Utilising Digital Badges in Higher Education. A Pilot Case Study Analysing their Influence on University Students

Federica Pelizzari, Simona Ferrari*

Abstract

The use of digital badges in education has gained popularity in recent years, offering a novel way to recognize and certify students' competences and learning outcomes. These badges are akin to physical awards, but they can be shared online, making them accessible to potential employers and higher education institutions. A significant feature of digital badges is the detailed description of skills they represent, which enhances their transparency and value. Research has delved into the benefits and challenges of implementing digital badges, examining their impact on student motivation, learning, assessment, and best practices in design and implementation. Digital badges provide immediate feedback, thus promoting engagement and participation. They can also be "open" or "stackable," motivating students to pursue long-term learning goals. However, the implementation of digital badges presents challenges. To ensure integrity, digital badges must have clear and reliable criteria, and stakeholders should validate their design. Good practices include student involvement in design, collaboration with industry experts, and the use of reliable technologies.

This case study, as part of a master's degree program, found that students questioned the value of badges, emphasizing that they require teacher emphasis to be motivating and do not necessarily reflect skills attained. This study aligns with students' preference for learning without the need for tangible rewards, highlighting how badges can be complementary but not essential to the learning process. The research indicates the importance of further evaluation and

* Università Cattolica del Sacro Cuore (Italy), e-mail: federica.pelizzari@unicatt.it.
The authors collaboratively developed this article. F.P. contributed to Section 1, "Introduction", 2.2 "The Case Study and its Methodology", 3. "Results" and 4. "Discussion and Conclusions"; S.F. authored Section 2.1 "The context of Media Education Master's Degree".

Excellence and Innovation in Learning and Teaching (ISSNe 2499-507X), 2025, 1

Doi: 10.3280/exioa1-2025oa20582

improvement of digital badge implementation to maximize their educational impact.
Keywords: Digital badge, higher education, competences, lifelong learning, open learning

Article submitted: 25/08/2024; accepted: 23/06/2025

1. Introduction

Recent years have witnessed a remarkable surge in the integration of digital badges into the field of education. This trend has not gone unnoticed within the scientific community, and this innovative approach to credentialing has garnered significant attention and discussion. Digital badges serve as dynamic, visual representations of an individual's acquired learning skills, achievements, and competencies, like physical badges or medals awarded to acknowledge skills or accomplishments (Gibson et al., 2015). They are unique in that they transcend physical constraints, and they can be readily shared through social media platforms and seamlessly integrated into digital educational curricula (Shields & Chugh, 2017).

A digital badge comprises several essential components, working in concert to ensure its credibility and authenticity. These include a distinctive image, metadata providing vital information about the badge issuer, criteria that must be met to earn the badge, and supplementary verification details. Together, these constitute a robust framework, solidifying the badge's legitimacy and value (Chucowry et al., 2021).

Digital badges can be categorized into three distinct types, each purposefully designed to acknowledge and certify specific achievements or competencies (Muilenburg & Berge, 2016):

1. Achievement badges: These are the digital counterparts of accolades awarded for completing tasks or reaching predefined milestones within a learning journey. They celebrate and recognize specific accomplishments and progress along a learning path.
2. Skill badges: These mark an individual's proficiency in a particular skill or a set of related skills and validate their competence in specific areas of expertise.
3. Participation badges: These commend an individual's active engagement and meaningful contributions within a specific learning context, acknowledging their dedication and collaborative spirit.

One of the defining characteristics of digital badges is their online visibility, allowing students to easily share their credentials with prospective employers,

higher education institutions, or any other interested parties. These badges often come with a comprehensive description of the skills acquired and the specific criteria that led to their awarding. This transparency facilitates a deeper understanding of their significance and value (Frederiksen, 2013).

The emergence of digital badges has prompted extensive research into the potential benefits and challenges that they present. Researchers have delved into topics ranging from their influence on student motivation to their impact on the learning and assessment processes (Carey & Stefaniak, 2018). Relevant investigations have also uncovered best practices for badge design and implementation, further illuminating the potential of this innovative educational tool. One particularly noteworthy feature of digital badges is that they can recognize and validate skills acquired by students beyond traditional educational settings (Abramovich, 2016). For instance, a digital badge can be awarded to acknowledge effective collaboration, creativity, or proficiency in solving complex problems. This enables students to demonstrate their unique skills to a wider audience, including potential employers and institutions of higher learning (Jones et al., 2018).

