Digital Badge Metadata: A Case Study in Quality Assurance

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Abstract

Digital badges are competency-based credentials that provide specific information within their metadata. However, there appears to be no research investigating the quality of the information conveyed in the metadata. To better understand how to convey the value of digital badges, this study investigated the metadata quality using mixed-method content analysis on the digital badges developed in a micro-certification pilot project. The results revealed similarities in metadata location but differences between curriculum expectations. This study found that metadata information's type and location may affect the perceived value of digital badges. Building on the research on assurance, this study suggests reimagining the learning experience to support digital badges as a new credential.

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*Original Research Articles are papers that report on original empirical research with a focus on teaching and learning. Papers may be qualitative or quantitative and include an Abstract, Introduction, Method, Results, Discussion, and Reference section, as well as any tables and/or figures.

INTRODUCTION

Digital badges are a new form of digital credentialing gaining popularity in higher education institutions. Like businesses awarding points to their customers, educators designed digital badges to reward students for their learning (Coronado, 2020; Mozilla Foundation, 2011). They differ from conventional credentials in that they contain verifiable evidence describing the skills or competencies achieved, embedded within the digital badge in the form of links. Furthermore, since they are a digital credential, the badges are in the control of the earner and can be easily shared online via social media. (Hickey, 2015; IMG Global, 2020; Open Badges, 2020).

Developed originally in the United States, higher education institutions in Ontario have recently begun to adopt digital badges. In 2013, the Mozilla Foundation created the open badge standard, which outlined the first set of guidelines for developing digital badges. By 2015, major companies such as IBM, Pearson, and Microsoft created their industry-specific learning pathways (Open Badges, 2020). And shortly after, education organizations like eCampusOntario   and higher education institutions in Ontario started to develop digital badges to meet short-term, industry-specific learning needs within the province.

eCampusOntario started an Educational Technology Sandbox with new digital badging technology, testing the use of digital badges with eight Ontario post-secondary institutions to develop a framework for other institutions (eCampusOntario, 2019). The number of institutions using digital badges has doubled with the help of two additional pilot projects by eCampusOntario (2020).

One reason for the adoption of digital badges is their ability to credential skills. For example, in a 30 funded pilot projects study, Hickey and Chartrand (2020) investigated how institutions were using badges to credential skills. They found four different methods of credentialing. Participants could earn a badge by demonstrating a skill, participating in an experience, completing a project, or a hybrid of the previous three. Like how Boy and Girl Scouts receive badges for developing a new skill, higher education institutions now have a tool to recognize skills gained to workplace needs and present this evidence in a public and open way.

Digital badges have a unique feature that recognizes the skills achieved called metadata. Since these badges are digital, developers can embed information such as the standards achieved, tasks, artifacts created, and the quality of experience (Gibson et al., 2015). This information is known as metadata, which represents data about the credential. Therefore, digital badges provide unique value because of their ability to display the skill developed by the earner in detail.

Even though the metadata provides valuable information about the skill developed, the value of digital badges is still in question. There have been several studies investigating the perceived value of digital badges. But without a framework describing the value of digital badges, stakeholders such as earners, employers, and institutions question their value (Devedži & Jovanovi, 2015; Dyjur and Lindstrom, 2017; eCampusOntario, 2019; Hickey et al., 2015). Grant et al. (2016) suggests that the lack of a central authority governing the quality of digital badges has contributed to this uncertainty. Part of this issue is the definition of quality, but this paper takes Weingarten's (2018) simplified approach in describing "whether these desired qualifications and learning outcomes are actually achieved." Moreover, with no central authority assuring the quality of digital badges in Ontario, it is essential to understand how to convey their value as adoption increases.

Decentralizing the authority of badges may be an asset to digital badges. Different stakeholders with different values may require alternative expectations for them. But, to better understand how to convey the value of digital badges, this paper investigates how badges convey the relationship between learning and skills.

