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Ethics, Transparency, and Integrity in Higher Education in the Age of Digital Transformation

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Introduction

This first issue of the *Rivista Universitas* stems from the call for papers on "Ethics, transparency and integrity in higher education in the era of digital transformation". The choice of this theme is not simply a reaction to increasingly pervasive technological change; it also reflects the need to situate the digitisation of higher education within a clear normative framework, in which innovation, rights and responsibilities are considered together rather than placed in opposition. The journal accepts and publishes contributions in both English and Italian, and this inaugural issue already includes articles in both languages.

The rapid diffusion of digital platforms, integrated information systems, artificial intelligence tools and electronic credentials has profoundly reshaped teaching, learning, research and university governance. Yet these processes are far from neutral: they raise crucial questions concerning the transparency of decision-making, academic integrity, equity of access and the protection of students' and staff members' personal data. "Digital transformation" cannot be reduced to the mere introduction of new technological tools; it entails the reorganisation of institutional processes, the redefinition of responsibilities and the construction of data governance frameworks inspired by quality-by-design principles and by the effective participation of the various institutional actors.

The contributions gathered in this issue address these questions from diverse but convergent disciplinary and methodological perspectives. They examine the digitisation of higher education systems, data interoperability and digital tools (including artificial intelligence); the implications of AI for academic writing and for institutional policies aimed at safeguarding integrity; the interconnections between sustainability, quality assurance and institutional responsibility in the use of technology; students' perceptions of education fraud and their potential role in countering it; forms of resistance and re-appropriation of education in crisis contexts, such as Palestine and Afghanistan; and the impact of diploma mills and fraudulent credentials on trust in educational qualifications and on the economic and symbolic costs borne by individuals and institutions.

Taken together, these essays demonstrate that to discuss ethics, transparency and integrity in the age of digital transformation is to interrogate not only which technologies are adopted, but also how they are designed, governed and made accountable to promises of inclusion, quality and educational justice. With this issue, Universitas seeks to contribute to a debate that rejects a simplistic opposition between innovation and the protection of rights, and instead explores pathways towards a digital transformation of higher education centred on people, institutional accountability and robust processes, as well as on their measurable outcomes.

Prof. Luca Lantero
Editor-in-Chief Universitas

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Digitalization, Data, Interoperability and Digital Tools (AI included) in Higher Education

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Abstract

In the face of rapid technological transformations, particularly driven by Industry 4.0, artificial intelligence (AI) and digitalization, higher education institutions should radically rethink how academic programmes are designed, updated, and aligned with labour market dynamics. This article explores how data-driven approaches, advanced analytics, and AI - both traditional and generative - can be integrated into the design and strategic evolution of academic courses. It focuses on actionable datasets, organizational constraints, and the contributions of multiple stakeholders beyond the well-discussed customers (students and families) and higher education providers such as career services, credential evaluators, alumni associations, policy makers, and companies. Our contribution ends the critical literature review with a forward-looking framework for enhancing higher education course design through intelligent data integration. The goal is to move from reactive and ideologically polarized practices toward strategic, evidence-informed, and continuously adaptive educational ecosystems.

Keywords: Higher education, Academic course design, Artificial intelligence, Data-driven decision-making, Labour market alignment

1. *The Higher Education Ecosystem*

The higher education (HE) system develops and evolves thanks to the interaction of various actors, operating within a constantly changing national and supranational framework. This framework is influenced by geopolitical developments, new technologies, regulatory aspects, as well as new environmental, ethical, and social sensitivities. At the same time, society itself is changing its customs, references, and development prospects.

Figure 1 represents the higher education (HE) system at the centre, surrounded by actors who interact directly with it. Further outward, the data generated and exchanged during these interactions are shown, while the outermost layer contains the forces that, while external to the system, influence its behaviour and guide its evolution.

Starting from the centre, the first-layer actors – capable of influencing both the content and dynamics of the system – are students and faculty, but also labour marker (companies and public organizations), policy makers, credential evaluation offices (essential for international mobility), alumni (former students who become professionals and maintain ties with their home institution), and career offices, which play a crucial role in connecting with the labour market and university programmes. On the data level, each actor produces or manages specific information sources. Faculty members manage degree programmes, individual courses, handouts, and training materials; they exchange grades (from faculty to student) and teaching evaluations (from students to faculty) with students; they interact in the classroom, in professional courses, in continuing education activities (including lifelong learning, first- and second-level master's degrees), and in the relevant professional registers.

Figure 1. The Higher Education ecosystem: driving forces, data and actors

Students, in turn, interact with career offices by answering questionnaires, submitting resumes, participating in career days and meetings with companies, and updating their employment and salary information. This relationship changes over time, with students forming alumni associations that maintain ongoing interaction with the university to strengthen their network and promote "giving back" initiatives.

Career offices also interact with companies and the labour market, seeking to facilitate the matching of supply and demand and, in the most effective cases, reporting to the degree programmes any mismatches found between the required skills and those actually provided.

International student mobility is achieved through admission procedures and the recognition of training completed abroad. This activity is made possible by credential offices, which verify the validity of certifications, arrange for their translation, and manage the processing of applications, which are then forwarded to the degree programme chairs.

Companies recruit new resources not only through career offices, but primarily through advertisements, referrals, direct contacts, and informal or non-digitalized channels. While online job offers, posted on company websites or matchmaking platforms, can be collected and monitored, tracking hires made through personal relationships or informal networks is much more difficult. This data, while valuable, largely escapes datafication processes.

Policymakers, observatories, and national and supranational institutions analyse the available data, which is often fragmented across different ministries and replicated at the national level, in the absence of a coordinating supranational body. Overlaps between offices and directorates are not uncommon. The data, managed in silos, fuels interesting reporting but is rarely integrated with other sources, thus limiting the possibility of developing more comprehensive explanations.

Based on stakeholder interests, international trends, and national or supranational contingencies, policymakers define new or updated policies, laws, and standards to guide the evolution of higher education and generate added value for businesses and society as a whole.

The current landscape reveals a growing misalignment between academic offerings and professional demands. Enterprises increasingly require adaptive, often hybrid professional profiles, but tend to avoid investing in long-term relationships with academic institutions. As a result, Career Services operate under reactive modes, focusing primarily on immediate placement tasks while lacking the analytical tools, time, and strategic mandate to inform curricular changes. The limited reuse of structured and unstructured data from these offices represents a critical missed opportunity for universities.

