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Investigation on Open Badge and Market

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Abstract

This document investigates the transformative role of Open Badges and Blockchain technology in the educational sector, focusing on the University of Turin's (UniTo) "Premialità 2023" project. It discusses the development of a digital credential ecosystem using the Bestr platform, which employs Blockchain to ensure the transparency, security, and portability of academic credentials. The study highlights how digital credentials, particularly Open Badges, streamline the validation of skills and competencies and significantly contribute to social mobility and inclusivity. By providing a verifiable and accessible means of recognizing formal and informal learning, these technologies empower individuals from diverse backgrounds, enhancing their employability and participation in the workforce. Furthermore, the case study of UniTo showcases the potential of digital badges to bridge the gap between academic achievements and market needs, promoting a culture of continuous learning and adapting education to modern societal demands.

Keywords: Open Badges, Blockchain, Lifelong Learning, Digital Credentials, Educational Equity

1. Introduction

Technological innovation has opened up new opportunities for skills certification in the ever-changing educational environment. Among the emerging solutions, the Bestr platform is a cutting-edge digital ecosystem developed by Cineca in collaboration with MIUR and other Italian academic institutions. Bestr hosts Open Badges (OB), a standard format for the digital representation of skills that is revolutionizing how skills acquired by individuals are recognized and certified (Baratto et al., 2024). Open Badges, with their potential for transparency and portability, are becoming a benchmark for skills certification

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(Raffaghelli J.E. 2014), so much so that the Council of Rectors of Italian Universities (CRUI), in 2018 as part of its 'Digital University' initiative, has recognized the Bestr platform as a national pillar in advancing this mode of certification. Adopting open-source standards and compatibility with Mozilla technical specifications ensures transparency and standardization in the certification process, fostering a collaborative and interconnected environment. The flexibility offered by Bestr allows users to carry their credentials across different platforms, creating a more extensive and interconnected network.

This simplifies the skill validation process and boosts participation from educational institutions and organizations. Adopting systems like Blockcerts - based on blockchain technology - and Open Badges is revolutionizing the management and validation of digital credentials. Blockchain offers unprecedented security and authenticity, eliminating the risk of forgery and manipulating educational qualifications (Min C. et al., 2019). Adopting innovative solutions like Bestr and Blockcerts in a future-oriented educational landscape represents a significant step towards creating a more open, flexible, and transparent educational system (Baratto et al., 2024).

2. Bestr System

The Bestr platform was developed by Cineca, a non-profit consortium comprising 70 Italian universities, four national research centers, and the Ministry of University and Research (MIUR). It aims to support the Italian scientific community through advanced supercomputing and visualization tools. In June 2018, CRUI recognized Open Badges and the Bestr platform as a national reference point for skill certification, highlighting the growing importance of this certification method. Adopting the open-source format of Open Badges on Bestr, aligned with Mozilla's technical specifications, is a fundamental pillar for creating an open and interconnected educational ecosystem. This feature ensures transparency and standardization in the certification process and promotes a collaborative environment where skill sharing and validation are significantly facilitated (Tsou M. et al., 2011). The compatibility with other issuing and viewing platforms of Open Badges represents a critical element of this interconnectivity. Users who acquire skills on Bestr are not confined to a single "ecosystem" (here, meant as a digital credential ecosystem); instead, they can transport their badges and related certifications across various platforms that adopt the same standards. This creates a broader, more flexible network where recognized skills can be easily verified and integrated into different academic or professional contexts. The openness and interoperability promoted

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by this feature also encourage the participation of more educational institutions and organizations (Baratto et al., 2024). When skills are certified in a universally recognized format, there is no need to make costly or complex adaptations to integrate different certification systems. This simplifies the collaboration process between various entities, creating a synergy that benefits learners and training providers (La Rocca C., 2020).