One crucial area to investigate is the metadata's quality. All badges provide specific information for the metadata issued for them. However, there appears to be limited research investigating the quality value of the information conveyed in the metadata, and none within the context of Ontario.

This study investigates the quality of the metadata by exploring two questions:

1. What are the similarities and differences between the metadata of digital badges?
2. Is the information provided in the metadata relevant to stakeholder's understanding of value?

By exploring the quality of information conveyed by digital badge metadata, this study hopes to add to the body of research on digital badge metadata design.

LITERATURE REVIEW

The perceived value of digital badges tends to vary between stakeholders. For example, some stakeholders are optimistic about digital badges' ability to track and visualize different learning pathways (Pitt et al., 2019). In some cases, stakeholders are divided on their perception, where some see them as innovative, whereas others see them as less prestigious than certificates of completion (Dyjur & Lindstrom, 2017). Although in other cases, earners, faculty, and employers do not understand the value of digital badges (eCampusOntario, 2019).

This difference in perception may be due to the varying usage of digital badges. For example, Hickey and Chartrand (2020) defined four types of digital badges. A competency badge for demonstrating specific competencies; a participation badge for engaging in social learning; a completion badge for individuals completing projects or investigations; a hybrid badge for multiple types of learning.

Across each of the four types of digital badges, there is the potential for further variance. West and Randall (2016) described the badges as lightweight or heavyweight, depending on the criteria' rigor and assessment. Also, the scope badges can support at a local level or upwards to a global level. With so much variability, the varying perception of digital badges may be due to the inconsistency of digital badge expectations.

Applying quality assurance frameworks to digital badges may help with their varying perception and usage. Generally, quality assurance refers to measuring whether desired learning outcomes have been achieved (Weingarten, 2018). Research in quality assurance happens at nearly every level and credential in the field of education: secondary school (Spruit & Adriana, 2015), higher education (Skolnik, 2016), professional schools (Ingvarson & Rowley, 2017). However, since digital badges are a reasonably new credential, there appears to be less research investigating how to ensure quality.

Providing a framework for design and implementation has been shown to improve the quality of digital badges. For example, Derryberry et al. (2016) investigated how badges can be recognized and accepted within education ecosystems. They found that several elements are needed. There needs to be a process for verification, authentication, and validation. Also, there needs to be a respected endorser supporting this process. Their work suggests that badges developed in this process are likely to be perceived as credible.

Design and implementation frameworks support the development of well-constructed digital badges but adding standards may help with the credibility of digital badges. Pitt et al.

(2019) investigated the credibility of digital badges from college admission officers' perspectives. First, they were concerned with the credibility of the endorsers. If the endorsers who authorized the badge was not credible, then the badge was perceived as of lower quality. Second, they were concerned with the standard of badge completion. Since the standard for achieving a badge is unregulated, then its value is put into question. Their argument suggests that the credibility of digital badges may improve with credible standards due to their novelty.

In Ontario, the Ontario Qualification Framework (OQF) sets the standards for post-secondary credentials. The OQF provides the specifications for knowledge and skills for every credential in Ontario. Created by the Postsecondary Education Quality Assessment Board in 2002, the OQF specifies the qualifications offered by post-secondary institutions and other authorized providers. Also, the OQF describes in detail the full range of post-secondary credentials in Ontario (Ministry of Colleges and Universities, 2018a).

Institutions use the standards set by the OQF to quality assure their programs. Every new post-secondary credential in Ontario must follow the standards set out by the OQF. By starting from the same base standard, every credential should meet the same learning outcomes.

These same learning outcomes set the baseline for quality assurance of current credentials. This relationship between standards and quality assurance ensures that a credential earned in Ontario is the same quality regardless of the institution.

These standards also apply to the transfer of domestic and international credentials. For example, if a student is changing schools, the standards of the OQF are used to identify which credits are transferable. This process also applies to internationally trained professionals trying to work in Ontario. If their credential meets the OQF standards, they will be allowed to practice in their field (Canadian Information Centre for International Credentials, 2020).

