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LESSONS LEARNED FROM INITIATIVES TO ROLL OUT DIGITAL CREDENTIALS IN EUROPE

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Abstract

Day by Day, society is becoming more digital in almost every aspect. Education is also increasingly becoming digitized, considering the acquisition of skills mediated by technology, both in formal and informal learning. In order to recognize the achievement of proficiency in a given competency, it is critical to adopt a digital credential model.

Digital credentials are a disruptive model of accreditation, more suited to the digital world we currently find, which can evidence learning through the issuance of a Badge, containing relevant information about the learner, the acquired skill, and the issuing institution.

Important aspects to be considered are the interoperability, recognition, and validation of digital credentials between institutions. Badge recognition should be as widely accepted as the scope of technology-supported or technology-based educational activities.

This paper presents a study on the main initiatives to implement digital credentials within Europe, considering the policies and guidelines of the European Commission. Based on the report of the experiences and results obtained, it is possible to point out the most relevant aspects and challenges related to the adoption of digital credentials.

One of the key lessons learned from this study is the importance of using shared and standard frameworks, whose quality is recognized by all EU member countries, aiming at credential interoperability.

Another relevant takeaway is the need to establish a digital credential ecosystem, to overcome the challenges involved in managing, verifying, and sharing badges, considering all stakeholders involved in the digital accreditation process.

Keywords: Competencies, Digital credentials, Badges.

1 INTRODUCTION

Education is increasingly incorporating technologic aspects to keep up with the society's evolution. One of the biggest challenges nowadays is to provide a meaningful online learning, motivating students to engage in the knowledge though the interactions mediated by technology.

It is essential to consider cyberspace as a legitimate space for learning, taking advantage of all the potential of the technological tools available, that can enhance both individual and collective construction of knowledge. Virtual communities "are built on affinities of interests, knowledge, projects, in a mutual process of cooperation and exchange" (Lévy, 1999, p.127).

Taking those aspects into consideration, the success of an educational initiative is the recognition of the student's cognitive achievements through the transformation of their knowledge into practice. In order to legitimize these achievements, it is necessary to academically recognize them, providing the student a proof that certifies the acquisition of a skill, whether it has been obtained through formal or informal learning initiatives.

Digital credentials (badges) are the elements that can provide this certification, representing the skill acquisition, supported by an educational or business institution, whose quality is recognized and validated by society. ADCs (Alternative Digital Credentials) can help institutions create greater alignment between theory and practice, and, at the same time, help protect the traditional values of theory and inquiry in the teaching/learning process (International Council for Open and Distance Education [ICDE], 2019).

2 METHODOLOGY

The present investigation is guided in the qualitative method, as it analyzes the data obtained in a more inductive way. Some data have descriptive nature (even considering quantitative data, such as reports and statistics), but the critical analysis of experiences in European Union for the badge implementation is based on qualitative aspects. The investigation is also situated in the field of pragmatism, as it has a transformative character and is "centered on real-world practice in terms of solving known problems" (Sordi, 2017).

The analysis of the collected data took place in a systematic and organized way, defining the following analysis criteria, aiming to observe the criteria to implement digital certification. The selection criteria for the documents were articles and publications from the year 2020, in Portuguese and English, with free access, containing the keywords "micro-credentials" + "education" + "university" + "European union". As variants of the term "micro-credentials", the terms "digital credentials" and "badges" were used, in addition to the same terms translated into Portuguese.

Considering the circumstances of the global scenario when the research was developed, since 2019 there was significant progress in the discussions about digital certification and its impacts on higher education – and this discussion continues to this day. Due to the impacts of the Covid-19 pandemic, the e-learning methods and use of technology in education were in evidence. Since then, the society has widely accepted online educational initiatives as part of their daily lives, which drives the need to implement digital certification.

In addition, most of the existing initiatives and projects are supported by the European Commission, which constitutes rich and essential material for this work. All this knowledge base allows the content analysis of this specialized literature, and the posterior critical analysis about the digital credential process in Europe.