Moreover, the open environment promotes transparency and trust in the certification process. Since Open Badges on Bestr follow an open standard, anyone can examine and understand the criteria and methods of skill attribution. This helps dispel doubts and uncertainties, increasing the credibility of the badges and strengthening the value of the acquired skill certification. Adopting the open-source format on Bestr is not a technical choice but a key strategy to promote innovation, collaboration, and transparency in skill certification (Spenser A., 2020). This feature creates a more open, flexible, and future-oriented educational landscape. As of spring 2020, 15% of Italian universities have issued Open Badges, constituting 70% of the total on Bestr. The widespread presence of training academies, online courses, and Massive Open Online Courses (MOOCs) offered by private entities that issue digital certifications has prompted public universities to consider adapting their degree issuance methods, considering the international impact. In this scenario, national and international universities are called to excel by adapting to the constant evolutions of technological innovations. Bestr has distributed over 644,000 badges, of which 62% come from universities and 27% from schools, and it has also recognized 50,000 university credits (ECTS). The platform participates in six significant European projects, including MIRVA, OpenAgri, OpenVM, Anpal/EDCI, DARE, and Big DATA. The main functions of Bestr include:

- Create and publish digital credentials with the ability to organize them into complex pathways.
- Exploration of badge classes and badge projects.
- Flexible Issuance of Open Badges.
- Issuance of notarized Blockcerts on the public Ethereum blockchain, in conjunction with Open Badges.
- Full integration with Digital Education platforms through standards like xAPI and RESTful APIs.
- Linking to the Student Management System (Esse3) for automatic and large-scale assignments.
- Incorporation of evidence and results from student information systems into digital credentials.
- Automatic recognition of ECTS.
- Implementing the features of the European Diploma Supplement to share and increase visibility.

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- Advanced monitoring and reporting tools for issuing organizations.

Bestr is recognized as a service provider for the IDEM and eduGAIN identity federations. It offers access to researchers, students, and technical administrative staff of major research institutions and global universities through their institutional accounts. In the Italian context, Bestr has obtained the qualification of "SaaS provider for public entities" by AgID, the national authority for digitization, and is officially listed in the AgID Cloud marketplace.

In the last five years, many higher education institutions have adopted new approaches to issuing academic qualifications, embracing innovative technologies such as Blockchain. A notable example is the University of Melbourne, which in 2017 began using Blockchain to issue digital credentials, allowing students to share verified copies of their qualifications with employers and other stakeholders, enhancing the transparency and verification of credentials. Another pioneering institution has been the State University of New York, which in 2018 successfully implemented a micro-credential system in its programs and activities with external stakeholders. This initiative enabled the recognition and validation of specific skills acquired by students, offering a more flexible approach to education.

In 2019, McMaster University became the first Canadian university to issue digital diplomas via Blockchain for graduates from the Faculty of Engineering. During the Covid-19 pandemic, the university extended the option of receiving notarized diplomas on the Blockchain to all spring session 2020 graduates, addressing the challenges of producing and distributing paper documents.

In Europe, the recovery after COVID-19 and the transition towards the Green Deal have influenced learning and working. The Council of the European Union (EU) decided in 2021, highlighting the need to address the lack of skills in the European Union market. This underscores the importance of adopting innovative approaches and advanced technologies, such as Blockchain, to improve the match between the skills acquired by students and the needs of the European market (Mikroyannidis A. et al., 2020).

Specifically, the decision 2021/1868 of the EU, issued on 10/15/2021, highlights the need to develop a coordinated strategy aimed at promoting employment among Member States and the European Union. The goal is to promote a qualified, trained, adaptable workforce and future-oriented markets. This decision aligns with the ambitious project to create the European Education Area by 2025.

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In response to this directive, the European Commission aims to establish a European approach to (micro) digital credentials to enhance learning opportunities and strengthen the role of higher education and vocational education in lifelong learning.

In particular, the Commission is working on creating the Europass Digital Credential Infrastructure (EDCI). This infrastructure facilitates the secure and efficient recognition of qualifications and other learning outcomes across Europe. Article 4, paragraph 6 of the Europass decision specifies that the EDCI supports authentication services for digital documents and representations of information on skills and qualifications. Europass's web-based tools are crucial in supporting and ensuring technical interoperability and synergies with other relevant tools and services at the Union level and, where appropriate, at the national level. This initiative aims to create a harmonized environment where information on skills and qualifications can be shared and effectively recognized across the European Union.

In this context, the EDCI represents a significant step towards creating a more integrated and flexible educational and training system capable of responding to the challenges and needs of contemporary society. Its implementation reflects the European Commission's commitment to adopting innovative solutions to improve the transparency and portability of educational and professional credentials within the European context.

