played a role in a small number of organizations using feminine pronouns when responding to the applicant.
The links used on the résumé took the hiring professional to a description of the badge. Had an actual badge been included on the résumé, it would likely include meta-data related to the student’s specific work, perhaps even a short video of the applicant discussing what was done to earn the badge. This type of résumé audit study is further discussed in the concluding section.

For example, many job postings sought out specific degrees, this audit only focused on general entry level jobs. Although there were a few laboratory jobs that were consistent for a biology major, so these were included in the study. Another limitation of the job pool included positions that used unique essay questions. To maintain consistency in the application submissions by reducing variation in the experimental design, these jobs were ignored. Many large corporations require applicants to create a unique username and password to access the company’s online application, this too disqualified jobs from consideration due to time constraints and concerns about variation. All the jobs applied to in this study were directly applied to using the job posting website.

If a specific degree was required (e.g. accounting, marketing, etc.) the job was not included in the audit study except, as noted, for the few jobs that specifically called for a biology major. There were some biological related positions that specifically called for a B.S. in biology, these jobs were excluded from this correspondence study. The website provided an option to select entry level in the selection criteria, this was used. Some job postings asked if the applicant was willing to earn a license (such as an insurance license), a yes response was always provided. The website

Only jobs that listed bachelors required or preferred were selected for this audit study.

References


Gaddis, S. M. (2018). *An introduction to audit studies in the social sciences*. In Audit studies: behind the scenes with theory, method, and nuance (pp. 3-44). Springer, Cham. [https://doi.org/10.1007/978-3-319-71153-9_1](https://doi.org/10.1007/978-3-319-71153-9_1)


Appendix 2.1: Goods-Producing Industries by Supersector and NAICS Code (source: BLS, 2019b)

**Goods-Producing Industries**

**Natural Resources and Mining**
- Agriculture, Forestry, Fishing and Hunting (NAICS 11)
  - Crop Production (NAICS 111)
  - Animal Production (NAICS 112)
  - Forestry and Logging (NAICS 113)
  - Fishing, Hunting and Trapping (NAICS 114)
  - Support Activities for Agriculture and Forestry (NAICS 115)
- Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)
  - Oil and Gas Extraction (NAICS 211)
  - Mining (except Oil and Gas) (NAICS 212)
  - Support Activities for Mining (NAICS 213)

**Construction**
- Construction (NAICS 23)
  - Construction of Buildings (NAICS 236)
  - Heavy and Civil Engineering Construction (NAICS 237)
  - Specialty Trade Contractors (NAICS 238)

**Manufacturing**
- Manufacturing (NAICS 31-33)
  - Food Manufacturing (NAICS 311)
  - Beverage and Tobacco Product Manufacturing (NAICS 312)
  - Textile Mills (NAICS 313)
  - Textile Product Mills (NAICS 314)
  - Apparel Manufacturing (NAICS 315)
  - Leather and Allied Product Manufacturing (NAICS 316)
  - Wood Product Manufacturing (NAICS 321)
  - Paper Manufacturing (NAICS 322)
  - Printing and Related Support Activities (NAICS 323)
  - Petroleum and Coal Products Manufacturing (NAICS 324)
  - Chemical Manufacturing (NAICS 325)
  - Plastics and Rubber Products Manufacturing (NAICS 326)
  - Nonmetallic Mineral Product Manufacturing (NAICS 327)
  - Primary Metal Manufacturing (NAICS 331)
  - Fabricated Metal Product Manufacturing (NAICS 332)
  - Machinery Manufacturing (NAICS 333)
  - Computer and Electronic Product Manufacturing (NAICS 334)
  - Electrical Equipment, Appliance, and Component Manufacturing (NAICS 335)
  - Transportation Equipment Manufacturing (NAICS 336)
  - Furniture and Related Product Manufacturing (NAICS 337)
  - Miscellaneous Manufacturing (NAICS 339)
Appendix 2.2: Service-Providing Industries by Supersector and NAICS Code (source: BLS, 2019b)