Credential Evaluators (e.g., those in the ENIC-NARIC[1] networks), historically tasked with recognition and comparison of qualifications, now face new challenges such as generative AI-enabled credential fraud. Although they possess large-scale knowledge on international mobility and education comparability,

[1] The ENIC (European Network of Information Centres)-NARIC (National Academic Recognition Information Centres in the European Union) Networks, is an initiative to coordinate national information centres on academic recognition of qualifications of 56 countries, operating under the principles of the Lisbon Recognition Convention (1997).

their insights are not yet systematically embedded into institutional planning and curriculum design processes. Moreover, internal fragmentation within universities – across offices, programmes, and levels – hinders interoperability and limits the potential for integrated analysis of credential data[2].

Alumni associations also represent a largely untapped resource. While they often focus on networking and identity-building, their potential to contribute longitudinal data on career development remains underexploited. If coordinated with Career Services, these data could be used to build predictive models to evaluate course efficacy over time.

Even richer data is available for individual degree programmes and courses. Indeed, interactions between instructors and students could reveal important suggestions for improving teaching. Instructors evaluate students' acquired knowledge and skills based on tests and exams, while students evaluate teaching in terms of quality and quantity. This can allow us to correlate final results with different pedagogical approaches to teaching, assuming the incoming student population does not change. This assumption is somewhat tentative, but if the population were to change, it would be possible to measure it by analysing the entrance tests required in some faculties (e.g., medicine, engineering) to assess entry skills and formalize learning gaps. If we then delve deeper into each course, the quantity and richness of data become even greater. The syllabus for each course, which often identifies the content of a single lesson, as well as lecture recordings, slides, handouts, and reference texts, are a vast treasure trove of information. The complexity of the analysis has often prevented analytical use of these data, let alone prospective use.

The authors argue that a digital and data-centric approach is essential to overcome this fragmented ecosystem. Therefore, the aim of the article is to review the various sources of data that Higher Education Institutions (HEIs) can (potentially) use to better inform curricula development, and the means available to merge and synthesize these data. It looks at both demand requirements (labour market) and supply-side ones, including the use of new types of education and training delivery (including both platforms and gamification approaches).

The integration of multiple datasets – ranging from Credential Evaluator repositories, labour market intelligence, and online job ads (Filippo Chiarello, Gualtiero Fantoni & Terence Hogarth, 2021[3]; Silvia Fareri, Nicola Melluso, Filippo Chiarello & Gualtiero Fantoni, 2020[4]) to internal data sources like course syllabi, teaching evaluations, and career outcomes – enables a more evidence-based, agile approach to curriculum development.

The article is structured as follows: it starts with the analysis of the current landscape through the driving forces that shape Higher Education, as illustrated in Fig. 1. It then investigates individual data sources, exploring their analytical and prospective uses, and various approaches for their analysis. The

[2] Debowski, S., *Shifting sands: Navigating being academic in an evolving sector*, "Higher Education Research & Development", Vol. 41, no.1, 2022, pp.7-20. Le Deist, F. D., Winterton, J., What is competence?, "Human Resource Development International", Vol. 8, no.1, 2005, pp. 27-46.
[3] Chiarello, F., Fantoni, G., Hogarth, T., et al. Towards ESCO 4.0: *Is the European classification of skills in line with Industry 4.0?*, "Technological Forecasting and Social Change", Vol. 173, no. 121177, 2021. https://doi.org/10.1016/j.techfore.2021.121177.
[4] Fareri, S., Melluso, N., Chiarello, F., Fantoni, G. *SkillNER: Mining and mapping soft skills from any text*, "Expert Systems with Applications", Vol. 184, no.115544, 2021. https://doi.org/10.1016/j.eswa.2021.115544.

article critically presents potential uses of the sources highlighting areas for interoperability. It concludes by outlining the advantages and outcomes of systematically analysing data sources. Furthermore, given the rise and widespread application of new AI technologies, including generative AI. The paper concludes with an illustrative case study where different sources and tools are used to design a novel course.

2. *The present scenario*

The digital transformation of HE is deeply influenced by multiple external forces – political, economic, social, technological, environmental, legal, and ethical. A STEEPLE analysis helps to systematically map these factors, highlighting both opportunities and risks that universities must address when redesigning courses with AI, data, and interoperable systems at the core.

Table 1 - STEEPLE Analysis

DRIVING FORCE	KEY ISSUES FOR HIGHER EDUCATION DIGITALIZATION
Political	EU and national policies on digital skills and AI adoption; funding programmes (Horizon Europe, Erasmus+); tensions in international geopolitics affecting tech dependencies (US software, Chinese/Taiwanese hardware).
Economic	Labour market mismatches and STEM skills shortage; pressure to align courses with employability; cost-saving potential of online/hybrid education; impact of edtech startups aiming to become "Netflix of education".
Social	Changing student profiles, shorter attention spans (microlearning trends); demand for motivation and guidance beyond content; alumni networks as underused resources for career tracking and feedback loops.
Technological	Machine-to-Machine and IoT; Industry 4.0; Industry 5.0; AI, Deep Learning and generative AI development; interoperability challenges across university systems; opportunities in predictive analytics (job ads, skill mining); risks of overreliance on generative AI and cognitive skill losses.
Environmental	Push for green and sustainable transitions (ESCO[5] integration of green skills); digital education can reduce commuting emissions but increases energy demand for IT infrastructure.
Legal	Credential evaluation and recognition (ENIC-NARIC, ESCO updates); risks of credential fraud with generative AI; data privacy and GDPR compliance in student monitoring and learning analytics.
Ethical	Risk of exacerbating inequalities (access to AI tools, digital divide); bias in AI-driven recommendations; role of teachers as motivational and ethical guides; need to balance gamification/addiction with genuine learning motivation.

[5] European Skills, Competences, Qualifications and Occupations.

The STEEPLE analysis shows that technological and economic drivers are currently the most pressing: universities are under pressure by the rapid evolution of technologies (IoT, blockchain; DeepLearning, etc..) and models (digital twining; Industry 4.0 and 5.0) to adopt. The availability of data increased as the complexity to homogenize, clean and correlate them, tools for data analytics are more available than those for data integration that still require IT proficiency. New competences on AI to stay aligned with labour market dynamics face both infrastructure and capability gaps not often the HEIs can assure.

The speed at which technologies and business needs evolve is significantly higher than the reactivity of universities, which are hindered not so much by willingness (though this also warrants discussion) but primarily by the technical time required to update courses and curricula. Indeed, even for a single course that undergoes substantial revision or update, the minimum time we can expect between identifying a need and launching a new course is about one year, not to mention the revision of an entire degree program, which takes at least three years. The solution adopted by many instructors is to progressively introduce new content that doesn't drastically alter the course's overall structure but provides new elements as technology improves. This is a palliative compared to the significant need for revision of many university courses that were designed when artificial intelligence and generative artificial intelligence did not exist, were not known, and were not inexpensive or free as they are today. Political and legal factors provide both constraints and opportunities, with EU policies pushing for interoperability, green/digital skills, and international recognition systems (ESCO), but also imposing compliance requirements (e.g., GDPR).