Moreover, scientific literature has underscored the pivotal role of digital badges in bolstering student motivation. These badges provide immediate and concrete feedback on student performance, thereby prompting heightened engagement and active participation (Hurst, 2015). Further, they can be designed to be "open" or "stackable," allowing students to accumulate badges progressively and effectively build an increasingly advanced skill set over time. This structured progression system has the potential to boost students' motivation to pursue long-term learning goals (Gamrat et al., 2014).

The utilization of digital badges in education offers a plethora of advantages, as elucidated by Besser and Newby (2019):

- Increased motivation and involvement: The tangible nature of digital badges constantly increases motivation and active participation among students in the learning process.
- Specific outcomes and visible skills: Digital badges enable students to tangibly display their skills, making them readily shareable with peers, educators, and prospective employers.
- Micro-credentials: Digital badges effectively break down complex skills into manageable units, facilitating a targeted approach to learning and assessment.

Digital badges are versatile tools that have applications in various educational contexts, as described by Newby and Cheng (2020):

- Validation of skills: These badges can effectively validate a broad spectrum of skills, including technical expertise, soft skills, and digital literacy.

- Lifelong learning and essential skills: Digital badges align seamlessly with the notion of lifelong learning, providing individuals a clear means to demonstrate skills acquired over their lifetime.
- Competency-based training: Digital badges are in line with competency-centered training approaches, offering clear pathways for skill acquisition.

Nonetheless, the integration of digital badges into education poses a set of significant challenges. To maintain the integrity of the assessment process, transparent and dependable criteria must be established as the foundation for awarding these badges. Various stakeholders, such as employers and academic institutions (Ostashewski & Reid, 2015), must thoroughly evaluate their design to ensure the badges' validity and recognition. Existing literature provides invaluable insights into the most effective strategies for creating and implementing digital badges, including involving students in the badge design process, fostering collaboration between faculty and industry experts to delineate evaluation standards, utilizing reliable technologies for badge management and validation, and offering badge recipients opportunities to showcase and share their achievements (Ellis et al., 2016). The decision to integrate digital badges into educational practices is supported by several motivations (Alt, 2023):

1. Personalized learning: Digital badges promote personalized learning, enabling students to focus on skills directly aligned with their goals.
2. Formative assessment: Badges can furnish real-time feedback, thus enhancing the efficacy of formative assessment strategies.
3. Reflective and metacognitive practice: Badges encourage students to reflect upon the skills they have acquired, fostering a culture of reflective and metacognitive learning.
4. Student engagement: The opportunity to earn badges promotes a sense of accomplishment and recognition among students, thereby cultivating a positive learning environment.
5. Career readiness: Digital badges provide a tangible means to display an individual's competencies to current and prospective employers, thus enhancing career readiness.
6. Data-driven insights: Collecting data on badges earned yields valuable information for improving the learning process and optimizing course design.

In higher education, digital badges serve as a potent tool for acknowledging and validating students' competencies and accomplishments, transcending the confines of traditional grade-centric assessment systems (Dyjur & Lindstrom, 2017). They could be awarded to signify the completion of specific courses, modules, or projects, or they could be earned through various activities, including workshops, projects, and collaboration with peers, or through the

attainment of specific levels of competence within a particular field of study. Understanding the impact of digital badges on students' perceptions is crucial in the evolving landscape of higher education. In recent years, digital badges have gained prominence as a novel means for recognizing and validating students' achievements and competencies (Ifenthaler et al., 2016). They have the potential to transform the traditional paradigms of teaching and assessment by providing students with tangible micro-credentials for their accomplishments.

By exploring how students perceive these digital badges, we can gain insights into their motivational factors, engagement levels, and overall satisfaction with the educational experience (Fanfarelli & McDaniel, 2019). Such insights can inform educators and institutions on how to effectively utilise digital badges to enhance teaching and assessment strategies and contribute towards the broader goal of improving the quality of higher education.