3 RESULTS

3.1 International standards and European Union Policies

The recognition of digital education has been addressed by international organizations such as UNESCO[1] and the OECD[2], which have emphasized the added value of e-learning methods, especially in their broad social reach.

The UNESCO guidelines for education to 2030 are focused on the importance of access to quality basic, vocational and higher education. In addition, there is a clear commitment to lifelong learning, strengthened by the use of Information Communication Technology (ICT) tools. Furthermore, it mentions the recognition, validation and accreditation of knowledge, skills and competences acquired through non-formal and informal education (UNESCO, 2015). Digital credentials can be included in the pillars of recognition, validation and accreditation.

In a European Union document of May 20, 2020, with the world already facing the COVID-19 pandemic, it is mentioned that "digital technology is essential and will contribute to a more solid recovery of both our societies and our economies", and education is included in this aspect.

Although the digital credentials are a more recent topic in EU, the foundations for this discussion were stablished long ago. The first European Union guidelines regarding education were established in the Bologna Process[3], in June 1999, whose objective was to unify the higher education system throughout the European bloc, with a view to creating the European Higher Education Area. The most important principles that to this day guide educational initiatives in Europe are:

1 The implementation of a system of 3 academic cycles;

2 The adoption of a standardized ECTS credit system (European Credit Transfer System), which guarantees the convergence of the different European systems;

3 Allow the mobility of students, professors and university staff, through the Erasmus program;

[1] https://en.unesco.org/

[2] https://www.oecd.org/

[3] https://education.ec.europa.eu/education-levels/higher-education/inclusive-and-connected-higher-education/bologna-process

4 Create the European Education Area by 2025, with the aim of promoting mobility and academic recognition of qualifications for all EU citizens.

More recently, the European Comission published some measures in the Action Plan for Digital Education 2021-2027[4] (European Commission, 2021), and the most relevant regarding online learning and recognition are:

1 Recommendation on online and distance learning for primary and secondary education;

2 The development of a European content framework for digital education, based on Europe's cultural and creative diversity;

3 Promote a feasibility study on a possible European exchange platform to share certified online resources and establish links with existing education platforms;

4 Promoting digital pedagogy and expertise in the use of digital tools for teachers, through the Erasmus Teacher Academies, and launching an online self-assessment tool for teachers — SELFIE (Self-reflection on Effective Learning by Fostering the use of Innovative Educational Technologies).

Another initiative under the EU guidelines is the Europass[5]. As described in Decision (EU) 2018/646 of the European Parliament and of the Council (18 April 2018), the Europass is one of several tools and instruments, created at Union level, to improve transparency and understanding of competences and qualifications. Education is included in the Europass scope, and there is a wish to promote greater interoperability between the members of the block European.

In this context, digitally-signed credentials are electronic documents which are awarded by organisations to individuals to confirm and provide proof of their learning outcomes. A European technical framework for issuing digitally-signed credentials ensures that digital qualifications issued in one Member State can be understood and verified in any other. The technical approach to be designed for the framework will allow for identifying, issuing, storing, sharing and verifying digitally signed credentials." (No more papercuts – Digitally Signed Credentials in the new Europass, 2018)

The implementation of a coherent system of recognition and sharing of accreditations depends on the standardization of criteria, including methodologies and terminologies that generate the metadata for digital credentials. In this sense, Europass initiative represents an important guideline to standardize educational projects in Europe.

An important asset developed to create a standard for the education in Europe was the European Qualifications Framework[6] (EQF). Created in 2008, it consists of a quality framework, organized into 8 levels of proficiency, according to learning outcomes. This tool aims to facilitate the comparison of different conversion tools, which allow integration between different institutions and operability between institutions. This instrument favors the mobility of students and workers in Europe.

Another relevant asset for the European guidelines is the ESCO taxonomy[7]. It identifies and categorizes skills, qualifications and occupations that are relevant for the labor market and education, available in 25 European languages. This is the only European standard terminology able to link the competences to the occupations, free of charge and available for download.

