New Paradigms in Educational Training Between Digital Architectures and Certification Systems: The Catania Experience within the ALMA Project

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Riassunto

L'esperienza dell'Università di Catania nell'ambito del progetto ALMA illustra un approccio integrato all'innovazione didattica che combina infrastrutture digitali, formazione del personale docente e sistemi di certificazione delle competenze. Attraverso attività coordinate nei settori della formazione digitale, delle micro-credenziali e del rafforzamento delle capacità istituzionali, il progetto sostiene percorsi formativi flessibili promuovendo al contempo apprendimento permanente e trasformazione organizzativa. L'istituzione del Teaching and Learning Centre, l'adozione di NOOC, laboratori remoti e Open Badge, insieme a tutor basati sull'intelligenza artificiale integrati in Moodle, dimostrano come le architetture digitali possano migliorare l'insegnamento e l'apprendimento, garantendo un'innovazione pedagogicamente orientata, affidabile e scalabile nell'istruzione superiore.
Parole chiave: Educazione digitale; Micro-credenziali; Formazione del personale docente; Intelligenza artificiale; Istruzione superiore

Abstract

The University of Catania's experience within the ALMA project illustrates an integrated approach to educational innovation that combines digital infrastructures, faculty development, and skills certification. Through coordinated activities across digital learning, micro-credentials, and

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Excellence and Innovation in Learning and Teaching (ISSNe 2499-507X), 2026, 1 Special Issue

Doi: 10.3280/exioa1-2026oa23994

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institutional capacity building, the project supports flexible learning pathways while promoting lifelong learning and organisational transformation. The establishment of a Teaching and Learning Centre, the adoption of NOOCs, remote laboratories, and Open Badges, together with AI-powered tutors integrated into Moodle, demonstrate how digital architectures can enhance teaching and learning while ensuring pedagogically guided, trustworthy, and scalable innovation in higher education.
Keywords: Digital education; Micro-credentials; Faculty development; Artificial intelligence; Higher education

Article submitted: 24/06/2026; accepted: 02/09/2026

Infrastructures and Digital Learning Environments

Within the ALMA project, the University of Catania has developed a locally situated pathway for the renewal of academic teaching. Rather than treating digitalisation as the adoption of discrete tools, the project has brought together infrastructure, course design, competence recognition, professional development and artificial intelligence within a single institutional trajectory. The relevance of this experience lies in the relations established among these dimensions: digital environments require pedagogical design; new forms of certification call for organisational arrangements; and AI-supported learning raises questions of responsibility that cannot be resolved at the level of software alone.

The work on digital programmes has provided the material and organisational basis for this trajectory. The Teaching & Learning Center, currently under development, has been conceived as a shared environment for the production of multimedia resources, webinars, seminars and laboratory-based activities. Its purpose is to support the design and delivery of blended and fully online provision, while also making the production of digital learning resources a more visible and collective dimension of academic work.

This infrastructure has been accompanied by the experimentation of different formats – MOOCs, NOOCs and remote laboratories – which address distinct educational needs rather than constituting a single standardised offer. The first ALMA Days & Sessions module made this relationship between infrastructure and practice explicit. Case studies on blended learning and formative assessment were discussed alongside a Moodle workshop, bringing technological choices into dialogue with questions of teaching design and evaluation (Spinu et al., 2022a, 2022b; Bruni et al., 2024; Romiti et al., 2023). In this sense, the initiative has served as a space in which staff could examine

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the conditions under which online and hybrid teaching may become academically sustainable.

Micro-credentials and Faculty Development

A second strand concerns the recognition of learning outcomes through micro-credentials and Open Badges. The 2022 Council Recommendation frames micro-credentials as records of assessed learning outcomes obtained through a small volume of learning, and links them to lifelong learning and employability (Council of the European Union, 2022). Their adoption in higher education is consequently not reducible to the digital issuing of badges: it raises questions about assessment, quality assurance, portability and the relationship between short learning experiences and established degree structures (Ahsan et al., 2023; Varadarajan et al., 2023).

At Catania, the work has unfolded through participation in a national observatory involving the other Digital Education Hubs and through the definition of an internal offer to be delivered on the Bestr–CINECA platform. Three areas were selected: inclusion, including support for particular student groups and inclusive classroom management; professional communication in foreign languages; and health literacy and supervision in nursing practice. The selection is significant because it locates micro-credentials at the intersection of transversal competences, professional formation and educational inclusion. The ongoing work concerns the design of recognisable, assessable and institutionally meaningful learning units, rather than the multiplication of credentials as isolated outputs.

The faculty development strand addresses a central condition of this process: the capacity of an institution to make innovation part of ordinary academic practice. The local Action Plan therefore focused on the role of the Change Agent, understood not as an individual champion of technology but as a participant in distributed processes of professional learning. The literature on institutional change suggests that durable innovation relies on organisational learning, local leadership and opportunities for peers to interpret and adapt change within their own contexts (Fullan, 2007; Kezar, 2014). Activities developed within ALMA Days & Sessions were intended to create such occasions for dialogue, with attention to classroom practice rather than to technical training alone.

This perspective also informed the decision to involve technical-administrative staff. Three Digital Experts were selected and enrolled in a second-level Master's programme. Their role is expected to connect advanced digital expertise with the everyday administration of teaching, thereby reducing

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the risk that innovation remains dependent on individual initiatives. Scholarships awarded to students enrolled in pedagogical Master's programmes extend this work across the relationship between training, research and professional preparation.

A validated questionnaire was administered to participants in the activities associated with the digital-programmes and faculty-development strands in order to investigate teaching beliefs and perceived development needs. The data are currently under analysis; no definitive claims can therefore be made. Initial observations nevertheless suggest a strong interest in faculty development as a space for reflecting on teaching identities and classroom practices.

AI in the Course Environment

The AI strand has concentrated on a Moodle plugin that embeds configurable tutors within individual course sections. Teachers may define the tutor's role and ground its responses in their own materials; students can continue a conversation across sessions rather than restarting each interaction. The plugin also regulates individual access and provides instructors with information about patterns of use. These features were designed to keep AI-mediated support connected to the course environment and subject to pedagogical oversight.

The project does not approach the tutor as a substitute for teaching. Instead, it examines whether conversational AI can support orientation, feedback and participation while leaving the teacher responsible for the design of activities and the interpretation of student engagement. This approach responds to concerns in the literature regarding the contextual reliability of chatbot responses, student overreliance and the need for transparent human supervision (Kuhail et al., 2023; Labadze et al., 2023). Discussion of these issues within ALMA Days & Sessions has allowed technical development to remain connected to questions of educational purpose, particularly in relation to the ethical and pedagogical challenges that AI introduces in teaching, learning and research (Agrusti, 2023; Schiff & Rosenberg-Kima, 2023).

Conclusion

The Catania experience shows the value of approaching digital transformation as a coordinated institutional process. Infrastructure, micro-credentials, faculty development and AI have been pursued as interdependent elements, each exposing questions that the others help to address. The

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contribution of ALMA Days & Sessions has been to create a setting in which these questions can be discussed across academic and professional roles. The project is still in development, and several outcomes – including the analysis of faculty-development data and the implementation of new credential pathways – remain provisional. Its relevance lies less in presenting a completed model than in documenting an attempt to build the organisational, technical and pedagogical conditions through which innovation can become part of university life.

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