Since digital badges are not a part of the OQF, it is currently not possible to quality assure them against a standard in Ontario. Digital badges have a section that identifies an industry partner/external body that endorses the competency (eCampusOntario, 2021), but this validation is industry-specific and only applies to that badge. The OQF includes certificates, diplomas, advanced diplomas, post-graduate diplomas, bachelor's degrees, master's degrees, and doctoral degrees (Ministry of College and Universities, 2018b). Each of these credentials have different standards and expectations for quality assurance. Digital badges are currently not included, but they may be in the future.

For digital badges to be a part of the OQF, they require standards. If digital badges had their own set of standards, their value would be consistent across all Ontario institutions. Some standards do exist for different aspects of digital badges, which we will explore.

IMG Global Learning Consortium, and formerly Mozilla, leads the development of the open badge standard. These standards set the specifications for developing a badge and are available for anybody to use. Its second iteration, Open Badges 2.0, describes the standard method to package and embed information into digital badges (IMG Global Learning Consortium, 2020). The specifications ensure that all badges that follow this method have the same digital structure, allowing for universal integration into existing learning management systems and social media platforms.

By specifying the underlying code of digital badges, organizations now have a base to develop frameworks. For example, eCampusOntario has undertaken the task of expanding the use of digital badges in Ontario. In partnership with a working group, they created the Micro-certification Principles and Framework, which provides a common provincial framework for developing micro-certifications. Using the Open Badge standard for their digital badges, they were able to test and modify their framework.

Standards and frameworks support the construction of digital badges, but they do not assure their quality. For example, every qualification in the OQF states the typical duration for the credential (e.g., a certificate 1 is at least 40 hours of instruction). Neither Open Badges 2.0 nor the Micro-certification Principles and Framework sets guidelines for the duration of a digital badge. Even though the administration uses program duration for other needs (e.g., student number estimates), they provide both students and employers an idea of the amount of work completed. Without these guidelines, future earners can participate in vastly different instructional hours and yet earn the same digital badge.

To ensure digital badge quality, standards for content are necessary. Currently, the International Association of Continuing Education and Training (IACET) is developing digital badge standards. The IACET is presently working on a set of guidelines for metadata detail. These guidelines are not yet complete, but they believe their standards will support the quality assurance process in the future.

Also, credential standards are not new to post-secondary institutions. For example, the Credential Validation Service (2021) ensures that credentials issued by Ontario colleges meet sufficient rigor and credibility by comparing the program outcomes against specific standards.

Even though standards are important, there are other issues with digital badges.

Over time, the credibility of digital badges may improve with the addition of more content-related standards. However, experts argue that credibility does not have to do with the content but with the usage of digital badges.

The current job market is rapidly changing, pushing higher education institutions to adapt their delivery methods. The StrategyCorp Institution of Public Policy and Economy released a white paper with recommendations to promote economic recovery (Davidson & Ruparell, 2020). Their research suggests that automation will take over large parts of the economy, so Ontario's future workforce must develop their skills for the work of tomorrow. Ontario's institutions need to be able to adapt quickly to address market demand.

In a rapidly changing job market, small and quick credentials like micro-credentials may be the solution. Students earn micro-credentials by learning specific competencies. Also, by combining them, they can achieve a full qualification (Pichette & Rizk, 2020). Since competencies are often synonymous with skills, digital badges are the credentialing tool of choice because of their ability to display this information in the metadata. In combination, experts believe that micro-credentials and digital badges present a potential solution to the changing job market.

Even though smaller credentials may fill this gap, some experts believe they may create another problem. For example, unions have criticized Davidson and Ruparell's paper and believe that their vision promotes the gig economy, offering precarious, impermanent work (Ontario Public Service Employee Union, 2020). They think by promoting micro-credentials, institutions will be creating a continuous loop of training for precarious jobs. Instead of focusing on building a foundation of knowledge, the fear is that workers are trained only for short-term work instead of stable, full-time employment.