Microcredentials, recently introduced by the Commission, offer a clever solution to the rapid evolution of the market and its new demands. While microcredentials have existed in various forms within vocational training, the European Commission has recently sought to standardize them to ensure quality and portability across the EU ecosystem[6]. Although the concept is well-conceived and structured, the systematic adoption of micro-credentials varies significantly across national contexts and educational sectors. While they are increasingly common in Vocational Education and Training (VET), their integration within HEIs remains uneven – often confined to lifelong learning or executive training portfolios rather than being fully embedded into standard degree curricula. It is currently unclear whether this resistance stems from a need for further experimentation with microcredentials or from ideological biases against this new approach.

On the social side, students' evolving profiles and expectations require universities to rethink pedagogy – moving from knowledge delivery to motivation, guidance, and skills for uncertainty. The abrupt emergence of Generative Artificial Intelligence (GenAI) has necessitated a shift in perspective and a thorough re-evaluation of potential ethical challenges. Universities, it seems, were unprepared for its arrival. Without careful management, the adoption of AI risks exacerbating inequalities, encouraging dependency, and diminishing crucial cognitive abilities.

In this complex scenario, HEIs continue to find answers to questions such as: What are the most sought-after professional profiles in the market? How can we adapt our educational offerings to market needs?

[6] European Centre for the Development of Vocational Training, *Microcredentials for labour market education and training*, CEDEFOP, n.d. https://www.cedefop.europa.eu/en/projects/microcredentials-labour-market-education-and-training. [Last accessed 15 Settembre 2025].

What new skills are needed for professional growth? Are there differences in the jobs and salaries students can expect if they graduate from different universities with the same degree program?

While many of these questions were once answered through logical considerations and deductive reasoning based on limited data or by observing macroscopic trends in enrolment at individual universities or degree programmes, now, thanks to abundant and diverse data, we can answer them much more accurately and likely even predictively, ignoring events that introduce difficult-to-predict nonlinearities (COVID-19, wars, etc.).

Unfortunately, data are often hidden in siloes, heterogeneous in format, with restricted access and disconnected, although sometimes gathered within the same institution. But, although available, too often such data are not used for analysis and for redesign content courses and pedagogical approaches. The following section details the data sources and methodologies employed to analyse historical trends and forecast future outcomes.

3. *Data sources and interoperability*

This section examines data sources and their interoperability, considering the content embedded within each source and the stakeholders involved in their production, aggregation, or management.

Information regarding lectures, courses, and studies offers valuable insights into content relationships, course structuring, dependencies, interconnections, and potential redundancies. Information types range from textual data, which is impactful yet challenging to analyze, to details regarding duration, organization, keywords, and topics.

3.1 *Degrees and courses content*

Italian universities must publicly provide detailed information about their degree programmes and courses due to Ministerial Decree 270/2004 and the ANVUR's AVA[7] system. The SUA-CdS[8], an annual standardized form, is crucial for this, ensuring transparency for students, families, employers and is tied to accreditation and quality assurance.

Programme and course descriptions must include objectives, expected learning outcomes, teaching and assessment methods, credits (European Credit Transfer and Accumulation System or briefly ECTS, and responsible professors. Learning outcomes are explicitly structured according to the Dublin Descriptors (knowledge and understanding; applying knowledge; making judgements; communication skills; learning skills), in line with the Bologna Process and European standards.

[7] The ANVUR's AVA system is a comprehensive framework for assessing and accrediting higher education institutions and their programs in Italy. The accreditation is the final outcome of the AVA process, where the ANVUR decides whether the institution or program has met the established quality standards. ANVUR is the Italian National Agency for the Evaluation of the University and Research Systems.
[8] SUA-CdS stands for the Annual Study Programme Datasheet and is an official document used in Italian universities to describe a specific degree program providing information on graduate profiles, educational objectives, the course of study, learning outcomes, roles and responsibilities related to the Study Program quality assurance system.

Although there is no single central website for all course descriptions, the Ministry provides a national portal, Universitaly (www.universitaly.it), which collects information on all accredited degree programmes. For detailed course unit descriptions, each university publishes its own online course catalogue, generally following a very similar format, since the structure is dictated by the requirements of DM 270/2004, the SUA-CdS template, and the ANVUR accreditation criteria.

Since 2013, the SUA-CdS (Annual Programme Form) has been mandatory for every study programme. This form, collected and updated annually, ensures the systematic publication of standardized data. Consequently, the collected data now include extensive textual information, adhering to international standards, which details aspects such as learning objectives, goals, and assessment methods, and has a relatively long observation period.

This information is publicly available and easily accessible via the specific university website. Since it often follows a consistent template (e.g. via Universitaly), data from different courses, departments, and universities can be easily compared, allowing for the observation of their evolution over time.

Irene Spada, Simone Barandoni, Vito Giordano, Filippo Chiarello, Gualtiero Fantoni & Antonella Martini (2023)[9] analysed 54,535 learning outcomes from degree programmes across 92 Italian universities (State, Private, and Online) over 10 Academic Years (2013/2014 to 2022/2023). By using a series of natural language processing (NLP) techniques, they identified 6,062 distinct topics, with an average of 23 per program, and measured their relevance, introduction, and growth rates.

The most recently introduced and rapidly expanding topics in these programmes include: (i) the impact of technological transformation on products, services, and organizations; (ii) Artificial Intelligence; but also (iii) Sustainability, (iv) Research and development in the medical field and (v) Renewal in law.

These topics aim to equip students with the necessary skills for a rapidly changing job market. Additionally, many universities are adopting interdisciplinary approaches. This allows students to explore connections between different fields, fostering knowledge exchange and promoting vertical specialization to prepare them for fast-changing career paths. The research work not only demonstrated the possibility of analysing a huge amount of data and transforming it into valuable insights but also showed how NLP can convert textual data, often left qualitative, into quantitative insights.

3.2 *Lecture contents*

Course data is standardized. However, detailed lecture information (date, duration, teacher, title, and content description) is not uniformly tracked or publicly accessible across all universities. Typically, each lesson record includes the date, time, type, and a brief, two-line description of the topics covered.