2.1 Open Badge & Blockchain

The Open Badge constitutes an open technological standard defined by the Mozilla Foundation (OBI - Open Badges Infrastructure) and has achieved global diffusion, finding application in a wide range of organizations. Open Badges are represented by images on any computer, which includes metadata about the badge's skill, the recipient, the acquisition methods, and more (Vladan et al., 2015). The Open Badge has significant communication potential due to its visual component and the accessibility of its metadata. This makes it particularly portable, allowing any standard-compliant system to read and verify the metadata by accessing the digital credential-issuing platform. Bestr has adopted Open Badges as its first standard for representing competencies, recognizing their versatility and effectiveness in communicating acquired skills.

OB represents a growing phenomenon in the contemporary educational landscape, serving as a versatile tool for recognizing and certifying skills acquired by individuals in various contexts. These certifications

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are issued by a wide range of organizations, with higher education institutions awarding badges to students to certify their academic achievements and K-12 schools are issuing them to teachers for professional development (Clements K. et al., 2020). One of the challenges educational institutions face is adapting to the changing dynamics of learning that are increasingly integrated with innovative technologies and methodologies. In this context, open badges represent a dynamic and adaptable response, allowing for the flexible recognition and certification of specific skills. Adopting this practice, even in the context of extracurricular learning, as evidenced by after-school programming, highlights their adaptability to contexts outside traditional education. The assignment of badges by teachers, tutors, and trainers to individual students represents a personalized approach to skill recognition, as it motivates students by providing feedback that is tangible and visually evident. This process not only values individual achievements but can also foster an educational climate focused on engagement and personal growth. Furthermore, the widespread adoption of open badges reflects a growing awareness of recognizing skills acquired outside traditional academic pathways. This trend contributes to a cultural shift towards a more comprehensive and diversified evaluation system, considering practical and transversal skills as much as theoretical knowledge.

The Open Badge plays a multifunctional role, acting on different levels of engagement. At the individual level, it can contribute to self-esteem and stimulate self-assessment processes. Its presence at the group level manifests in the ability to recognize a step or milestone achieved in a public setting. Additionally, the Open Badge can provide teachers with valuable information about each student's choices at the institutional level, facilitating a deeper understanding of their perspectives and learning paths (Loughlin C. et al., 2017). The use of the Open Badge as an accreditation system can be examined from two perspectives. First, it can be considered a tool for describing skills, knowledge, competencies, or dispositions in more detail than formal certifications provided by degrees, like diplomas and bachelor's degrees. From this perspective, the Open Badge can offer a more articulated representation of the abilities acquired during specific training paths. Secondly, it can be used to attribute credentials to "other" learning experiences compared to formal ones, recognizing skills acquired outside traditional school contexts. The Open Badge is configured as a standard field where three categories of entities or individuals converge. The "Issuers" are entities and associations that issue badges, organizing courses or activities certified through such badges. The "Earners" are users who participate in these courses or activities, collecting

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badges as evidence of the skills acquired during the training path. The "Users" are employers or training professionals who also evaluate people by analyzing the badges earned (La Rocca C., 2020).

Badges play a fundamental role as they offer various benefits at different levels:

● At the individual level, digital badges are a powerful tool, representing a diverse set of skills and competencies acquired in various learning contexts. These easily verifiable online badges provide tangible recognition of one's skills, becoming a visible testament to an individual's abilities and enhancing their professional growth.

● At the institutional level: Badges officially recognize the learning of skills acquired through structured training activities within specific pathways. This institutional recognition adds validation and authenticity to the acquired skills, helping to build a documented trace of an individual's educational journey. Moreover, it provides institutions with a clear view of the competencies of participants in their training programs.

● At the inter-institutional level: Badges facilitate a more effective and rapid verification of competency levels. They allow for a more straightforward assessment of an individual's abilities through diverse learning experiences, which eliminates some communication barriers between different institutions. This inter-institutional verification process helps to create a more complete picture of an individual's competencies, facilitating recognition by external entities (Raffaghelli J.E. 2014).