Service-Providing Industries
Trade, Transportation, and Utilities
  Wholesale Trade (NAICS 42)
    Merchant Wholesalers, Durable Goods (NAICS 423)
    Merchant Wholesalers, Non-durable Goods (NAICS 424)
  Wholesale Electronic Markets and Agents and Brokers (NAICS 425)
  Retail Trade (NAICS 44-45)
    Motor Vehicle and Parts Dealers (NAICS 441)
    Furniture and Home Furnishings Stores (NAICS 442)
  Wholesale Electronic Markets and Agents and Brokers (NAICS 425)
  Electronics and Appliance Stores (NAICS 443)
  Building Material and Garden Equipment and Supplies Dealers (NAICS 444)
  Food and Beverage Stores (NAICS 445)
  Health and Personal Care Stores (NAICS 446)
  Gasoline Stations (NAICS 447)
  Clothing and Clothing Accessories Stores (NAICS 448)
  Sporting Goods, Hobby, Book, and Music Stores (NAICS 451)
  General Merchandise Stores (NAICS 452)
  Miscellaneous Store Retailers (NAICS 453)
  Nonstore Retailers (NAICS 454)
  Transportation and Warehousing (NAICS 48-49)
    Air Transportation (NAICS 481)
    Rail Transportation (NAICS 482)
    Water Transportation (NAICS 483)
    Truck Transportation (NAICS 484)
    Transit and Ground Passenger Transportation (NAICS 485)
    Pipeline Transportation (NAICS 486)
  Scenic and Sightseeing Transportation (NAICS 487)
  Support Activities for Transportation (NAICS 488)
  Postal Service (NAICS 491)
  Couriers and Messengers (NAICS 492)
  Warehousing and Storage (NAICS 493)
Utilities (NAICS 22)

Information
  Publishing Industries (except Internet) (NAICS 51)
  Motion Picture and Sound Recording Industries (NAICS 512)
  Broadcasting (except Internet) (NAICS 515)
  Internet Publishing and Broadcasting (NAICS 516)
  Telecommunications (NAICS 517)
  Data Processing, Hosting, and Related Services (NAICS 518)
  Other Information Services (NAICS 519)

Financial Activities
  Finance and Insurance (NAICS 52)
    Monetary Authorities - Central Bank (NAICS 521)
    Credit Intermediation and Related Activities (NAICS 522)
    Securities, Commodity Contracts, and Other Financial Investments and Related Activities (NAICS 523)
    Insurance Carriers and Related Activities (NAICS 524)
    Funds, Trusts, and Other Financial Vehicles (NAICS 525)
  Real Estate and Rental and Leasing (NAICS 53)
    Real Estate (NAICS 531)
    Rental and Leasing Services (NAICS 532)
    Lessors of Nonfinancial Intangible Assets (except Copyrighted Works) (NAICS 533)

Professional and Business Services
  Professional, Scientific, and Technical Services (NAICS 54)
  Management of Companies and Enterprises (NAICS 55)
  Administrative and Support Services (NAICS 56)
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Education and Health Services
  Educational Services (NAICS 61)
  Health Care and Social Assistance (NAICS 62)
  Ambulatory Health Care Services (NAICS 621)
  Hospitals (NAICS 622)
  Nursing and Residential Care Facilities (NAICS 623)
  Social Assistance (NAICS 624)

Leisure and Hospitality
  Arts, Entertainment, and Recreation (NAICS 71)
  Performing Arts, Spectator Sports, and Related Industries (NAICS 711)
  Museums, Historical Sites, and Similar Institutions (NAICS 712)
  Amusement, Gambling, and Recreation Industries (NAICS 713)
  Accommodation and Food Services (NAICS 72)
  Accommodation (NAICS 721)
  Food Services and Drinking Places (NAICS 722)

Other Services (except Public Administration)
  Other Services (except Public Administration) (NAICS 81)
    Repair and Maintenance (NAICS 811)
    Personal and Laundry Services (NAICS 812)
    Religious, Grantmaking, Civic, Professional, and Similar Organizations (NAICS 813)
Private Households (NAICS 814)
CHAPTER THREE:
DIGITAL BADGES: TRANSFORMATIONAL OR TRANSITORY?