2. Materials and Methods

2.1 The context of Media Education Master's Degree

The master's degree program in Media Education at Università Cattolica del Sacro Cuore (Milano, Italy) adopts an innovative and engaging pedagogical approach, combining elements of both online and in-person instruction. This blended learning program, which accommodates a cohort of 40 students, places significant emphasis on the didactics and media education domain and has its teaching methodology rooted in the principles of the EAS method as outlined by Rivoltella in 2013. The course structure follows a well-defined pattern, combining asynchronous online learning with synchronous in-person sessions, all facilitated through Blackboard, the University's learning management system (LMS). This holistic approach is designed to maximise student engagement and facilitate comprehensive learning experiences:

1. Online video lectures and anticipatory activities: Throughout the week, students can access video lectures that lay the theoretical foundation for the respective module. These video lectures serve as the initial point of contact with the course material. In addition to passive learning, students are tasked with completing an anticipatory activity from the comfort of their homes. This individual challenge helps prepare students for the subsequent group activities conducted during in-person sessions.
2. Synchronous in-person lectures: In contrast to the online lectures, the in-person sessions span a duration of three hours. During these sessions, students actively engage in in-group activities aimed at producing cognitive

artefacts. These activities are situated within the conceptual framework introduced during the online lectures. Following the completion of group tasks, students present their resulting products, fostering collaborative learning and knowledge exchange. This is followed by a debriefing session that encourages critical reflection. To conclude the module, the lecturer provides a posteriori lecture, offering additional insights and consolidating the learning experience.

3. Webinar integration: A pivotal component of this blended learning model is the incorporation of webinars between the online and in-person teaching phases. These webinars serve a triple purpose: troubleshooting, facilitating the sharing of doubts and contributions among students, and maintaining the pace of the course. They offer a platform for real-time interaction and ensure that students remain connected and engaged throughout the learning journey.

The assessment framework employed in this program is rooted in competency-based assessment principles, drawing from the work of Boud and Falchikov (2007). The assessment structure encompasses both the in-progress evaluation and final evaluation components:

- In-progress assessment (40% weight): This comprises a series of individual and group activities. These activities are thoughtfully designed to align with the learning outcomes of the course and are distributed throughout the learning journey. They carry a weight of 40% of the overall assessment. This ongoing assessment not only monitors student progress but also provides opportunities for formative feedback and skill development.
- Final assessment (weight 60%): The final assessment component consists of a written test and a subsequent oral interview. This assessment has the greatest weight, accounting for 60% of the overall assessment. In the written test, knowledge of the course material is ascertained, while in the oral interview, students must demonstrate their ability to apply theoretical concepts in practical contexts and their capacity for critical analysis and synthesis.

In this educational context, digital badges are intricately linked to specific individual actions that students are expected to perform throughout the course. These actions are not only essential for learning but also serve as milestones for assessing students' engagement and progress. Importantly, the Blackboard platform is programmed to automatically award badges when it detects the successful completion of predefined objectives. These objectives include a range of activities and tasks, each contributing to students' overall learning experience. They include the following:

- Acceptance of the "rules of the game": To foster a sense of commitment and adherence to the course guidelines, students are initially required to accept the rules governing their participation.
- Hypervideo engagement: A key component of the course involves hypervideos, which must be viewed in their entirety. To ensure active engagement, questions embedded within these videos must be answered satisfactorily. This approach not only encourages attentiveness but also verifies comprehension.
- Review of module materials: Course materials, including supplementary reading materials and resources, are uploaded onto the Blackboard platform. To indicate engagement with these resources, students are required to mark them as "reviewed." This step underscores the importance of self-directed learning.
- Timely delivery of e-tivities: To foster time management skills and adherence to course deadlines, students must submit e-tivities within the specified time frames. This requirement promotes discipline and a commitment to coursework.
- Self-assessment proficiency: For each module, students are evaluated using self-assessment tests. To earn a badge, a score of at least 6 out of 10 points must be achieved. This not only evaluates comprehension but also encourages self-reflection and improvement.
- Attendance at classroom lectures and webinars: Active participation is further emphasized through attendance requirements. Students are expected to attend at least 70% of classroom lectures and webinars, ensuring their engagement in both in-person and virtual learning environments.
- Adherence to module timelines: To reinforce time management skills and discipline, students are encouraged to complete each module within the predefined time frames established in the course calendar.
- Successful course completion: Finally, students earn a badge upon successful completion of the entire course. This signifies their comprehensive understanding and mastery of the course content.