When they are publicly available and not restricted to students belonging to the specific university or course, the data format is still different, thus requiring a long process of standardization, necessary for comparison. This lack of granular data and the different information they capture prevents a real possibility of detailed comparative analyses.

[9] Spada, I., Barandoni, S., Fantoni, G., Martini, A., et al., *What users want: A natural language processing approach to discover users' needs from online reviews*, "Proceedings of the Design Society", Vol. 3, 2023, pp. 3879-3888. https://doi.org/10.1017/pds.2023.387.

However, when available or accessible, they could complement more general analysis with insights emerging from the detailed descriptions that explain how each course is implemented in reality. Moreover, having the possibility of analysing comparatively the same course (e.g. Physics I) taught with different sequences and maybe with different results (in terms of students' proficiency) could help in improving teaching approaches.

The evolution of the course, lecture by lecture, actually provides an interesting opportunity to discover the real curriculum or even the hidden curriculum (Jane Roland Martin, 1976[10]). Diana Domenichini, Vito Giordano, Gualtiero Fantoni & Filippo Chiarello (2023)[11] developed a method using Natural Language Processing to create personalized glossaries for new teaching courses. This approach addresses the diverse backgrounds of students by focusing on their expected skills, derived from lectures attended, rather than their CVs. The knowledge and skills documented in each lesson record were cross-referenced with the handouts of the new course. The resulting personalized glossaries highlight terms and topics unfamiliar to students, providing a strong foundation for learning new material.

Given that many educators already provide slides and handouts for their courses, a subsequent enhancement would involve linking these materials directly to specific lecture content. This would also include creating explicit links to other relevant courses, outlining prerequisites, highlighting overlaps, and identifying other connections that might not be immediately apparent.

3.3 *Study materials: books, lecture transcripts, slides, and handouts*

Learning materials encompass various resources like handouts, glossaries, textbooks, articles, videos, exercises, and quizzes. While AI-driven systems have been developed to leverage this material for personalized learning path recommendations, as noted by Amir Hossein Nabizadeh, José Paulo Leal, Hamed N. Rafsanjani, Rajiv Ratn Shah (2020)[12], Felipe Leite Da Silva, Bruna Kin Slodkowski, Ketia Kellen Araujo Da Silva, and Cazella, Silvio Cesar (2023)[13] highlight significant limitations. Indeed, these systems often fail to consider all the factors influencing a student's learning process.

Due to the rapid pace of technological change, companies must continuously develop new upskilling and reskilling programmes for their workforce. These programmes are often generic, and designing specific courses can be demanding and time-consuming. To create effective and efficient learning paths, Irene Spada, Gualtiero Fantoni & Antonella Martini (2023)[14] proposed a Prerequisite Discovery approach. This method maps dependencies among skills to be acquired, while also considering field-specific requirements. The approach utilizes text mining techniques and machine learning algorithms to identify and predict prerequisite relationships. It begins by identifying and extracting skills from structured texts such as books, handouts, or course transcripts. Once extracted, each skill is linked to

[10] Martin, J. R., *What should we do with a hidden curriculum when we find one?*, "Curriculum Inquiry", Vol. 6, no. 2, 1976, pp. 135-151.
[11] Domenichini, D., Giordano, V., Fantoni, G., et al., *Towards Personalized Educational Materials: Mapping Student Knowledge Through Natural Language Processing, Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, "Cham: Springer Nature Switzerland", Vol. 2134, 2023, pp. 64-79. https://doi.org/10.1007/978-3-031-74627-7_5.
[12] Nabizadeh, A.H., Leal, J.P., Rafsanjani, H.N., et al., *Learning path personalization and recommendation methods: A survey of the state-of-the-art*, "Expert Systems with Applications", Vol.159, no.113596, 2020.
[13] Da Silva, F. L., Slodkowski, B. K., Da Silva, K. K. A., et al., A *systematic literature review on educational recommender systems for teaching and learning: research trends, limitations and opportunities*, "Education and information technologies", Vol. 28, no. 3, 2023, pp. 3289-3328.
[14] Spada, I., Martini, A., Fantoni, G., *How to Discover the Prerequisites in Education and Training Courses: A Data-driven Method to Design Learning Path*, Riunione Scientifica Annuale AiIG, Palermo. 2024.

all sections where it is mentioned, but specifically attributed to the section where it is most elaborated and frequently cited. When two or more competences appear in the same section, the correlation between competences emerges and the prerequisite relationship is determined. They are linked one with the other and the prerequisite follows the logical order in which different competencies appear and are elaborated within the text.

4. *The labour market side of education*

In the past, a degree in a specific field virtually guaranteed immediate employment and a good salary. Today, however, the rapid evolution of technology and the labour market quickly render obsolete job profiles that were highly sought after less than five years ago (e.g., social media manager). Data on hiring, firing (including voluntary resignations), and vacancies, broken down by age, industry, and region could provide a real-time mapping of professional and skill-based dynamics to be analysed, understood and faced with new university or training programmes.

4.1 *Long, short and immediate impact of education*

Assessing the impact of a course or degree programme often presents challenges. While initial data exists and is collected systematically by all Italian universities, the problem arises when this information needs to be linked to students' careers after they have completed their university studies. The connection with students who have passed through a specific institution is lost or managed by different entities that often do not coordinate. There are, in fact, alumni groups organized into associations, some career services offices that systematically connect with alumni, or, to get all the data, one would have to integrate information from all the unstructured groups of connections and friendships among former students – Facebook, LinkedIn, and WhatsApp groups – but this is difficult, if not impossible, to do.

Universities with the foresight to establish an alumni office can more easily manage data and information concerning the career progression and development of their former students. This means having the ability to monitor the job profiles that their alumni go into, stratified by background, graduation score, etc., and their remuneration in the short, medium, and long term. Without this information, it's challenging to assess the return on investment and the alignment between a new student's aspirations for a university programme and their eventual job market placement. Similarly, it's difficult to gauge the discrepancy between expected salary and the effort needed to achieve it. But, while it helps the single university to compare its internal educational offerings, it does not provide any information about potential comparison and benchmark.

An interesting and quite wide source of information has been managed by AlmaLaurea since 1994. AlmaLaurea is an Italian inter-university consortium that connects universities, students, graduates, and businesses. It has since expanded with the gradual inclusion of many Italian universities. The purpose of collecting data is twofold:

- to gather and analyse statistical data regarding graduates' university careers and employment;

- to function as a "CV database", facilitating the connection between job seekers and available qualified positions.