In 2019, higher education has been the topic of popular interest in the U.S. media. Stories have been written of American Presidential candidates promising to fix the student loan crisis (Berman, 2019). Much press has been given to Hollywood stars going to jail for illegally hacking higher education by bribing coaches and hiring test takers to get their children to elite campuses through the side door (Gerstmann, 2019). Also, books have been published on how to legally hack higher education to accrue credits and complete a bachelor’s degree while in high school (LoDolce, 2015). There are reports of the low birth rate and a steep decline in traditional-aged college students after 2025 which, some argue, is likely to lead to the closure of thousands of smaller, universities that rely on tuition to operate (Barshay, 2018). Some question whether a college degree is worth it given its steep cost and considerable time commitment (Shell, 2018).

College degrees are no longer a rare commodity since more than 33% of Americans have earned a bachelor’s degree in 2017 compared to just 4.6% of the population in 1940 (Wilson, 2017). With a larger supply of degree holders, the U.S. economy is experiencing degree inflation where bachelors’ degrees are required for jobs that previously did not require them, thus creating inefficiencies in the U.S. economy (Fuller & Raman, 2017). In 2019, roughly as many Americans have a master’s degree as the number of Americans had bachelor’s degrees in 1960. Unlike students in 1960, however, students are attaining their degrees in less traditional ways with 33% having taken some or all courses online (Lederman, 2018). Even the notion of a
traditional student has shifted with 75% of college students not fitting the traditional mold (Nadworny & Depenbrock, 2018).

Although higher education has gone through a plethora of changes over the past six decades, the college transcript is one educational artifact that has been relatively untouched. One can argue the greatest innovation with respect to college records in the past 400 years is moving from sheepskin to paper. The paper-based transcript has become “a record of everything the student has forgotten” (Mangan, 2015, para. 2) and fewer employers are asking for college transcripts.

The old analog transcript is not working well in a world awash in secure, verifiable, granular digital data. One problem with a paper-based record is the ease of falsifying the document. Credential fraud is high with estimates of 50,000 fake degrees being issued annually (NY Times, 2015). Not only are degrees being fabricated, but most people are lying on their résumés (CareerBuilder, 2017). A new educational technology, the digital badge, might prove a more useful record of learning than the traditional transcript.

A digital badge is a digital depiction of a competence, learning accomplishment, or experience. Each badge is associated with an icon and data. Once issued, a badge is secured digitally to prevent hacking or tampering with the data. Badges also include software coding that allows verification of the badge issuer. The data stored within the badge provides background about what the badge represents as well as the evidence to support it. Badges also are different from paper-based transcripts because the badge earner maintains the credential, unlike traditional certificates where the issuing institution holds the record. Another difference is when a student pays to have a transcript released by a university, every course and each grade is shown. However, with badges, students can decide what to publicly display. Since the badges are
secured, employers can verify the badge’s authenticity via the student’s social media feed instead of waiting for an official copy from the institution. Since the digital badge is interactive, it can store far more data about the student’s knowledge and skills than a vague transcript. Badges also are different from paper certificates and transcripts because they can be used to mark more than learning or skills outcomes. They can mark experiences and other achievements (e.g. team or club captain, classroom competition winner, successful internship, etc.).

Badges became popular in 2013 when Mozilla, using funds from the MacArthur Foundation, set out to create a badging standard for open badges (Mozilla, 2014). Many private organizations, such as the Project Management Institute, International Business Machines (IBM), and Google, have been issuing digital badges for years. While research in academic digital badges is increasing (Fanfarelli & McDaniel, 2017), many faculty and administrators remain unaware of this developing technology. Also, most employers are unaware of badges (Gallagher, 2018; Raish & Rimland, 2016).

It is not surprising that university faculty and staff would be wary of yet another ed-tech that assures a paradigm shift in a nearly 400-year-old American institution. College personnel recall the unfulfilled promises of wikis, learning objects, virtual second-life, Massive Open Online Courses (MOOCs), and e-portfolios. Digital badges are different in one sense; unlike past ed-tech that had pockets of acolytes, more than ten million badges have been issued in a broad range of activities by a large swath of organizations and individuals since 2013 (Surman, 2018). This reality presents a problem if higher education hopes to adopt the badge as a formal credential.