The integration of digital badges within the Blackboard platform, a widely used learning management system, has provided an innovative approach to tracking and rewarding students' progress and accomplishments in real time. To enhance students' awareness of their achievements and ongoing progress, a dedicated badge dashboard has been integrated into Blackboard. This dashboard functions as a digital showcase, displaying badges as they are earned. This not only acknowledges students' accomplishments but also motivates continued engagement and goal attainment.

2.2 The Case Study and its Methodology

The primary aim of this pilot case study is to examine digital badges within the context of higher education. Specifically, it seeks to comprehensively understand how students perceive digital badges and assess their potential contributions to the broader landscape of teaching and assessment practices.

The central research question guiding this study is as follows: What impact do digital badges have on students' perspectives and perceptions regarding their educational experiences in higher education?

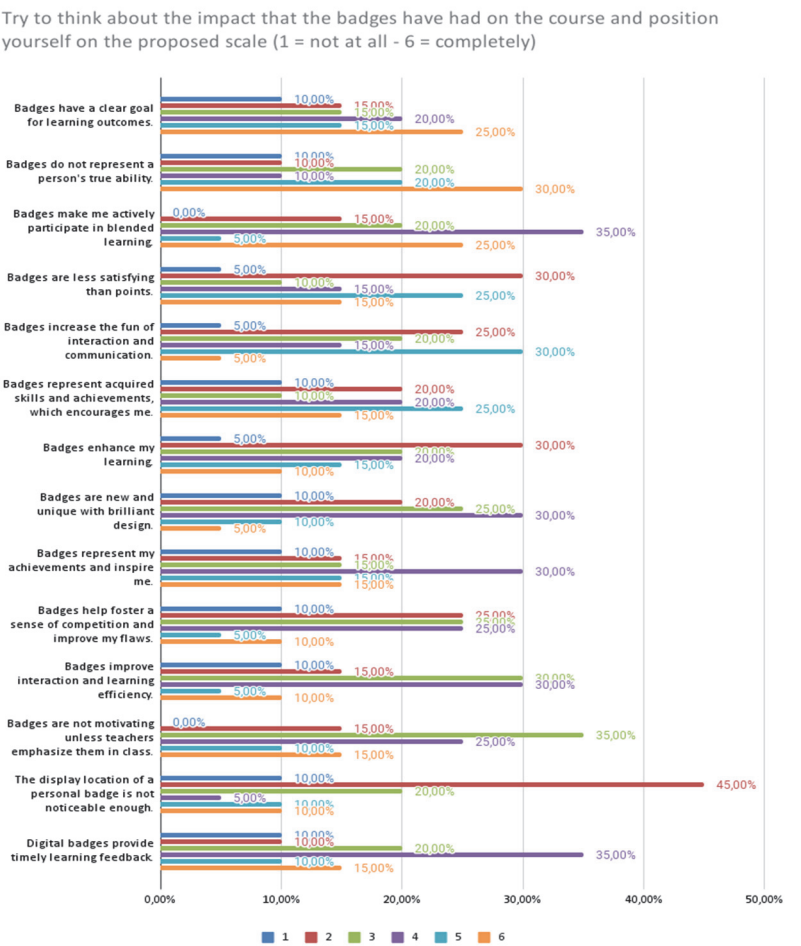
To effectively address the research question and the research objective, we employed a structured survey instrument in the form of an anonymous online questionnaire. This questionnaire, administered at the end of the course, incorporates a validated scale obtained from a prior study conducted by Zhou et al. (2019) titled "Students' Perception of Using Digital Badges in Blended Learning Classrooms". This scale has been rigorously evaluated and refined, and it demonstrates a high degree of reliability with a Cronbach's alpha coefficient of 0.886. The survey instrument was designed to collect comprehensive data regarding students' perceptions, attitudes, and experiences with digital badges in the higher education context. It constitutes a range of questions and statements that were carefully formulated to assess various facets of the students' views on the subject. Additionally, demographic information was gathered to ensure a comprehensive understanding of the diverse perspectives within the student population. Subsequently, a descriptive and inferential data analysis was conducted (Kenny et al., 2020).