There is an additional important instrument to create standard parameters: the International Standard Classification of Education – ISCED[8]. This is the international reference classification for the organization of education programs and qualifications, organized in levels and areas, enabling comparisons of education systems between countries. It is a widely used global benchmark for education systems, maintained and periodically revised in consultation with Member States and other international and regional organizations. The ISCED-F, revised in 2013, classifies education programs and related qualifications by subject area according to the broad domain, branch or content area covered.

4 https://education.ec.europa.eu/focus-topics/digital-education/action-plan

5 https://europa.eu/europass/en

6 https://europa.eu/europass/en/european-qualifications-framework-eqf

7 https://www.cedefop.europa.eu/en/news/esco-taxonomy-classification-european-skills-competences-qualifications-and-occupations-just

8 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_Standard_Classification_of_Education_(ISCED)

3.2 Digital credentials and microlearning

Digital certification by badges is based on microlearning, as they represent the acquisition of specific skills. Microlearning is based in the idea of “developing small pieces of content, learning and using flexible technologies that allow students to access them more easily under specific conditions and times” (Gabrielli et al. 2006, p.45).

Each badge represents a different achievement, and this concept has its origins in gamification, where the player gets immediate feedback on their performance. The accreditation process is associated with the reward, obtained after the achievement of the learning objective. Therefore, the badges “can be used to display students’ achievements and rewards. Learners can share and demonstrate their badges and achieve social recognition” (Kiryakova et al, 2014).

3.3 Digital credentials criteria and trends

Many initiatives in Europe focus on creating or choosing criteria to the digital credentials. This includes standard frameworks that can be shared between institutions, relevant information about the learning characteristics, including data about the issuer and the learner, amongst other important aspects.

The MICROBOL / MicroHE[9] project is coordinated by the European University Association (EUA), in cooperation with European institutions. It aims to provide support for the implementation of micro credentials during the reform of the European Higher Education Area (EHEA), in line with the Bologna Process guidelines and tools.

Based on ESCO taxonomy metadata and its relationship to the European Qualification Framework[10] (EQF), it creates a table of correspondence between the two classifications, making possible to obtain metadata that can be understood and replicated in computerized systems across Europe. Interoperability, therefore, is the crux of this work.

The most take-aways of this project are:

- The organization of research on micro-credentials in higher education, with at least 70 European institutions, in order to understand what the current offer is, the types of micro-credentials used and future trends;
- Predict future impacts of the continuous modularization of Higher Education;
- Analyze the suitability of instruments for the recognition of micro-credentials in Europe, considering the credit system (European Credit Transfer and Accumulation System - ECTS), diploma and qualification frameworks;
- Propose a "credit supplement" to on micro credentials in an ECTS compliant manner;
- Propose a metadata standard and develop an online clearinghouse to facilitate recognition, transfer and portability of micro-credentials in Europe.

Another important initiative towards the study of the digital credentials is led by the International Council for Open and Distance Education – ICDE[11]. This council has more than 70 countries, promoting working groups to discuss the present and future workgroup on Alternative Digital Credentials, which offers basic guidelines on the current reality of digital credentials at a global level, as well as anticipating important future trends.

Loureiro, Meirinhos & Osório (2020) carried out a study on teaching digital skills within the European Union. The main purpose was to characterize the main digital skills and their specificities, based on official documents from different European entities. The study presents that there are similarities in those entities in relation to policies and initiatives for the development of teaching digital skills, highlighting:

- A set of similar core competencies, involving technical computing, pedagogical, digital content creation, communication and collaboration, digital security and assessment skills.
- A central axis based on the development of digital skills for pedagogical integration, focusing on the exploitation of information and communication technologies in learning contexts.

[9] https://microcredentials.eu/about-2/microbol/

[10] https://europa.eu/europass/en/european-qualifications-framework-eqf

[11] https://www.icde.org/

- The structuring of different levels of mastery of skills, organized into areas of knowledge and progressive deepening of the themes.
- The interdependence between competences.