In recent years, education has witnessed an increasing adoption of digital badges as a tool to document and validate individuals' competencies. However, despite the benefits of digital badges, challenges related to the authenticity, integrity, and security of digital credentials persist. Moreover, the need for an interoperable and standardized system for managing and validating digital badges remains a fundamental goal to ensure such credentials' maximum effectiveness and reliability in modern education. In this context, blockchain technology emerges as a potential solution to address these challenges and further optimize the use of digital credentials in education. With its decentralized structure, Blockchain represents a secure and reliable tool for ensuring the authenticity and integrity of digital credentials, allowing for transparent and verifiable management of individuals' competencies (Holotescu C., 2018). Blockchain offers the possibility of eliminating the threat of forgeries of issued degrees. Due to its nature, this technology provides high security, protecting academic documents from manipulation or counterfeiting (Avni R. et al., 2023). Blockchain is a technology that provides a publicly shared and immutable ledger,

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representing a significant step in the evolution of data management. The fundamental characteristic of Blockchain is its immutability (Hofmann F. et al., 2017). Once data has been recorded on a block of the chain, it becomes permanent and cannot be altered or deleted.

Moreover, Blockchain provides an ideal environment for integrating data analysis techniques. Thanks to its distributed structure and the availability of a complete historical record of transactions, Blockchain allows data analytics algorithms to extract useful information and identify significant patterns or trends in the data (Choi M. et al., 2019). In particular, Blockcerts are an innovative application of blockchain technology in digital credential management. Blockcerts are a standard format for the digital expression of certificates, credentials, and other types of attestations of skills or achievements. This format, developed by the MIT Media Lab, leverages blockchain technology to ensure digital credentials' authenticity, integrity, and transparency. In practice, a Blockcert is a digital certificate recorded on the Blockchain, thus creating a permanent and immutable trace of the certificate itself (Gräther W. et al., 2018). Each Blockcert contains detailed information about the attestation it represents, such as the name of the title or skill, the date of achievement, the issuing entity, and other relevant information. Registering a Blockcert on the Blockchain involves creating a transaction containing the document's digital fingerprint, or hash.

. Once this transaction has been confirmed and added to the Blockchain, the Blockcert becomes available for public and independent verification. The distinctive feature of Blockcerts is that they allow holders to share their digital credentials securely and transparently without the need for intermediaries or central authorities.

Moreover, since Blockcerts use the Blockchain, they remain immutable and resist manipulation, thus ensuring the long-term authenticity of credentials (Jirgensons M. et al., 2018). Blockcerts are an innovative way to issue, manage, and verify digital credentials using blockchain technology. This standard offers numerous advantages, including increased security, transparency, and efficiency in the accreditation and verification process of skills and achievements. Adopting open badge and notarized blockcerts systems in the Blockchain for validating degrees has become a reality in several Italian public universities. In 2019, the Universities of Padua and Milano-Bicocca were the first in Italy to use Cineca's Bestr platform, implementing open badges and blockcerts to certify academic degrees on Ethereum, the public Blockchain used for Bestr certificates. Both have also participated in an international project led by the MIT Media Lab to create an ecosystem to ensure the portability and verifiability of academic institutions' degrees

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without consulting the issuing entity. With the continuous development of the educational and professional landscape, Open Badges thus emerge as a fundamental tool for unlocking the potential of continuous learning and enhancing the skills acquired. Open Badges represent an innovative form of digital certification with the primary goal of enhancing the skills of individuals and promoting a culture of continuous learning.

3. Goals

Digital badges represent an innovative form of recognition of the skills and achievements of individuals, using technology to offer a more personalized and flexible learning experience. These badges attest to the acquisition of specific skills or milestones. One of the main objectives of digital badges is to motivate individuals to engage in learning and achieve specific goals. These badges provide a tangible form of recognition for acquired skills, whether formal knowledge gained through academic courses or informal skills developed through work or volunteer experiences. Additionally, digital badges allow for recognising skills and abilities that traditionally might not have been valued or recognized, such as critical thinking, collaboration, and leadership. Another essential objective of digital badges is to promote the development of individuals' metacognitive skills, particularly self-regulation abilities. Through digital badges, learners can set their learning goals, monitor their progress, and reflect on their learning experiences. This process of metacognitive reflection helps individuals become more aware of their capabilities and develop effective strategies to improve their learning over time. They offer students a way to receive immediate feedback on their learning from both teachers and peers. Personalized feedback, provided through personal dashboards, helps students better understand the objectives and tasks required to complete the course and reflect on their progress over time. The future of Open Badges looks exciting and full of potential. Digital badges are likely to continue to evolve and become more embedded in the educational and professional environment (Clements K. et al., 2020).