Twenty students were taken from the non-representative and non-probabilistic sample, including 14 male students and 26 female students. The ages of the students were categorized into three classes, as shown in the graph below. As noted, the prevalence of students is relative to the under-30 age group (45% between 20 and 25 years of age and 35% between 26 and 30 years of age), so the data analyses involved merging the classes by dividing students aged 20–30 (80% of the students thus belonged to this class) and those aged 30 years and above (20% of the students). Twelve of them were workers (60%), and the remaining 8 were non-workers (40%). Among the workers, their main employment was noted (see the graph): 5 were full-time workers (41.7%), 4 were part-time workers (33.3%), and 3 did casual work (25%). Finally, we examined how the students applied within the universities of origin for the bachelor's degree; only 35% of them came from the Catholic University, while the others all came from universities in Northern Italy (from Milan and Turin). All students completed the questionnaire.

3. Results

Looking at the items that investigate students' feelings about the use of digital badges (on a five-point Likert scale, with 1 being "not at all" and 5 being "totally"), we find that the students and female students argued quite strongly that "badges do not represent a person's true ability". In fact, the average rating given to this statement was 4.1 out of 5. In contrast, male and female students were not satisfied with one of the features in the implementation of digital badges; the statement "The display position of a personal badge is not obvious enough" received the lowest score (2.9 out of 5).

Figure 1- Item digital badge



It is indeed very interesting how the ratings of the statements "Digital

badges provide timely feedback on learning" (3.7), "Badges are not motivating unless lecturers emphasize them" (3.75), and "Badges represent my achievements and motivate me" (3.7) represent a countertrend to the scholarly literature, which often emphasizes the great ability of badges to encourage and motivate students to proceed with their courses.

Through a more in-depth statistical analysis, it is possible to discover how the scores and thus the importance attributed to digital badges are higher among female students than their male counterparts. This difference can be seen both from Spearman's rho calculation, which reports significance at 0.01 in favor of women.

Table 1- Digital badge and sex

	Q3 - SEX:	N	Media	Dev. std.	Standard error of the mean
QF - Total DIGITALBADGE	M	14	37,20	8,228	3,680
	F	26	53,07	13,210	3,411

Table 2- Spearman's rho and sex

			Q3 - Sex:	QF - Total DIGITAL BADGE
Spearman's Rho	Q3 - Sex:	Correlation coefficient	1,000	,561*
		Sig. (Two-tailed)	.	,010
		N	40	40
	QF - Total DIGITALBADGE	Correlation coefficient	,561*	1,000
		Sig. (Two-tailed)	,010	.
		N	40	40

* The correlation is significant at the 0.05 level (two-tailed).

This trend is also evident from the analysis conducted by independent-samples t-test; in fact, female students overall gave a significantly higher score (significance 0.022) to the use of digital badges than their male counterparts.

Table 3- Independent sample testing with sex

		Levene's test for equality of variances		Test t for equality of averages						
		F	Sign.	t	gl	Sign. (two-tailed)	Differences of the mean	Difference error std.	Confidence interval of the difference of 95%.	
									Inferior	Superior
QF - Total DIGITALBADGE	Equal variances assumed	,490	,493	-2,502	18	,022	-15,867	6,341	-29,188	-2,546
	Unassumed equal variances			-3,162	11,418	,009	-15,867	5,017	-26,861	-4,873

Even more significant is the difference in the perception of badges in the responses when students and female students are divided by employment status. Spearman's rho calculation shows a significance of 0.002 in favor of non-working students. The data show that non-working students attributed significantly higher scores to the badge-based instrument compared to their counterparts in the questionnaire. This finding suggests that the implementation of badges exerted a greater motivational and educational impact on students not engaged in external employment.

Table 4- Digital badge and employment status

	Q5 - What is your current employment status?	N	Mean	Dev. std.	Standard error of the mean
QF - Total DIGITALBADGE	Student worker	24	41,92	11,107	3,206
	Non-working student	16	59,88	10,371	3,667

Finally, the independent-samples t-test analysis reveals that the total score attributed to the use and implementation of digital badges is significantly higher (significance of 0.002) for non-working students. Thus, this further confirms the observation with the previous statistical indicator, namely that non-working students attributed a significantly higher score to the badge tool than non-

working students in the questionnaire; therefore, badges had a greater impact on non-working students.