The proliferation of the college degree plays a role in the devaluation of the degree, but barriers to entry exist (e.g. federal and state laws, accrediting standards, faculty qualifications, to
name a few), making it difficult for anyone to award accredited college credit. With digital badges, however, tens of thousands of organizations and individuals issue millions of badges for everything from showing up at a conference to writing a hotel review to drinking a beer to conducting doctoral-level research. With the hyperinflation of so many badges, one is reminded of post-World War II German currency where wheelbarrows of Reichsmarks were worthless. Digital badges are certainly trending across the globe, but will they remain just a trend for higher education?

Perhaps not. Hiring managers see potential value in university badged skills over unbadged skills (Gallagher, 2018; Raish & Rimland, 2016). After all, just like monetary currency, the entity backing the financial note plays a significant role in determining the monetary value. It should not be surprising that manager’s give credence to university-issued badges given the amount of deceit on résumés today; at least a badge can be verified in terms of who issued it. Additionally, as previously noted, a badge contains much more data than a traditional college transcript. Hiring managers never seem to have enough information when assessing candidates.

Perhaps the greatest value of the badge is the ability to make it disappear. Badges can be made to expire. Now this is a paradigm shift for higher education because degrees are permanent; the idea that parts of a degree need to be refreshed is novel but not uncommon. Some professions have mandated continuing education (health, education, social work, etc.) to maintain licenses while many business certification programs require regular re-certifications (e.g. the Project Management Institute, some Six Sigma programs, etc.). The notion of expiration may be of interest to an employer because it gives insight regarding the currency of a candidate’s human capital. For decades, the notion of life-long learning has been espoused, but the time and
cost factors make it difficult for most adult learners, and little evidence exists employers care. The badging structure may change the educational behaviors of adult learners and the expectations of hiring managers while creating a new product line for universities.

Since badges are truly micro, colleges can offer new skills development in a much faster way than the traditional curriculum development process. Traditional university processes are not designed to keep up with the world’s rapid rate of change, but digital badges may offer a medium to do so. Badges also may prove useful to people going through transitions.

Since anyone can earn a university-issued digital badge, it opens access to higher education learning to more than those admitted on campus. For example, university badges were an option for women in a Madison, Wisconsin, abuse shelter looking to improve their résumés to obtain living-wage work and gain independence from their abusers (McGovern, 2018). Also, badges could prove useful to military members transitioning to become full-time students.

Universities use an archaic process to subjectively determine what life experiences might count as college course equivalents. Capturing the knowledge and skills of military members acquired via their military work and recorded in digital badges may prove superior to hand-crafted portfolios that require time to verify and depend upon subjective criteria. Similarly, immigrants transitioning to a new nation where the new resident’s knowledge and skills need to be verified from trusted sources also may find value in digital badges.

The success of digital badges in higher education will not happen by accident. Decision-makers must take steps for badges to avoid being shipped off to the island of misfit ed-tech. Two key changes that must happen at the outset involve awareness and policy.
Awareness

In a sense, badges are something of a paradox. They are not well known as an academic credential, yet it seems *everyone* is issuing a digital badge. Much more needs to be done to increase awareness about Instructional Management System (IMS) Global Learning Consortium’s (e.g., Global) efforts to develop the academic digital badging ecosphere (IMS Global, 2018). More badging research and presentation of that research is needed. Presentations at academic conferences raise awareness among faculty. Presenting at industry conferences helps registrars, instructional designers, and curriculum designers see the possibilities of badging. Partnerships between universities and businesses offer another avenue to raise awareness among employers. Badging is already a feature available on many learning management systems, but few faculty understand the applicability of badges for student employment prospects. Badging workshops can raise awareness and develop the necessary skills for faculty and staff to create badging strategies. Badging needs a champion to help stakeholders see the value of them.

The champion needs to advocate diligently for badges and create a sense of urgency. Given the dim prospects of fewer traditional students for higher education, badges present an opportunity for the large pool of adult learners seeking life-long learning. Badging also needs a champion to push policy changes necessary to support the systemic possibilities a badging system offers.