Among future trends, greater recognition of non-formal and informal learning through digital badges and increased adoption of badges as a tool for recognizing skills in the workplace are expected. Furthermore, digital badges are predicted to become increasingly personalized and adaptable to the needs and interests of individual learners. Thanks to technology, badges will be able to be integrated into a wide range of

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platforms and digital environments, enabling individuals to quickly and effectively display and share their skills and achievements.

Open Badges are powerful tools for recognizing skills and supporting individual learning. They contribute to promoting a culture of lifelong learning adapted to the needs of the contemporary world.

In particular, the university plays a crucial role in promoting the economic growth and resilience of the country through a series of initiatives and services it provides to individuals. First, it offers innovative and relevant academic programs that equip students with the essential digital and technological skills needed to meet the challenges of the modern workplace. These skills include knowledge of digital tools and platforms, the ability to analyze data critically, and flexibility in adapting to rapid technological changes. Additionally, the university fosters innovation and economic development through research and collaboration with industry, contributing to creating and disseminating cutting-edge knowledge and technologies. Simultaneously, it encourages entrepreneurship and innovation among students and academic community members, providing support and resources to turn ideas into successful entrepreneurial ventures.

3.1 Social Impact of Digital Credentials

Digital credentials, particularly Open Badges, play a transformative role in modern education and labour markets by promoting inclusivity and accessibility. These tools democratize recognising skills and competencies acquired through formal and non-formal education, thus supporting lifelong learning pathways. This inclusivity is pivotal in fostering equal opportunities for all learners, regardless of socioeconomic background.

Open Badges serve as a bridge between education and employment, providing a transparent and verifiable way to showcase soft skills and non-traditional learning experiences. These experiences are often undervalued in conventional education systems. The visibility provided by Open Badges not only aids learners in underserved communities but also encourages diverse hiring practices among employers, thereby promoting a more inclusive workforce.

Open Badges, when implemented, can significantly impact social mobility. They provide a verifiable and respected method to display one's skills and achievements, empowering individuals to advance their careers and educational pursuits more effectively. This is particularly beneficial for marginalized groups

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who may lack traditional academic credentials but possess valuable skills gained through practical experience.

Open Badges also enhance educational and occupational mobility across borders by facilitating more accessible validation of skills and achievements. This global recognition can lead to more excellent employment opportunities and contribute to economic growth, thus supporting the sustainable development goals of reducing inequality within and among countries.

3.2 University of Turin- Open Badge case study

The adoption of Open Badge and notarized Blockcerts systems on blockchain for the certification of academic qualifications has become a reality in several Italian public universities. This innovation simplifies the process of validating qualifications and complements the issuance of traditional certificates. In 2019, the Universities of Padua and Milan-Bicocca were the first in Italy to use the Bestr platform to certify their academic qualifications through Open Badge and Blockcerts. Both universities also participated in an international project led by the MIT Media Lab aimed at creating an ecosystem to ensure the portability and verifiability of academic qualifications without needing to consult the issuing institution.

The University of Turin (UniTo) has now joined the list of six Italian universities using blockchain-notarized Blockcerts via Bestr, positioning itself as the second among large universities to adopt this innovation. By promoting digital credentials, UniTo contributes to spreading a culture that values digital skills and aligns with the objectives outlined in the National Recovery and Resilience Plan (PNRR). These efforts are consistent with PNRR initiatives focused on enhancing active labor market policies, professional training, and the national education system.

UniTo's promotion of digital credentials not only ensures students' skills keep pace with industry demands but also plays a significant role in fostering lifelong learning and encouraging adult participation in professional training and skills development opportunities.

Specifically, the University of Turin has developed its first ecosystem for (micro)digital credentials through the "Premialità 2023" project. Micro-credentials are a significant tool for certifying short, targeted learning experiences, in compliance with Article 6 of Law 341/1990, which pertains to focused training and supplemental educational services. The project introduced several measures to optimize and automate

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various aspects of creating and assigning digital credentials at the university while also implementing technical innovations.