The study by Kato, Galán-Muros & Weko (2020), contextualized within the scope of the OECD – Organization for Economic Co-operation and Development, aims to assist in the creation of policies to implement digital credentials, based on pre-defined terminology and characteristics, examining how employers and governments perceive this type of certification.

In this study, the term “Alternative credentials” is adopted to define those certifications that are not formally recognized by the most relevant educational authorities, relating to individuals who have already completed secondary education. In this work, it is mentioned a distinction between academic certificates, digital badges and micro credentials. However, there is a common understanding that the micro-credential necessarily implies a relationship to a wider scope credential on offer (International Council for Open and Distance Education, 2019 apud Kato et al, 2020).

Other important contributions of this study to the alternative credential field are:

- Methodology: face-to-face, online and blended. Despite being more common in online learning environments, alternative credentials can also be issued for face-to-face or blended educational actions.
- Duration and pace: from hours to months, generally respecting each student's own pace. It will depend on the time to cultivate or acquire the competence and create the necessary evidence to prove it.
- Validation processes: attendance, tasks and exams. Certification is issued based on different criteria, which may only consider participation in a certain event, or the fulfillment of a certain task (formative or summative assessment), or even the formal assessment of knowledge through a project or exam, which can be even carried out by third parties.
- Content and area of focus: from general skills to specific knowledge, and from cognitive to non-cognitive skills. In general, alternative credential programs cover skills and knowledge that are relevant to the job market.
- Integration options: standalone or integrated with another qualification offer – including a formal Higher Education qualification program. In the case of being associated with another educational action, it may be within another action (embedded), it may be a prerequisite or have a prerequisite in relation to another qualification, or even be part of a modular qualification.

In this study is also pointed out that the European MOOC Consortium[12] launched in 2019 the Common Microcredential Framework[13] (CMF), proposing criteria for alternative credentials, such as:

- Have study time between 100 and 150 hours, including review and completion of summative assessment task;
- Be based between levels 6 or 7 of the EQF (European Qualification Framework), or equivalent levels of the NQF (National Qualification Framework);
- Offer a summative assessment, which enables the issuance of academic credits and the association with formal university programs;
- Operate with a reliable method of identity verification, in accordance with university policies;
- Establish the desired learning outcomes, number of hours of study, EQF level and number of ECTS credits.

Although this is a preliminary study to analyze the trends of alternative credentials in the context of the OECD, the work brings together important reflections and indications for the construction of a common taxonomy, which allows the recognition of credentials by all stakeholders.

[12] https://emc.eadtu.eu/

[13] https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework_.pdf

3.4 Blockchain technology

Blockchain is an official public ledger, that registers block currency transactions. This technology is able to decentralize the infrastructure of digital certification, sharing student's data in a safe way, enabling verification process based on Blockchain registry structures (Castro-Iragorri, Lopez-Gomez & Giraldo, 2020, p.2).

According to these authors, in 2018 a Digital Credentials Consortium was created, founded by universities in Europe, North America and Latin America - an initiative that also had similar examples in other locations, which aims to pursue the implementation of the digital network using Blockchain technology. The costs of implementing digital resource projects using Blockchain technology are similar to the costs of projects that use other technologies. The biggest difference, however, would be the creation of consortia and the selection of data, shared in a secure and integrated way.

Mikroyannidis (2020) advocates the use of blockchain technology based on the need for recognition of digital certifications by the various stakeholders, whether educational institutions, employers and learners. The central focus is the technological and methodological interoperability. In this study is mentioned that blockchain technology allows decentralized management, where privacy, data security, consensual ownership, transparency and reliability are intrinsic attributes, both in relation to the software and the infrastructure involved.

One aspect that stands out in Mikroyannidis work is the issue of personalized recommendation provided to the apprentice, in relation to the badges acquired. Based on the badges collected in the personal ePortfolio of each learner and considering their aspirations, the system can indicate courses that complement the skills already acquired and professional opportunities that relate to the knowledge that the person has. At the same time, the system allows the employer to access ePortfolio digital certifications for validation purposes.

