Digital Education Hub and Teaching and Learning Center and integrated experience of "Sapienza" University of Rome

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Riassunto

L'Università Sapienza di Roma ha sviluppato un modello integrato di innovazione didattica che coniuga la formazione del personale docente con la trasformazione digitale attraverso il Teaching and Learning Center e il Digital Education Hub ALMA. Pensata per rispondere alle esigenze di una comunità accademica ampia e diversificata, l'iniziativa promuove una didattica centrata sullo studente, mediante sviluppo professionale, coordinamento istituzionale e tecnologie digitali avanzate. Tutor basati sull'intelligenza artificiale, laboratori remoti, ambienti immersivi, MOOC e piattaforme collaborative sostengono pratiche didattiche innovative, favorendo al contempo accessibilità, apprendimento permanente e collaborazione interdisciplinare. L'esperienza dimostra come una governance coordinata e adeguate infrastrutture tecnologiche possano promuovere un'innovazione sostenibile e rafforzare la qualità dell'istruzione superiore.
Parole chiave: educazione digitale, teaching and learning center, formazione personale docente, formazione continua, innovazione didattica.

Abstract

Sapienza University of Rome has developed an integrated model for educational innovation that combines faculty development with digital transformation through the Teaching and Learning Center and the Digital Education Hub ALMA. Designed to address the needs of a large and diverse academic community, the initiative promotes student-centered teaching by

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combining professional development, institutional coordination, and advanced digital technologies. AI-based tutors, remote laboratories, immersive learning environments, MOOCs, and collaborative platforms support innovative teaching practices while fostering accessibility, lifelong learning, and interdisciplinary collaboration. The experience demonstrates how coordinated governance and technological infrastructures can drive sustainable innovation and strengthen the quality of higher education.
Keywords: digital education, teaching and learning center, faculty development, educational innovation, life-long-learning

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"Sapienza" University of Rome exploited the Digital Education Hub (DEH) funding for a great boost in the diffusion of innovation in education. The challenge of dealing with 3,500+ faculty, and 125,000+ students is faced by the Teaching and Learning Center (TLC), which is setting up a systemic strategy to address structural realities like large classrooms and highly diverse disciplinary environments. Such strategy is finalized to have a more inclusive and student-centered teaching able to adapt to the extremely rapid change in the student's skill, competences, pre-requisites and educational need for employability.

Faculty Development and Network Strategy

The Strategic Document of the Center (TLC, 2025), designed starting from the ANVUR guidelines (Felisatti et al., 2023), considers as strategic fields initial/in-service schoolteacher training, the faculty development, the development of innovative didactic methodologies and technologies and the life-long learning. Initial university teachers' formation is instead responsibility, since 2017, of an ad hoc working group (Pascucci & Viteritti, 2020).

Conceived as a "common home" for the teaching community, the TLC therefore has a very broad mission finalized to coordinate and systematically disseminate the multiple experiences of a very large university like Sapienza, to foster interdisciplinary collaboration, and to ensure economic sustainability.

The Center conducts research on pedagogical practices and digital tools, while offering life-long-learning courses. To build an academic community of practice, the TLC hosts targeted workshops (starting with the June 2025 General States on Learning and Teaching, followed by workshops on evidence-based education, Service Learning and digital education) and utilizes

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communication tools like a website and a bi-weekly newsletter to create a community.

Sapienza's Faculty Development relies on a dual-track approach:

- **Newly Hired Researchers (RTDb/RTT):** A mandatory, certified two-year pathway managed by a Working Group separated from TLC (QUID). Year one focuses on active learning, observational internships, and course redesign. Year two targets qualitative innovation and syllabus planning.
- **In-Service Faculty:** aimed at minimizing innovation barriers by providing access to technologies, mentoring, and resources.

Implementation utilizes a **distributed network strategy** linking the TLC, central administrative offices, and educational structures. A *Commission for Innovative Teaching* – comprising experts and departmental delegates – coordinates these actions. Experts handle specialized training and web resources, while delegates communicate local disciplinary needs back to the TLC and disseminate innovative practices within their own departments.

Educational Innovation and Technologies

Whilst therefore setting up the structure to diffuse the culture for innovative didactics throughout the university, the participation in the *Digital Education Hub – ALMA* (Alma, 2025) project has given a powerful boost to the identification and implementation of novel didactical technologies. In particular Sapienza has significantly upgraded its digital infrastructure by developing:

- **Platforms & Multimedia:** Launched the *IDEA* Moodle platform (Sapienza, 2025) open outside Sapienza and upgraded the Audiovisual Laboratory (LABS) to produce high-quality MOOCs and micro-credentials. The LABS is equipped with Reflect Media™ green screen technology and LED-wall-based virtual production set designed to integrate live-action footage, motion graphics, and digital visual effects. This system enables a level of integration between live-action footage and virtual imagery. The LABS allows professors to record high-definition visual content, demonstrations, and simulated environments. The software HeyGen is used in production studios for automatic audio translation featuring instructor voice.
- **Immersive Teaching:** five labs were equipped with headsets and haptic sensors. Skills were developed to create educational environments and games for teaching. Exploring the interior of a hemoglobin molecule, operating a minimally invasive surgery robot, managing a financial intermediary crisis, or setting up a successful exhibition – all within immersive, gamified environments using virtual reality headsets and haptic

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gloves that allow users to "touch" digital objects. The concept is to move beyond the limitations of traditional teaching by learning through experience in virtual environments that simulate real world scenarios.

- **Remote Labs:** Remote operation of instrumentation was infrastructured to ease students' laboratory experiences. These labs allow to run real physical experiments or interact with simulated digital environments directly through WEB platforms. An AI assistant (based on Gemini technology) is available to answer questions about how the system works or to help resolve technical issues. Remote laboratories come in various types: real (connecting to physical devices), virtual (connecting to simulators or software systems), or digital twin (connecting to digital systems that replicate and are linked to real-world systems). The Remote Laboratory for Social Robot Programming and Artificial Intelligence enables the programming of a mobile robot using Generative AI techniques, utilizing a simulated digital twin of a physical robot. Course participants can discover and learn the fundamentals of programming mobile and social robots, as well as the integration of robotics and generative AI. The Remote Optics Laboratory (SAPeRLO) is a facility designed to conduct actual optics experiments remotely using various standard samples. The system offers experimental configurations of increasing complexity, ranging from Malus's law to ellipsometry.
- **Artificial intelligence-based tools:** RAG systems, collaborative platforms like Perusall, AI alphabetization courses and prompting courses for course design were implemented in the perspective of making Artificial intelligence a valuable assistant in education to strengthen student-centered didactics. The Chatbot system RITA indexes course materials using Retrieval-Augmented Generation (RAG) technology; this focuses responses on the context most relevant to the specific question, thereby improving answer quality. Students can ask RITA for clarifications or study guidance – she acts much like an expert study partner. Perusall (Miller et al., 2018) aim to foster collective reading while stimulating critical engagement by allowing students to add comments in the margins of texts assigned. This platform developed at Harvard University based on an idea by Eric Mazur, the platform is now available in Italian as well; through a collaboration with the American university, Sapienza developed an Italian version of Perusall, enabling professors to utilize the platform's predictive assessment algorithm for comments directly in Italian.

Conclusions

Sapienza's model successfully pairs central management with a distributed

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network. It frames the TLC as a systemic environment where training and infrastructure converge to build a shared culture of higher education quality and to disseminate the achievements of the Digital Education HUB in terms of new technologies for didactics.

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