The most notable innovation was the creation and issuance of the university's first digital credentials tied to academic qualifications. Particular attention was given to providing a distinct visual identity for UniTo's Open Badge and Blockcerts that certify the attainment of academic titles. Defining a graphic identity for Open Badges involved a multidisciplinary collaboration, including the Web and E-learning Editorial Office of the School of Management and Economics, technical-administrative staff, and teams responsible for multimedia systems and e-learning infrastructures and Staff E-Learning, Online Collaboration and Architecture. The multidisciplinary approach and synergetic collaboration between these different structure contributed significantly to the success of the creative process.

Another significant innovation was the introduction of a previously unused type of digital credential: Blockcerts. The Bestr platform allows accredited bodies to create and issue digital certificates, called Blockcerts, which are used in particular by universities to certify degrees. Blockcerts are digital certificates leveraging blockchain technology to guarantee the authenticity and security of data. Developed as an open-source solution by MIT Media Lab, Blockcerts allow institutions to issue, verify, and store digital certificates in a decentralized and transparent manner. An institution can then create Blockcerts and register the fingerprint (hash) of the document (notarisation) on a blockchain. The blockchain is like an immutable ledger that proves the existence of the certificate. After issuing, the Blockcerts are sent to recipients, who can store them on personal devices or digital wallets. Verification of the certificate's authenticity is straightforward, relying on public and secure blockchain data, eliminating the risks of fraud or forgery.

The notarisation process does not involve storing personal user data on the blockchain, ensuring the information's security. The Blockcerts certificate contains detailed information about the certification, including the visual of the Open Badge, the issuing university, the graduate's name, the degree programme, the EQF levels, the date of graduation and the digital signature of the Rector. In the UniTo context, the Rector's digital signature and the University of Turin logo complete the certificate and provide elements of authenticity. This process helps to ensure the integrity and transparency of the digital credentials, underlining the University of Turin's commitment to the adoption of innovative technologies for the reliable management of academic certificates (Presutti K. et al. 2023).

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UniTo has also optimized the process of assigning digital credentials as part of the "Premialità 2023" project.

The Bestr platform handles Open Badge assignments through a process that typically involves the creation and uploading of a .csv file containing the learner's personal information required to assign the digital certificate. However, in order to facilitate and speed up this process, especially considering the detailed information associated with graduates, an integration between Bestr and the Esse3 platform has been implemented. Thus, the graduate will have the possibility to receive the certificate in the form of an Open Badge as well as in the form of Blockcerts in combination with the OB. This additional option guarantees the permanent authenticity of the certificate on the public Ethereum blockchain. In order to receive the Blockcerts, the graduate must download the Blockcerts Wallet app on their mobile phone and save their passphrase, thus obtaining a unique identifier associated with the Blockcerts. The app plays a key role in managing the Blockcerts identifier and communicating it to organisations authorised to issue these digital credentials. It will also enable the storage and sharing of all Blockcerts received. Once in possession of the identifier, the graduate must notify the university of his or her wish to be allocated the Blockcerts.

By adding the organisation to the authorised issuers within the app, the graduate can use the mobile device to scan the QR code provided by the Bestr English page and add the University of Turin as an issuer. At this point, Bestr will be able to write the Blockcerts and store them on the blockchain. The process takes time: the graduate will be notified by email when the Blockcerts are ready and can find them on their Bestr profile. To access them, visit the 'My Badges' page on Bestr. This innovative and automated approach dramatically simplifies the collection of Blockcerts, while guaranteeing the security and permanent verifiability of the credentials via the blockchain (Presutti K. et al. 2023).

In the future, this process could be further refined, paving the way for greater integration and automation of processes related to digital certificates.

3.3 Survey

In the context of the Project, the Orientation, Tutoring and Placement (OTP) office initiated a detailed investigation through an online survey sent to 357 learners, all recipients of OB and part of the project's target. These learners come from various study paths, including 134 graduates from a Master's Degree in Economics and Management, 111 graduates from a Master's Degree in Business Administration, 86

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graduates from a Master's Degree in Environmental, Cultural, and Territorial Economics, and 26 graduates from the Master's Degree in Statistical and Economic Methods for Decisions. The survey aimed to record the pre-existing knowledge of digital tools and explore the learners' expectations. Data were collected through questionnaires, some of which were completed non-anonymously to ensure greater accuracy in the responses. Additionally, the questionnaire was extended to another 1,200 OB recipients at UniTo who participated in doctoral courses, professional courses, seminars, and other training events. This data collection extension was anonymous to encourage honest participation (Presutti K. et al., 2023).