Besides influencing problems such as the gig economy, digital badges also influence student motivation. Research has shown that digital badges may positively affect student motivation to learn (Abramovich et al., 2013). Critics believe that badges motivate students for the wrong reasons (Resnick, 2012). Motivation to earn badges may undermine the content being learned by shifting the focus from learning the information to accumulating badges.

Even though digital badges have their shortcomings, many still believe in their potential. In their 2019-2020 annual report, the Ministry of Colleges and Universities set out their plans and priorities for the upcoming year. In 2019, the government changed its skills training programs to help job seekers reskill for new jobs. One solution proposed is micro-credentials and digital badges.

Micro-credentials are "a certification of assessed learning associated with a specific and relevant skill or competency" (eCampusOntario, 2021). When an earner completes a micro-credential, they receive a digital badge. Currently, eCampusOntario is developing a framework to help institutions align to a common provincial framework. As more institutions build micro-credentials, digital badges will likely increase. Hence, it is essential to perform further research on the quality assurance of digital badges.

The OQF sets the value of every post-secondary credential in Ontario using descriptions and standards. The descriptions section of the framework outlines the purpose, length, admission requirements, providers, and the qualifications awarded for each credential. The standards section the depth and breadth of knowledge; conceptual and methodological awareness/research; communication skills; application of knowledge; professional capacity/autonomy; awareness of limits of knowledge. Combining the descriptions and standards identifies each qualification's primary purpose and represents a benchmark along the continuum of credentials (Ministry of Colleges and Universities, 2018).

This study uses these benchmarks as a conceptual framework. Since the OQF descriptions and standards define every post-secondary credential, this study uses the same. By investigating the metadata using these categories, this study hopes to understand if the metadata provides adequate information to meet the criteria of the OQF.

This study will use a digital badge pilot project as a case study. In 2019, eCampusOntario ran a pilot project developing micro-certifications using digital badges. Each project constructed a digital badge using the framework created by eCampusOntario. This study hopes to add to the research on digital badge quality assurance by investigating if developers in this pilot project are providing sufficient information to meet the criteria of the OQF. This study also hopes to add to the research by exploring the similarities and differences between the metadata to find patterns of good practice.

METHODOLOGY

To better understand how to convey the value of digital badges, it is crucial to investigate the quality of the metadata.

All digital badges provide program-specific information within their metadata. However, there appears to be no research investigating the quality and value of the metadata information conveyed.

This research aims to fill this gap by performing a case study on a digital badge pilot project, using a mixed-methods content analysis design, to answer the following questions:

- What are the similarities and differences between the metadata of digital badges?
- Is the information provided in the metadata relevant to stakeholder's understanding of value?

Research Design

This case study used mixed-method content analysis to investigate metadata quality. Since digital badges are text-based, other methods such as discourse analysis and textual analysis are possible. But the content analysis method determines the presence of words, themes, or concepts from qualitative data; this method allows researchers to quantify and analyze the presence of meaning and relationships (Columbia Public Health, 2019).

This study used the OQF description and standards for its content analysis scoring. Also, to understand the digital development process, developers participated in an open-ended survey or interview.

Data Collection & Analysis

For the content analysis, this study will use the criteria set by the OQF. The OQF consists of five descriptions and another five standards:

- OQF descriptions
  - Purpose
  - Length
  - Admission Requirements
  - Provider
  - Qualification Awarded
- OQF standards:
  - Depth and breadth of knowledge
  - Conceptual and methodological awareness/ research
  - Communication skills
  - Application of knowledge
  - Professional capacity/autonomy

The content analysis scoring method used a range from **0** to **2**.

- **0**: If there was no evidence of the criteria in the metadata.
- **1**: if there was evidence to infer the criteria in the metadata.
- **2**: if the metadata explicitly explained the criteria.

In addition to the content analysis, this study will use open-ended surveys or interviews.