Table 5- Spearman's rho and employment status

			Q5 - Quale è il tuo status occupazionale attuale?	QF - Total DIGITAL BADGE
Spearman's Rho	Q5 - What is your current employment status?	Correlation coefficient	1,000	,638**
		Sig. (two-tailed)	.	,002
		N	40	40
	QF - Total DIGITALBADGE	Correlation coefficient	,638**	1,000
		Sig. (two-tailed)	,002	.
		N	40	40

Table 6- Independent sample testing with employment status

		Levene's test for equality of variances		Test t for equality of averages						
									Confidence interval of the difference of 95%	
		F	Sign.	t	gl	Sign. (two-tailed)	Differences of the mean	Difference error std.	Inferior	Superior
QF - Total DIGITALBADGE	Equal variances assumed	1,415	,250	-3,634	18	,002	-17,958	4,942	-28,340	-7,577
	Unassumed equal variances			-3,687	15,887	,002	-17,958	4,871	-28,290	-7,627

4. Discussion and Conclusions

The results presented in this study offer intriguing insights into the role of tangible rewards, particularly digital badges, in the educational context. Notably, these findings challenge common expectations.

First, it is essential to acknowledge that the students' motivations and reactions about digital badges are influenced by their choice of enrolling in a blended degree program. Working students opt for this program due to the flexibility it provides, which allows them to seamlessly integrate their studies with their professional commitments. In contrast, non-working students appeared less likely to express a specific preference regarding the mode of the degree program, suggesting a more flexible or neutral attitude toward different learning formats. As a result, they rely on external and extrinsic recognition to maintain their commitment and engagement (Abramovich et al., 2013). Interestingly, this reliance on extrinsic motivation is more pronounced among female students, indicating a stronger need for tangible acknowledgment of their achievements.

The findings of this study challenge the widespread assumption that external rewards consistently enhance intrinsic motivation, aligning instead with previous research suggesting that this effect is not universally valid (Deci et al., 1999). In many cases, externally administered rewards can undermine intrinsic motivation, especially when used explicitly as behavior or learning incentives (Ryan & Deci, 2016). The possession of competence is closely tied to motivation. When individuals believe they excel at a particular task, they tend to be intrinsically motivated. However, it is important to note that intrinsic motivation may wane when external factors are removed, and extrinsic motivation can sometimes hinder intrinsic motivation (Warneken & Tomasello, 2008).

Finally, this study raises several key considerations. Despite being non-generalizable because of the sample type, it underscores that learning does not inherently depend on tangible "objects" like points or badges (Rughinis, 2013). These elements are often viewed as mere symbols or progress indicators, akin to a simple "achieved / not yet achieved" checklist. Nevertheless, the impact of badges can significantly vary depending on the context. Their effectiveness as feedback and competitive incentives is more pronounced when coupled with a shared leaderboard, fostering engagement and performance improvement.

Teacher recognition and badge visibility emerge as pivotal factors (Fields, 2015). Students derive the most benefit from badges when they are acknowledged by educators and prominently displayed, through pop-up notifications or an initial dashboard. Such recognition and visibility enhance the significance of badges in the learning process.

Digital badges, although they are dispensable for learning, can be powerful tools when they are clearly aligned with specific learning objectives (Cheng et al., 2018). This alignment enhances their effectiveness in motivating students to pursue academic improvement and success, as indicated by the study's findings.

In conclusion, the evolving landscape of digital badges necessitates multifaceted research endeavors. As they continue to find their footing as transformative tools in education, such research endeavors will be instrumental in harnessing their full potential. By navigating the uncharted territories of design, recognition, motivation, long-term impact, and ethical implications, these studies will empower educators, learners, and institutions to unlock maximum benefits while adeptly managing the inherent limitations of digital badges. In this journey, research will be the guiding star illuminating the path to a brighter future for education.

References

Abramovich, S. (2016). Understanding digital badges in higher education through assessment. *On the Horizon,* 24*(1*), 126-131.

Abramovich, S., Schunn, C., & Higashi, R. M. (2013). Are badges useful in education?: It depends upon the type of badge and expertise of learner. *Educational Technology Research and Development,* 61*,* 217-232*.*

Alt, D. (2023). Who benefits from digital badges? Motivational precursors of digital badge usages in higher education*. Current Psychology,* 42*(8*), 6629-6640*.*

Besser, E. D., & Newby, T. J. (2019). Exploring the role of feedback and its impact within a digital badge system from student perspectives. *TechTrends,* 63*,* 485-495*.*

Boud, D., & Falchikov, N. (Eds.) (2007)*. Rethinking assessment in higher education: Learning for the longer term.* NY: Routledge*.*

Carey, K. L., & Stefaniak, J. E. (2018). An exploration of the utility of digital badging in higher education settings. *Educational Technology Research and Development,* 66*,* 1211-1229.