Policies

Policy changes at the federal, state, and institutional levels are needed to support a badging architecture. Perhaps the most important needed federal policy change regarding badges is tied to one of the key problems in higher education today—financial aid. As of this writing, a student must be full-time (a minimum of 12 credit hours per term) to qualify for U.S. financial
aid. If the United States hopes to have life-long learners, then funding policies should support this goal. Other federal programs, such as the Post 9/11 Government Issue (GI) Bill, need to be more flexible to support badging offerings. Government-backed micro-student loans are needed to help learners who are continuing their education through university issued digital badges.

At the state level, policy change could include badge development funds as part of unemployment assistance to help the unemployed with earning badges so that they can gain skills to compete better in the changing job market. Also, states could look to develop badging databases to allow for the state’s public institutions to automatically accept badges issued from entities like companies, the military, and other educational institutions that align with agreed-upon outcomes. The badges could include pre-determined credits (or micro-credits) allowing for a more consistent prior learning assessment.

Institutionally, changes will need to be made by several stakeholders. Universities need to create policies that promote competency-based education to align with the badging approach. Also, universities should re-think policies concerning course offerings and faculty load to accommodate the micro-nature of badges. Companies will need to change policies concerning tuition remission to allow for pursuit of badges in addition to degree programs. Accrediting agencies also need to reconsider credit-bearing policies for digital badges. Policies around the minimum number of credits a university can offer for a course (0.5 credits) may need to be adjusted to allow for the micro nature of digital badges where a single badge may only account for 1/10 of a credit hour, but 10 could be stacked to form a full credit hour.

Along these lines, universities will need to think about students who withdraw, drop, or earn an incomplete in a badged course. Badges will allow for partial credit in a traditional course. If a student withdraws, the student would only need to complete the unfinished badges instead of
having to repeat the entire course. Badges also allow for new creative mixtures of degree majors and minors, using in-class learning and out of class experiences, resulting in a highly personalized educational outcome. University partnerships with businesses also will yield badging opportunities through internships and business certifications, such as Anaplan’s university certificate program. These partnerships might provide the ideal place to begin testing credential expirations. Badges also may be part of a pre-requisite program, like the one used by Belgium’s BeCode’s no-cost coding boot camp.

Earning a college degree becomes a permanent part of one’s record. In a world with a rapid pace of change, it is naïve to believe that a little learning early in life will suffice for one’s career. Badging, however, provides a new way to think about learning that goes beyond the classroom and includes other experiences and achievements. The ability to expire a badge is a profound change for educational institutions. A university degree program supplemented with digital badges allows for parts of a permanent record to expire, requiring the learner to recertify to stay current in certain competencies. The currency of one’s academic currency may shift the notion of life-long learning from an idea to practice. The expiration of university verified competencies and knowledge could be vital in saving smaller colleges dealing with smaller tuition pools because of lower populations of traditional-aged students.

Academic digital badges also present an opportunity regarding higher education’s most static artifact—the transcript. General systems theory teaches that structure drives behavior (Meadows, 2008). Changing the structure of the transcript, the academic coin of the realm, from a permanent institutionally-held, paper-based artifact to one that includes privately-held, digital-badges has the potential to create a genuine paradigm shift in educational behavior.
Academic digital badges show much potential in terms of recording academic outcomes and promoting life-long learning. Whether badges become transformational or transitory depends on deliberate actions by influential decision-makers. Awareness of badges must be increased to key stakeholders. A badging champion with a keen sense of urgency is needed to move badges from neat idea to disruptive technology. Second, policies must be altered to create the types of processes and support needed to realize the potential of a badged educational system. There is not a question of whether badges will present an opportunity if they transpire; badges are transpiring. The question is, *what will higher education do with the opportunities badges present.*

**References**


Fuller, J. B., & Raman, M. (2017). Dismissed by degrees: How degree inflation is undermining US competitiveness and hurting America’s middle class. *Published by Accenture, Grads*


LoDolce, R. (2015). College out of the box: How you can graduate from high school & college at the same time! Publisher: Author.