3.5 Digital credentials ecosystem

In order to implement digital credentials, it is necessary to consider the entire system involved, which includes all stakeholders. Several authors mention the Digital Credentials Ecosystem, which consists of mapping the variables involved in the certification process of acquiring skills through badges.

Rossiter and Tynan (2019, p11) point out some guidelines that are essential for creating digital credentials:

- Have a clear sense of purpose and benefit to your key stakeholders;
- Develop an engagement and communication plan to nurture a culture of innovation;
- Assess institutional readiness to achieve an effective microcredit ecosystem;
- Create a comprehensive system architecture and framework, including a credential taxonomy; a skills framework; and quality principles and processes for designing, developing and delivering micro-credential products;
- Create and map the micro-accreditation journey, remembering that each stakeholder will have expectations about the user, client and student experiences;
- Develop or modify administrative systems, policies, business rules and processes to enable new accreditation models;
- Design an emission and digital badge model;
- Ensure that effective governance and administration is in place for analytical and reporting purposes;
- Assess the capacity and capability of existing IT infrastructure and educational technology environment to support micro-accreditation and select the issuance platform;
- Review and evaluate all success factors.

Digital platforms are the tools that allow the exchange of knowledge and the recognition of this knowledge between institutions, enabling the creation of a sustainable ecosystem that is actually beneficial for all involved – people and institutions. In addition to the gains in terms of technical and technological knowledge, collaborative projects also develop interpersonal skills, such as teamwork, communication, creativity, critical thinking, among other skills that are highly valued in the current job market.

The OD&M project[14] aims to analyze education based on problem solving, focusing on teamwork, sharing experiences, creating prototypes, among other types of knowledge generation.

In the presented study, an important reflection stands out:

“Open design and manufacturing are paradigms mainly supported by ecosystems of actors that need to be engaged and supported, and this is the first step to establish and open innovation ecosystem oriented to education and supported by digital platforms.” (Tabarés et al, 2020, p.3)

The OD&M project represents an important example of the effort and trend that exists in the European Union to create digital ecosystems in the context of education, which can connect the interests of people, companies and educational institutions, recognizing the skills and abilities developed through digital certifications. accessed through integrated platforms, strengthening innovation through collaboration between the parties involved.

The ECCOE project[15] is another good example of initiative that contemplates a digital credential ecosystem. It is a project co-funded by the Erasmus+ Program of the European Union and is in line with all the guidelines and policies established in the scope of Education, aimed at the development of member countries. Supported by the concept of Open Education, this project aims to “facilitate the endorsement and appropriation of open, online and flexible higher education, with the aim of increasing trust in technology-enabled credentials among students, higher education institutions (HEIs) and employers”. The project has several partners in the educational area, located in different member countries of the European Union.

The ECCOE project's vision is to develop “A more inclusive and transparent credential ecosystem, where the value of a learner’s achievements is objectively and clearly understood by both HEIs and employers, enabling greater learning and employment mobility of European citizens”[16]. The main goals of this project are:

- Develop digital credential descriptors related to courses or educational modules;
- Create and validate a recognition model, available in several languages of European countries;
- Develop a catalog of more than 60 transversal disciplines and modules, already selected for recognition criteria between institutions;
- Design a credential enablement system;
- Stimulating wider acceptance of these digital credentials by producing and disseminating the supporting documentation that institutional stakeholders need.

One of the items mentioned above is the development of an Online Catalog of Learning Opportunities (OCLO), which is of great value in establishing standard descriptors for Europe and can help educational institutions at the time of construction of criteria to elaborate digital certifications.

The ECCOE project establishes a set of quality criteria for the description of credentials, as well as a digital credential model, which provides important data for recognition of a given credential. The ECCOE consortium organized an open public consultation on its quality criteria instruments for digital micro-credentials, with the aim of receiving feedback from all stakeholders involved in open higher education, assessing their suitability in relation to the accreditation process and the recognition.

3.6 Challenges

Tereseviciene et al (2020) explore the identification of the necessary requirements for the recognition of learning outcomes from online open educational initiatives, mentioning the obstacles to be overcome in terms of the reliability of digital credentials in this context.