Participating universities contribute administrative data concerning student careers. Undergraduates and graduates further enrich this database by completing questionnaires at graduation and then again after one, three, and five years[15]. These questionnaires collect personal information, details on educational experiences, and work history. Universities utilize this database for placement services, internal reporting, and monitoring the career progression of their graduates. Businesses can access CVs and post job advertisements through the platform.

What the AlmaLaurea surveys reveal: employment trends, salaries, mismatch (i.e., the gap between skills acquired at university and those actually used in the workplace), social trends. AlmaLaurea data allow the analysis of graduate employment rates, entry times, and degree-job mismatch[16]. It reports roles and average net monthly wages five years post-graduation, measuring the impact of investment. The data also covers gender differences in salaries, social dimensions, and family origin, including the social transmission of cultural capital.

4.2 *Compulsory communications*

While the correlation that could be achieved in by analysing ex post the medium and long-term impacts demonstrated to be largely true, more immediate data as those emerging from compulsory communications from employment centres could reveal fine grain behaviour, usually not observed when a wider timeframe is considered. Of course, the former e.g. those from AlmaLaurea are fundamental for promoting more difficult but higher value-added courses, but short-term or geographical impacts can be detected instantaneously by compulsory communications. Such data are even more interesting if we consider to linking the labour market results of specific cohorts or degree courses (especially Master Degrees). In this way, it is possible to have fresh data from the market, monitor what is happening in reality and not just what is declared, and understand if there are mismatches between the designed profile of the graduate and the actual demands of the job market. However, this does not mean that the expectations of stakeholders during the selection phase of a university course are the correct ones; rather, the choice is sometimes an ideological one or is linked to statistics that are no longer accurate because they are based on old data.

The creation and publication of fresh information, updated annually, could reduce the gap between the choice and the outcome after four to five years in the case of a bachelor's degree or three to four years for a master's degree. In this way, it would be possible to provide a more precise image of the real demand for and supply of educational programmes and profiles, thereby making the selection process transparent and informed. Transforming mandatory communications into an open statistical system, as proposed by Baldi, C., Giuseppe De Blasio, G., Di Bella, G., Lucarelli, A., & Rizzi, R., (2014)[17], would enable policymakers and universities to analyse publicly accessible, aggregated data (with appropriate privacy

[15] The response rate of the questionnaire is 93,3% since it is mandatory to be answered before the final defence.
[16] Caroleo, F. E., Pastore, F., *Overeducation at a glance. Determinants and wage effects of the educational mismatch based on AlmaLaurea data*, "Social Indicators Research", Vol. 137, no. 3, 2018, pp.999-1032.
[17] Baldi, C., De Blasio, G., Di Bella, et al., *Turning the compulsory communication data into a statistical system*, in Crescenzi, F., Mignani, S., (eds), *Statistical Methods and Applications from a Historical Perspective: Selected Issues*, Cham: Springer International Publishing, 2014, pp. 217-226.

and market safeguards). This would facilitate the extraction of effective and immediate insights. While mandatory communications are neither public and not easy to access, vacancies could represent a proxy of the labour market dynamics.

4.3 *Online vacancies*

Online vacancies issued by companies (especially large ones), by temporary employment agencies (i.e. Adecco Italia, Gi Group, Manpower, Randstad Italia, Umana, etc.), by matchmaking platforms (i.e. Glassdoor, Indeed, InfoJobs, LinkedIn, Monster), and by vacancy aggregators (i.e. Burninglass).

What is known, however, is that the same advertisement can be present on multiple platforms, and that the same advertisement can be repeated multiple times in the same year by the same company, either because it is searching for multiple positions or because it is not finding suitable candidates, leading in any case to an overestimation of the impact of that particular job profile being sought. On the other hand, it is also known that in some cases, the hiring of a new person occurs through the network of relationships of the company's internal staff; this is therefore not tracked through vacancies, but can be detected, for example, by changes in LinkedIn profiles, unfortunately often ex-post and only if the person has a profile on this platform or similar ones.

The Bicocca research group, Roberto Boselli, Mirko Cesarini, Stefania Marrara, Fabio Mercorio, Mario Mezzanzanica, Gabriella Pasi & Marco Viviani, (2018)[18]; Emilio Colombo, Fabio Mercorio & Mario Mezzanzanica (2019)[19]; Anna Giabelli, Lorenzo Malandri, Fabio Mercorio & Mario Mezzanzanica (2020)[20]; Anna Giabelli, Lorenzo Malandri, Fabio Mercorio & Mario Mezzanzanica (2021)[21], has extensively researched the value of web vacancies in the Italian labour market. They developed an intelligence tool that uses text mining, NLP algorithms, and machine learning to analyze job vacancies. This tool calculates measures to assess skills and job profiles, such as the skill requirements for each occupation (Colombo, et al., 2019). It has been applied to analyze skill demand and changes in job profiles affected by Industry 4.0[22] and in human resource management (HRM) to monitor evolving skill needs in job offers[23].

Nowadays, their research has been integrated in a commercial tool provided by burning glass and used by many Higher Education Institutions, thus showing how job offers captured via online vacancies can help HEIs to periodically revise their offer and to better link their courses with the labour market.

[18] Boselli, R., Cesarini, M., Marrara, et al., *WoLMIS: a labor market intelligence system for classifying web job vacancies.* "J. Intell. Inf. Syst", Vol. 51, no. 3, 2018, pp.477-502.
[19] Colombo, E., Mercorio, F., Mezzanzanica, M., *AI meets labor market: Exploring the link between automation and skills.* "Inormation Economic and Policy", Vol. 47, 2019, pp. 27-37.
[20] Giabelli, A., Malandri, L., Mercorio, F., et al., GraphLMI: *A data driven system for exploring labor market information through graph databases,* "Multimedia Tools Appl", Vol. 81, 2020, pp. 1-30. https://doi.org/10.1007/s11042-020-09115-x.
[21] Giabelli, A., Malandri, L., Mercorio, F., et al., Skills2Job: *A recommender system that encodes job offer embeddings on graph databases*, "Applied Soft Computing", Vol. 101, no.107049, 2021. https://doi.org/10.1016/j.asoc.2020.107049.
[22] Giabelli, A., Malandri, L., Mercorio, F., et al., *Skills2Job: A recommender system that encodes...* cit.
[23] Giabelli, A., Malandri, L., Mercorio, F., et al., GraphLMI: *A data driven system for exploring labor market...cit. Boselli, R., Cesarini, M., Marrara, et al., WoLMIS: a labor market intelligence...* cit.

5. *The skill side of education*

Skills are fundamental units used by various stakeholders to define prerequisites, the educational value offered to students, and the demands of the job market. To ensure mutual understanding, skills and job profiles have been standardized within extensive and interconnected ontologies. These ontologies serve multiple purposes but, mainly, enable a shared language.