Cheng, Z., Watson, S. L., & Newby, T. J. (2018). Goal setting and open digital badges in higher education. *TechTrends,* 62*,* 190-196.

Chukowry, V., Nanuck, G., & Sungkur, R. K. (2021). The future of continuous learning–Digital badge and microcredential system using blockchain. *Global Transitions Proceedings,* 2*(2*), 355-361.

Deci, E. L., & Ryan, R. M. (2016). Optimizing students' motivation in the era of testing and pressure: A self-determination theory perspective. In *Building autonomous learners: Perspectives from research and practice using self-determination theory* (pp. 9-29). Singapore: Springer Singapore.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. Psychological bulletin*,* 125*(6*), 627.

Dyjur, P., & Lindstrom, G. (2017). Perceptions and uses of digital badges for professional learning development in higher education. *TechTrends,* 61*(4),* 386-392.

Ellis, L. E., Nunn, S. G., & Avella, J. T. (2016). *Digital badges and micro-credentials: Historical overview, motivational aspects, issues, and challenges. Foundation of*

digital badges and micro-credentials: Demonstrating and recognizing knowledge and competencies, 3-21.
Fanfarelli, J. R., & McDaniel, R. (2019). *Designing effective digital badges: Applications for learning*. NY: Routledge.
Fields, E. (2015). Making visible new learning: Professional development with open digital badge pathways. Partnership: *The Canadian Journal of Library and Information Practice and Research,* 10(1).
Frederiksen, L. (2013). Digital badges. *Public Services Quarterly,* 9*(4),* 321-325.
Gamrat, C., Zimmerman, H. T., Dudek, J., & Peck, K. (2014). Personalized workplace learning: An exploratory study on digital badging within a teacher professional development program. *British Journal of Educational Technology,* 45*(6*), 1136-1148.
Gibson, D., Ostashewski, N., Flintoff, K., Grant, S., & Knight, E. (2015). Digital badges in education. *Education and Information Technologies,* 20*,* 403-410.
Hurst, E. J. (2015). Digital badges: Beyond learning incentives. *Journal of Electronic Resources in Medical Libraries,* 12*(3*), 182-189.
Ifenthaler, D., Bellin-Mularski, N., & Mah, D. K. (2016). *Foundation of digital badges and micro-credentials*. Switzerland: Springer International Publishing.
Jones, W. M., Hope, S., & Adams, B. (2018). Teachers' perceptions of digital badges as recognition of professional development. *British Journal of Educational Technology,* 49*(3*), 427-438.
Kenny, D. A., Kashy, D. A., & Cook, W. L. (2020). *Dyadic data analysis.* NY: Guilford Publications.
Muilenburg, L. Y., & Berge, Z. L. (Eds.) (2016). *Digital badges in education: Trends, issues, and cases.* NY: Routledge.
Newby, T. J., & Cheng, Z. (2020). Instructional digital badges: Effective learning tools. *Educational Technology Research and Development,* 68*,* 1053-1067.
Ostashewski, N., & Reid, D. (2015). A history and frameworks of digital badges in education. In T. Reiners, & L. C. Woods (Eds.), *Gamification in education and business* (pp. 187–200). NY: Springer.
Rivoltella, P. C. (2013). *Fare didattica con gli EAS. Episodi di Apprendimento Situato*. Brescia: La scuola.
Rughinis, R. (2013). Talkative objects in need of interpretation. Re-thinking digital badges in education. In *CHI'13 extended abstracts on human factors in computing systems* (pp. 2099-2108).
Shields, R., & Chugh, R. (2017). Digital badges – Rewards for learning?. *Education and Information Technologies,* 22*,* 1817-1824.
Warneken, F., & Tomasello, M. (2008). Extrinsic rewards undermine altruistic tendencies in 20-month-olds. *Developmental Psychology,* 44*(6*), 1785.
Zhou, L., Chen, L., Fan, Q., & Ji, Y. (2019). Students' perception of using digital badges in blended learning classrooms. *Sustainability,* 11*(7*), 2151.