Simultaneously, 171 companies were selected according to specific criteria, including 50 companies that hosted curricular interns from the project's target group. These 79 companies hosted curricular interns from the Degree Programs in Economics and Management and Business Administration during the period from 04/01/2022 to 03/31/2023, 13 companies that participated in the Job Orientation program in the academic year 22/23 and 29 exemplary companies that hosted more than five curricular interns from the School of Management and Economics (SME) Study Programs in the indicated period. The purpose of the survey of these companies was to investigate their awareness and use of digital credentials such as OBs and Blockcerts, and to gather feedback on the effectiveness of the information content conveyed through these credentials, particularly in relation to recruitment activities.

Later, the questionnaire was distributed to include companies that had signed agreements for conducting internships and those that had requested the publication of announcements for curricular internships. The OTP office of the School of Management and Economics at UniTo managed these administrative processes. As of 06/30/2024, 255 questionnaires had been sent out.

The results of this survey are expected to provide valuable insights into the perspectives and expectations of learners and companies regarding digital tools and certifications. These insights will enable the development of targeted strategies and interventions to improve the integration of such tools in the academic and work environments, potentially transforming how we approach education and recruitment.

The survey found interesting things about learners' adoption of OB and corporate recruiters' perceptions of them. The data collected show that OBs are increasingly widespread among learners, who use them as concrete evidence of their skills and abilities. However, it was observed that most corporate recruiters need more knowledge of this form of skill recognition.

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The analysis of the results from the questionnaires shows that only 30 out of 444 questionnaires sent to companies received responses, and just seven companies had received CVs or LinkedIn profiles that included OBs. On the other hand, among the anonymous learners who responded to the questionnaire (101 in total), 57 had already included OBs on their CV/LinkedIn profile or website/email. Nine of the non-anonymous learners (17 responses) incorporated OBs into their online documents. These data highlight a discrepancy between the adoption of OBs by learners and their presence in corporate recruitment processes. However, the absence of prior studies in this area presents a significant research opportunity, which could help bridge this gap and provide further insights into the effectiveness of OBs in the workplace context.

4. Conclusion

Open Badges represent a fundamental resource for learners, offering various advantages that underline their importance and usefulness in the academic and working context. These tools are characterized by a powerful visual impact that makes them particularly effective in communicating acquired skills. Moreover, their open and interoperable nature allows any system that supports the open-source standard to read their metadata through public and international tools like validators. It is important to emphasize that OBs are guaranteed by the issuing entity and certified on the Bestr platform, thus offering recognized and reliable validity. Among the main advantages of OBs for learners is the increased spendability and verifiability of acquired skills. The presence of OBs in digital CVs makes them more precise and communicative, facilitating participation in e-recruiting selections and offering the possibility to verify skills in real time without intermediaries. OBs enhance acquired skills and make them visible in the learner's OB e-portfolio, thus highlighting their educational and professional path. This improves their credibility in the eyes of potential employers. This aids their growth and employability. Another significant advantage is sharing digital credentials with educational entities or companies internationally through social networks like LinkedIn. By downloading and sending the badge image from the dedicated page or linking it directly, recruiters can verify the integrity and validity of the OB as though they had contacted the issuing entity (UniTO) for confirmation. Open Badges represent a valuable tool for learners, offering a range of advantages that enhance their skills and integration into the academic and working world (Devedzic V. et al., 2015).

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Adopting digital credentials through Open badges and Blockcerts represents a significant step towards modernization and innovation in the Italian academic sector. This approach simplifies the qualification validation process and is crucial in creating a dynamic and transparent ecosystem for managing academic credentials. Furthermore, the integration of new technologies, like the Bestr platform, and the existing student information management system, like Esse3, represents a tangible example of how technology can simplify and accelerate administrative processes while ensuring the security and authenticity of digital credentials.

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