5.1 *ESCO and O*NET as standardized ontologies for jobs and skills*

Detailed information regarding lectures, courses, and programmes serves as a valuable resource for individual or integrated analysis. However, a complementary approach could involve examining the market's acquisition of skills learned at university. Two primary labour market databases, O*NET in the US and ESCO in Europe, offer a broader and more stable perspective on skills for this purpose. They are also fundamental to standardizing job profile and skill descriptors, which are fully described and defined in the two databases.

These systems not only provide a standardized ontology for recruitment and contracts by mapping job profiles and associated hard and soft (transversal) skills, but provides also key information: They offer insights into the balance between hard and soft skills, the presence of managerial skills, and the portability of skills across different job profiles. Furthermore, it is particularly insightful to observe how the information within these databases changes and evolves over time. Moreover ESCO, being multilanguage, allows the comparison among different countries, different labour markets (demand) and HEI or VET offers.

While the databases of jobs, skills and competences ESCO in Europe remained unchanged for years, at a certain point, see Table 2 the maintenance converted into redefinition of profiles, addition of new skills, that now happened at least once per year.

Table 2 - The evolution of ESCO

VERSION	YEAR / DATE	MAIN FEATURES
SCO v1	July 28, 2017	First full release of ESCO (esco.ec.europa.eu)
ESCO v1.1	January 2022 (webinar on Feb 10, 2022)	Added 68 new occupations, 354 new skills, 158 new knowledge concepts; new transversal skills hierarchy; labels for green/digital/research skills (esco.ec.europa.eu)
ESCO v1.1.2	February 2024	Minor update: improved Ukrainian translation, no new conceptual content (esco.ec.europa.eu, ec.europa.eu)
ESCO v1.2	May 2024 (webinar on May 21)	Major update: 35 new occupations, 42 new skills, 196 new knowledge concepts, 677 new alternative labels, 96 hidden terms, 12,000+ updated concepts; focus on green and digital transition (esco.ec.europa.eu, ec.europa.eu, en.wikipedia.org)

Conversely, O*NET[24], the United States' occupational database, has a more structured and continuous update process since its inception. Nevertheless, there's an increasing frequency in the acceleration of changes and the number of new occupations introduced.

These two sources, despite differences in the number of occupations and skills, serve as valuable references. They can be used to standardize job profiles within companies, clearly define company needs (for accurate vacancy descriptions), and facilitate comparisons across different markets. The standardised databases are used by companies to refer to the same skills and profile in different countries but have been also used to create a common language to interpret the labour market.

The European Commission itself, through Cedefop (European Centre for the Development of Vocational Training) provides evidence, analysis, and policy support. Cedefop is an EU agency dedicated to enhancing vocational education and training (VET) across Europe. Through its work on themes such as Skills & Labour Market, Delivering VET & Qualifications, VET Knowledge Centre, and National VET Systems, Cedefop monitors changing skill needs, investigates how education and workplace shifts affect labour markets, and analyses how VET systems can respond. It supports the development of qualifications and credentials, learning outcomes, cross-border transfer of qualifications, and the validation of non-formal and informal learning.

With a rich suite of online tools and databases – including skills forecasts, apprenticeship schemes databases, and tools for evaluating key indicators on VET – Cedefop helps policy-makers, practitioners, and researchers to design and evaluate policies aimed at improving skills development, reducing skills mismatches, and enhancing lifelong learning. Cedefop offers a range of tools, datasets and databases designed to support policy-making, research and practice in vocational education and training (VET) and lifelong learning.

Among its online tools there are a series specifically designed for labour market and skills intelligence such as Skills Forecasts, Matching Skills (surveying policies anticipating future skills needs), STAS (short-term anticipation of skills trends and demand), and Skills-OVATE. Among them, it is worth citing Skills-OVATE that provides information on occupations, skills and regions based on international classification. It acts as an integration tool where occupations (ISCO-08) are classified according to sectors (NACE rev. 2) and regions (NUTS-2). Moreover, Cedefop provides two ways to display information on skills: via ESCO version 1 or O*Net, thus giving the US and European perspectives on the data.

Although the power of tools and data-driven insights (as trends) is enormous, they are not systematically used by universities to adjust or redesign their purposes.

5.2 *Skills required to manage new (and standard) technologies*

The current century presents considerably more uncertainties (VUCA[25]) than the last, making it difficult to predict stable and desirable future scenarios. Unforeseen events such as "black swans"[26], wars, and

[24] Occupational Information Network.
[25] Volatility, Uncertainty, Complexity, Ambiguity.
[26] High improbable negative events, as described in Taleb, Nassim Nicholas, 1960- author. *The Black Swan: the Impact of the Highly Improbable.* New York: Random House, 2007.

international tensions, once almost inconceivable, are now realities[27]. Furthermore, the transformation of capitalism[28] has the potential to shift global power dynamics towards nations or continents better positioned for capital growth.

Contrary to predictions by Carl Benedikt Frey & Michael A. Osborne, (2017)[29], the rapid advances in technology (Industry 4.0 and 5.0), coupled with international policies and laws, have not negatively impacted the labour market. Instead, these factors have reshaped market dynamics, leading to changes in the types of jobs and skills in demand. Evidence of this evolution in occupations, skills, and jobs can be found through the analysis of online vacancies and changes in reference occupation databases across both the USA and Europe.

While job vacancy analysis quickly reflects current labour market demands, it struggles to predict future skill needs. Chiarello, et al., (2021) demonstrated a method to identify skills emerging from new technologies or paradigms like Machine-to-Machine communication and sustainability. They collected scientific publications on a specific topic (e.g., Industry 4.0) and used Named Entity Recognition (an NLP technique) to extract relevant technologies. By measuring how well ESCO, a multilingual classification of European Skills, Competences, Qualifications and Occupations, was updated with these new technological paradigms, their analysis revealed that some technologies were well-represented, while others, despite being central to Industry 4.0 and known for years (e.g., Manufacturing Execution Systems), were entirely absent.

5.3 *From hard skills to soft skills*

Approaches like those of Giabelli, et al., (2021) and Chiarello, et al., (2021) can help in identifying required soft skills in the market or those linked to specific technologies or disciplines, Silvia Fareri, Nicola Melluso, Filippo Chiarello & Gualtiero Fantoni (2021) developed a tool specifically designed to extract soft skills from various texts. Their research introduced a named entity recognition (NER) system, trained on over 5000 scientific papers using a support vector machine (SVM). This tool not only detected soft skills but also calculated the connections between them, with potential applications for linking them to technologies, hard skills, and domains.