Keck, Vidal & Heller (2020), in a study entitled “Digital Transformation of Education Credential Processes and Life Cycles - A Structured Overview on Main Challenges and Research Questions”, addresses the challenges of transitioning from traditional paper-based credentials to the digital credentials. The authors propose a methodology to measure the effectiveness of the digital credentials management system of five pilot projects involved in the European Union initiative called Horizon 2020, through qualitative and quantitative descriptions.

[14] https://odmplatform.eu/
[15] https://eccoe.eu/
[16] https://eccoe.eu/

As a result of this study, the following challenges stand out at each stage:

- Challenges of traditional, paper-based certifications: Fraud and verification; Dependence on the issuing institution; Handling and Data security.
- Challenges of the transition to digital credentials: Digitization of existing certifications and Coexistence between analog and digital work processes.
- Challenges of digital credentials: Protection of individual data; Data security; Data management and Data sovereignty.

The intention of this project is to allow the construction of a structural model in the future to evaluate the performance of solutions for the management of educational digital credentials, covering the entire cycle from creation, storage, management and control, until the digital certification expires.

Gerbershagen (2020) compares several initiatives of companies that use digital credential management systems, and the general conclusion is that there is a great demand for this type of system, including both education in the institutional and academic and professional (some companies even overlap these two roles). Despite the great demand for digital certification, in this author's analysis, the maturity level for the implementation of these initiatives is still low, as the processes of each organization are different, the mandatory requirements are not always met and the issue of standardization is still a challenge to be overcome.

4 CONCLUSIONS

There are many convergences observed in the selected projects. First of all, it is evident that there is an urgent need for validation of formal and informal qualifications, and it became even more critical after the COVID-19 pandemic. The development of digital competencies is mandatory in the current scenario of society, as the education intermediated by technology requires it. There are a lot of initiatives, encouraged by the government and international institutions, to engage faculty at educational institutions, both to embrace digitalization and to develop digital skills.

Another common understanding is that the digital credentials should be based on the microlearning concept, providing accreditation for small portions of knowledge, aiming to develop specific skills. And there is a notorious trend of focusing on the skills related to the job market.

Most of the projects and initiatives also mention the need to develop an ecosystem to manage the badges, including the processes of issuance, verification and sharing. This system needs to provide information security, focusing on data ownership and privacy, where learners can control their digital identity and portfolio, authorizing access to this information when convenient.

Some initiatives go further and mention expectations about the acceptance of digital credentials by the labor market, an important stakeholder in the digital credential’s ecosystem. The reliability of the issuing institution is also a concern pointed out in several studies.

Although all these initiatives aim to create structural models to describe the competencies to be developed and recognized, as well as for the issuance and management of digital credentials, we can observe that not all of them are articulated with common guidelines.

The effort seems to be diffused in many different directions, despite having the same set of characteristics. All projects presented here are based on documents and guidelines from the European Commission or institutions affiliated to it, but there is no unity regarding the standardization of aspects related to the systematization of references and descriptors for the recognition of acquired competences, nor the organization criteria metadata for issuing badges.

In addition to these factors, several projects mention the issue of interoperability and digital certificate management ecosystems, but there is no consensus on the tool or methodology for this, which will make this process difficult to implement. However, if at least the metadata is based on the same set of criteria and categories, it may be possible to share and recognize the badge, even using different management systems.

The ECCOE project, however, demonstrates consistency in its direction, seeking to base its actions on instruments widely recognized at the European level and directly accredited by the European Commission, such as Europass, the European Qualifications Framework (EQF / EQF), the ESCO taxonomy, among others. By using official parameters approved by the European Commission, and with the support of institutions from several member countries, the ECCOE project guarantees the

effectiveness of its structural model and alignment with the values and premises established for the future of education in the European block.

Initiatives that promote the adoption of standard frameworks and wide dissemination to important actors in the educational scenario, enable greater adherence and open doors to a partnership for the development of ecosystems of digital credentials. This reinforces both the recognition related to the quality of the instruments and the interoperability in the management of digital credentials.

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