The survey and interview consisted of the same eight questions:

1. What was your experience explaining digital badges to your stakeholders (i.e., faculty, employers, earners)? Did they understand the value, or did they require some convincing?
2. Besides the headings provided by the BC Diploma for the metadata, did you use any frameworks to decide which information to provide?
3. For the pilot project, did you create one badge, or did you create a set of digital badges?
4. Can you describe your assessment?
5. Can you explain how your assessment demonstrates the skills/competencies in your course?
6. Did you use the evidence feature of the digital badge?
   - If yes, what type of evidence did you provide? Where was the information saved?
   - If no, why did you not include any evidence?
7. Do you believe your stakeholders (i.e., faculty, employers, earners) were very interested in digital badges?
8. Did you have any other issues with your digital badge?

The goal of these open-ended questions was to understand the decisions behind the metadata presented.

Participants

Participants in this case study were a part of a micro-certification pilot project by eCampusOntario (2019). The investigator contacted each of the 14 institutions to participate in this case study. Five institutions were removed from this study because they could not complete the project and create digital badges. Another three institutions decided not to participate in the case study.

For the analysis, the digital badges were publicly available through the badge issuing company. Four institutions participated in the open-ended interview, and the remaining two participated in the open-ended survey.

Limitations

The main limitation of this case study was the small sample size. Only nine of the fourteen institutions developed digital badges. Of those nine, only six participated in this study. Therefore, due to the limited number of participants, there is low generalizability from this study's findings.

In addition, the method in this study had its limitations. For example, having multiple digital badge assessors would improve the reliability of the analysis and minimize bias.

RESULTS

Ontario Qualification Framework Descriptions

This investigation analyzed the content within digital badge metadata to find similarities and differences in quality. The first

phase of the content analysis focused on the OQF descriptions (Table 1). Each badge represents a different institution, teaching other skills.

Table 1: *Content analysis using the OQF qualification description*

Scoring:
- **0**: If there was no evidence of the criteria in the metadata.
- **1**: if there was evidence to infer the criteria in the metadata.
- **2**: if the metadata explicitly explained the criteria.

QUALIFICATION DESCRIPTION	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Institution 6
Overall program design and outcome emphasis	2	2	2	2	2	2
Preparation for employment and further study	2	1	1	2	2	1
Typical duration	0	0	1	1	0	1
Admission requirement	0	0	0	0	0	0
Qualification	2	2	2	2	2	2

The content analysis of digital badges using the OQF descriptions found two categories clearly explained. All six badges clearly explained the Overall Program Design and Outcome Emphasis and Qualification.

This study found three OQF description categories unclear. Three badges clearly explained the Preparation for Employment and Further Study, but the other three were incomplete. Only one badge clearly explained the Typical Duration, but two badges needed inference, and three provided no evidence. Also, no digital badges provided any evidence of Admission Requirements.

Ontario Qualification Framework Standards

The second phase of the content analysis focused on OQF standards (table 2).

Table 2: *Content analysis using the OQF qualification standards*

QUALIFICATION DESCRIPTION	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Institution 6
Depth and breadth of knowledge	2	2	2	2	2	2
Conceptual and methodological awareness / Research and scholarship	1	2	1	1	1	2
Communication skills	1	2	1	1	1	0
Application of knowledge	1	1	1	1	2	1
Awareness of limit of knowledge	1	1	0	1	0	0

The content analysis of digital badges using the OQF standards found only one category clearly explained. All six badges clearly explained the Depth and Breadth of Knowledge.

This study found five OQF standard categories unclear. Conceptual and Methodological Awareness/Research and Scholarship and Professional Capacity/Autonomy had two badges clearly explaining these categories. Only one badge clearly explained Communication Skills and Application of Knowledge. Also, no badges clearly explained Awareness of Limit of Knowledge.

Location Of Evidence Within The Metadata

This study also identified the location of category evidence within the metadata.