Fareri and colleagues also utilized this soft skill map to analyse job profiles. By examining job profiles through the lens of shared soft skills, they uncovered clusters that revealed unexpected proximities between theoretically disparate professions and occupations, suggesting that many perceived differences are not as significant as believed.

5.4 *Skills for a green and sustainable future*

The United Nations' Sustainable Development Goals have prompted a thorough re-evaluation of production, logistics, social dynamics, and education across industries, labour markets, and educational systems. Higher Education Institutions have responded by integrating new or existing content into

[27] Aresu, A., *Geopolitica dell'intelligenza artificiale*, Feltrinelli, 2024.
[28] Sabella, G., *La Grande Transizione del capitalismo*, Rubbettino, 2025.
[29] Frey, C. B., Osborne, M. A., *The future of employment: How susceptible are jobs to computerization?* "Technological Forecasting and Social Change", Vol. 114, 2017, pp. 1-72. https://doi.org/10.1016/j.techfore.2016.08.019.
[30] Fareri, S., Melluso, Fantoni, F., et al., *SkillNER: Mining and mapping soft skills from any text*, "Expert Systems with Applications", Vol. 184, no. 115544, 2021. https://doi.org/10.1016/j.eswa.2021.115544.

their curricula. However, identifying the essential skills and competencies required to update higher education offerings remains a complex challenge.

The study performed by Irene Spada, Vito Giordano, Filippo Chiarello, Marco Abate, Francesca M. Dovetto & Gualtiero Fantoni (2024)[31] showed how universities were slowly absorbing the new mandate. For making it easier and operational, Irene Spada, Vito Giordano, Filippo Chiarello, Antonella Martini & Gualtiero Fantoni (2025)[32] analysed two EU employment policies: the EU Taxonomy for Sustainable Activities (EU-TSA) and the Green Concepts within the European Classification of Skills/Competences, Qualifications and Occupations (ESCO). Their research aimed to identify the crucial skills and mindsets for sustainability that can foster new growth models. They utilized a Natural Language Processing approach to assess the alignment between these policy documents and to operationalize their content in terms of specific skills, thus making them available to policy makers and chairs of programme degrees in universities.

6. *New venues and methods for education*

While the web has existed for decades, its structured application for training and courses is a relatively recent development. The COVID-19 pandemic significantly accelerated the growth of online learning. This surge led to the proliferation of online platforms offering self-paced courses, available 24/7, covering a vast array of topics. These platforms, some with coaches and teachers and others without, also facilitated experimental approaches, including attempts to blend education with entertainment. Gamification began influencing traditional courses, with efforts to boost student motivation and engagement often serving to drive sales. Various business models emerged, ranging from those capitalizing on trending topics and large student numbers to those exploiting the “long tail” where low-cost teachers offer niche courses to smaller audiences.

6.1 *The online side of training and education*

Online learning platforms (often known as MOOC, Massive Open Online Courses) such as Coursera, edX, and Udemy provide valuable insights into current learning trends. Coursera and edX offer structured, university-led programmes and formal qualifications, with edX specializing in STEM fields. In contrast, Udemy provides a vast catalogue of affordable, self-paced courses focused on practical skills rather than academic credentials.

While detailed information (transcripts, slides, etc..) may no longer be publicly accessible, these platforms offer a wealth of metadata (e.g., course titles, participants, ratings) and data (e.g., content, reviews). This information provides a clear overview of courses and topics. Analysing the evolution of participant numbers, user evaluations (Nasa Zata Dina, Riky Tri Yunardi, Aji Akbar Firdaus & Nyoman

[31] Spada, I., Giordano, V., Fantoni, G. et al., *Tracing topic evolution in higher education: A text mining study on Italian universities*, “Studies in Higher Education”, Vol. 49. no. 11, 2024. pp.1965-1983.
[32] Spada, I., F., Martini, A., Fantoni, G. et al., Text mining on green policies for integrating sustainability in higher education, “The International Journal of Management Education”, Vol. 23, no. 2:101126, 2025. https://doi.org/10.1016/j.ijme.2024.101126.
[33] Dina, N. Z., Yunardi, R. T., Firdaus, A. A., et al., *Measuring User Satisfaction of Educational Service Applications Using Text Mining and Multicriteria Decision-Making Approach*, “International Journal of Emerging Technologies in Learning”, Vol. 16, no.17, 2021. https://doi.org/10.3991/ijet.v16i17.22939.

Juniarta, 2023)[33], and content can help determine current trainee demands. Such trends can offer interesting insights into perceived high-value skills and abilities, as well as the changing perception of formal education.

Beyond formal online training, a rich array of valuable, current, and reinterpreted content is available through less structured channels. TED Talks, TEDx, and podcasts, often well-organized by topic, offer daily updates and recontextualize information in light of recent news and geopolitical developments. TED, a global conference series, began in 2006 and covers a wide range of subjects, from business to science to entertainment. TED talks have been made available on the TED website. These informal resources provide an enjoyable way to stay updated or explore unfamiliar topics. Davide Taibi, Shailendra Chawla, Stefan Dietze, Iolanda Marenzi & Besnik Fetahu (2014)[34] created an open database with a series of metadata (Title, Speaker, description, location, etc) but also content (keywords, transcript, etc.), thus making available and searchable the entire content.

Alongside traditional academic education, other forms of learning are crucial for upskilling, reskilling, and introducing innovative content. By analysing platforms such as Massive Open Online Courses and blogs (e.g., Medium), we can gauge student and practitioner interest in emerging topics and strategically integrate these into standard learning curricula.

6.2 *Microlearning and the challenge of attention in the digital age*

Research suggests that social media addiction, characterized by a preference for short, fast content and endless scrolling, may contribute to shorter attention spans[35]. In response, a growing number of companies are promoting microlearning on social media platforms. They often present it as a solution to combat social media addiction, yet frequently replicate the very “look and scroll” mechanisms that foster dependence. This raises a crucial question: can all content be effectively transformed into microlearning? Furthermore, can microlearning provide the deeper understanding achieved through connecting concepts, building causal chains, and establishing dependencies among different and unlinked pieces of micro information?

Microlearning, while convenient for quick consumption during corporate life’s spare moments, presents challenges for structured learning. It excels in training for specific tools or operational tasks but falls short in developing critical thinking and problem-solving skills, which are fostered by the holistic approach of classic courses. The effectiveness of learning numerous small, separate notions is questionable when compared to the comprehensive understanding offered by traditional methods.