This study found that the location of evidence was similar between the digital badges. All six digital badges provided evidence in the same location for five categories (Preparation for Employment and Further Study; Typical Duration; Application of Knowledge; Qualification; Application of Knowledge; and Awareness of Limit of Knowledge). Four categories (Overall Program Design and Outcome Emphasis; Depth and Breadth of Knowledge; Conceptual and Methodological Awareness/ Research and Scholarship; Communication Skills) had five of six badges providing evidence in the same location. Moreover, only one category provided evidence in three different locations (Professional Capacity/Autonomy).

Also, none of the badges used the evidence feature of the metadata. The evidence feature provides a link for developers to embed examples of the assessment completed by earners. Most developers did not use the evidence feature because they did not have the resources. First, there was no service available to upload evidence. Second, most badges used a quiz or a test to evaluate the students. These developers wanted additional training on creating different assessments that could provide better visibility of the skills achieved, rather than posting the tests' scores.

DISCUSSION

This study found that institutions are interested in increasing their use of digital badges. In the interviews and surveys, developers

Table 3: *Content location within the metadata using the OQF qualification description*

QUALIFICATION STANDARD	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Institution 6
Overall program design and outcome emphasis	Title	Outcomes	Title	Title	Title	Title
Preparation for employment and further study	Outcomes	Outcomes	Outcomes	Outcomes	Outcomes	Outcomes
Typical duration	Assessment	None	Assessment	Assessment	Assessment	Assessment
Admission requirement	none	none	none	none	none	none
Qualification	Title	Title	Title	Title	Title	Title

Table 4: *Content location using the OQF qualification description*

QUALIFICATION STANDARD	Institution 1	Institution 2	Institution 3	Institution 4	Institution 5	Institution 6
Depth and breadth of knowledge	Title	Outcomes	Outcome	Outcomes	Outcomes	Outcomes
Conceptual and methodological awareness / Research and scholarship	Competency / skill	Competency / skill	Competency / skill	Outcomes	Competency / skill	Competency / skill
Communication skills	Competency / skill	Competency / skill	Competency / skill	Competency / skill	Outcomes	None
Application of knowledge	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment
Professional capacity/ autonomy	Component of	Component of	Outcomes	Component of	Competency / skill	None
Awareness of limit of knowledge	Component of	Component of	none	Component of	None	None

expressed that their institutions were supporting them in this pilot project. Most projects decided to start with only one digital badge. So, they focused on the quality of the badge rather than the quantity.

Even though there is interest, institutions are still learning about digital badges. For institutions and industry partners who were new, developers mentioned that they had to teach them about digital badges. Although, once they understood the concept, they were interested in participating.

As more institutions adopt digital badges, this study maintains the importance of industry partner endorsement. For example, one institution worked with industry partners who could not provide sufficient professional development for their employees. Because of this need, they were willing to join the project and further promote their employees' badges. Therefore, this paper reiterates the importance of industry support for digital badge development.

Relevancy Of Metadata Information

This study found that the metadata lacked sufficient information to convey their value. All the digital badges clearly explained only three of the eleven OQF categories. For the other eight categories, stakeholders must infer the evidence, or there was no evidence at all. Since most categories were not clear, this study argues that the digital badges in this pilot project did not have sufficient information to convey their value.

Although more research is needed because of the small sample size, only nine of the fourteen institutions completed the project. Furthermore, of those nine, only six participated in this study. Therefore, readers must note that this was a small sample size, and there is limited generalizability in Ontario from these findings.

Even though the sample size is small, the evidence suggests that the missing information may contribute to stakeholders' misunderstanding of digital badge value. The OQF categories distinguish between different credentials and their value. Since digital badges do not clearly explain all of these categories, it is not easy to determine the value between different digital badges and other credentials.

Metadata Similarities

The location of evidence within the metadata was similar between digital badges. For 10 of 11 categories, the evidence location was in the same location for at least five out of the six badges.

Even though the location was consistent, there was one category missing. The category of admission requirements was not in the metadata. Even though significant, it was not an expectation for developers to include this information.

The evidence from this study suggests that digital badges can hold all of the information in the OQF. In the future, the OQF can be applied to the metadata sections to provide information that conveys the digital badge's value.

Metadata Differences

One significant difference between the metadata was the amount of content taught. For example, one digital badge requires an earner to complete five self-paced modules, whereas another had to complete an entire course with a co-op work term. In another example, one digital badge requires earners to complete three assignments and two quizzes, whereas another requires only one summative assessment.

The variability in the curriculum may be due to the lack of standards for digital badges. Even though each digital badge in this pilot project followed the framework set by eCampusOntario, there were no guidelines for the course structure. Therefore, the lack of curriculum standards for digital badges may influence the variability in expectations.

This study suggests that the difference in expectations may contribute to the lack of understanding of digital badge value. For each credential in the OQF, the expectations in workload are the same. For example, every certificate has no more than 700 instructional hours. In the case of the badges in this study, the number of hours varied. Since the workload is not the same for each digital badge, their perceived value may differ according to their expectations.

Future Outlook Of Digital Badges In Ontario

Currently, digital badges are recreating the traditional classroom experience. Some digital badges were indistinguishable from a traditional in-person class format with the same assessment requirements (i.e., quiz and assignments). In other cases, part of the badge expectation was to complete an actual credit post-secondary course.

To take full advantage of digital badges, developers may benefit from reimagining the classroom experience. For example, no digital badges used the evidence feature. This feature is one of the unique features of digital badges, allowing earners to show their accomplishments. Since the standard credential does not require posting evidence, most developers were unsure how to do this.

The evidence suggests that developers need to reimagine the learning experience to support digital badges as a new credential. From the interviews and surveys, developers expressed help in reimagining their courses to better use the badges' abilities. If developers transport the typical course from a paper credential to a digital badge, there is no additional value other than its portability. Therefore, having well-defined metadata following OQF criteria may increase the credibility of the digital badges.

Future Research

Building on the digital badge quality assurance research, this study suggests developing standards for the metadata. Since 10 of the 11 categories were consistently within the metadata, this study suggests that digital badges can hold all OQF categories.

The results of this study recommend placing the OQF categories in the sections outlined in table 5.

In addition to standardizing the location of evidence, this study also suggests standardizing the metadata's content. Only three of the eleven categories were well described. If there was guidance on how to write each section so that the information meets the OQF categories' expectations, then the metadata will better convey its value to stakeholders.

TABLE 5: *OQF category and location of evidence best suited for metadata*

OQF CATEGORY	METADATA LOCATION
Overall program design and outcome emphasis	Title
Preparation for employment and further study	Outcomes
Typical duration	Assessment
Admission requirement	none
Qualification	Title
Depth and breadth of knowledge	Title
Conceptual and methodological awareness / Research and scholarship	Competency / skill
Communication skills	Competency / skill
Application of knowledge	Assessment
Professional capacity/autonomy	Component of
Awareness of limit of knowledge	Component of

CONCLUSION

This study sought to investigate the quality of digital metadata, using the OQF as a conceptual framework. The evidence suggests that stakeholders may be misunderstanding the value of digital badges because of missing information and inconsistent workload. Also, this study found that the metadata can hold all of the evidence related to the OQF. For these reasons, this study suggests developing standards for digital badges in line with the OQF categories and placing them within the metadata.

One limitation, though, was the small sample size for this case study. Only six of the fourteen institutions of the pilot project participated in this case study. Therefore, another investigation with a larger sample size will further the research.

In addition to quality assurance, the results from this study suggest that developers should reimagine their course content and assessments for digital badges. The institutions in this study were unable to use all of the digital badge features. Institutions relied on traditional classroom formats, which did not translate to the evidence feature. If developers start to design new forms of learning and assessments, digital badges may carve a unique credentialing niche.

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