Similarly, in learning support materials, condensed study guides (like a “Bignami”) may hinder the development of learning strategy, planning, and study tactics, unlike a complete textbook. Developing educational materials with excessive simplification, necessary for information fragmentation, risks eliminating crucial connections between parts, thereby impeding deep understanding. Omitting seemingly “irrelevant” sections can compromise overall learning, as these may contain connections that become clear with maturity and subsequent readings.

[34] Taibi, D., Chawla, S., Dietze, S., et al., *Exploring TED talks as linked data for education*, “British Journal of Education Technology”, Vol, 46, 2015, pp. 1092-1096. https://doi.org/10.1111/bjet.12283.
[35] Iotti, L. *8 secondi: viaggio nell’era della distrazione*. Il Saggiatore. 2020.

Conversely, it is hypothesized that learning small notions could stimulate curiosity and motivate deeper exploration. However, it remains to be seen if this approach is sufficient for developing a complete discipline of study and structured learning. The question remains whether comprehensive information can truly be replicated within a microlearning format.

6.3 *Microcredentials*

The need of new courses to respond to market demands, the necessity of filling some skill gaps between the standard courses and the ability to proficiently deal with new technologies, pushed the European Commission to conceptualize the microcredentials.

The European Commission defines microcredentials as certifications for knowledge, skills, and competencies gained over shorter periods than traditional qualifications. These flexible, portable, and labour market-relevant credentials enable individuals to quickly update or acquire new skills, addressing the demands of digital and green transitions and supporting lifelong learning and career changes. They are often confused with or overlapped with open badges, which represent any type of learning outcome, from simple recognition of participation to more structured courses. They are extremely flexible in their application and can be issued by any organization or individual.

Microcredentials are a broader political and pedagogical concept, aiming to create a standardized European ecosystem for the certification of small-scale learning outcomes. The European Commission is working to define common standards and ensure the quality, transparency, and recognition of microcredentials across the EU. The emphasis is on their formal value and their integration into existing education and training systems, as well as their recognition in the labour market.

Evaluating the impact of microcredentials in Europe, regarding their adoption, results, and overall effect, is currently challenging. This is due to their flexible nature and the absence of a standardized reporting format in a dedicated open repository. Therefore, any such analysis would necessitate a significant investment in data collection.

6.4 *Gamification*

Before the emergence of Generative AI, the COVID-19 pandemic spurred the growth of numerous education and training startups. These companies offer a range of solutions, from profile analysis and assessment tools to online platforms that accelerate learning, applications that support studying and track progress, and apps designed to aid in planning and developing effective study methods.

Concurrently, gamification has emerged as a significant paradigm for content delivery in education[36]. Gamification refers to the use of game design elements in non-game contexts and its aim is to simplify the learning process by stimulating attention and creating mnemonic shortcuts, potentially for short-term memory. This approach has been widely applied across various subjects and content areas, making learning experiences resemble electronic games. Gamification extends beyond mere content to encompass exercises, progress tracking, and even exam preparation planning.

[36] Bassanelli, S., Vasta, N., Bucchiarone, A., et al., *Gamification for behavior change: A scientometric review*, "Acta Psychologica", Vol. 228, no. 103657, 2022. https://doi.org/10.1016/j.actpsy.2022.103657.

Many of these startups have expressed ambitions to become the "Netflix of education", highlighting a broader trend of integrating entertainment with educational content. This concept is not entirely new; the television industry, in its pursuit of niche markets, has long featured specialized channels dedicated to documentaries on almost every subject imaginable, from history and animals to cooking and gardening. This trend is also evident in websites and podcasts, demonstrating a consistent effort to blend informational content with engaging delivery.

Also, the research in education tries to develop gamified platforms to support students' learning, stimulating a sense of accomplishment, to engage them with the serious games, and sometimes also to provide a retrospective in order to consolidate what students have learnt. Different gamification techniques could be ported from digital to real classes or vice versa.

While engagement and appreciation metrics are readily available, predicting the long-term impact of this learning paradigm is challenging. Further specific and comparative studies involving large numbers of students across different educational levels are needed due to the phenomenon's nascent stage.

6.5 *Treating a class as a continuous experiment*

A robust monitoring system facilitates in-depth analysis of class learning. Regular assessments offer valuable insights into the class's comprehension, enabling instructors to tailor lectures to the students' ability to absorb information. Moreover, progressive performance data can help teachers forecast student behaviour and outcomes, providing essential direction for annual or even in-course lecture modifications.

Assessments and tests are vital, not only for tracking progress but also for fostering motivation. Motivation can stem from a desire to achieve goals, such as acquiring skills and competencies for employment, or finding a job that allows for self-expression and talent utilization. However, even in higher education, the fear of poor grades and the pressure of others' opinions and judgments can sometimes be more powerful motivators than intrinsic drive. But this is only a small part of the value tests and assessments that can be provided.

Each lesson can be treated as a laboratory experiment: There is a certain number of "guinea pigs" (students) who are subjected to a "treatment" (the lesson). Their learning can be measured through a series of continuous and well-structured tests to see how the individual has learned the lesson. However, this is not enough. In fact, as demonstrated by Diana Domenichini, Sebastian Strauß, Sebastian Gombert, Nikol Rummel, Hendrik Drachsler, Knut Neumann, Filippo Chiarello, Gualtiero Fantoni & Marcus Kubsch (2025)[37], it is possible not only to identify homogeneous subgroups of learning within the class, but also to predict, based on belonging to such subgroups, what the final outcome of the different students will be.

At this point, given the different cognitive styles, different starting points, and different learning speeds, it is possible to consider separating the class into homogeneous subgroups and planning specific

[37] Domenichini, D., Strauß, S., Gombert, et al., *Leveraging AI and network analysis to uncover learning trajectories of energy to foster knowledge-in-use in science education.* "Disciplinary and Interdisciplinary Science Education Research", Vol. 7, no.28, 2025.

learning activities for each of them, thus reducing the gap in the final evaluation and, consequently, in learning.

The combination of automatic data gathering plus AI systems (in the paper the authors presented an unsupervised clustering technique for grouping students according to their performance) could help the teacher in monitoring the class, understanding the specific need, designing and providing specific contents or exercises to improve the absorption of missed contents.

7. *AI and Generative AI: the disruption of the "old" education system?*

The 2024 Nobel Prize in Physics for AI discoveries and the rise of generative AI are profoundly transforming academia and industry. Many roles traditionally held by knowledge workers and managers, previously unaffected by technological advancements, now face potential replication by intelligent machines. This shift is fuelling anxieties, intensified by public advertisements suggesting the recruitment of AI over human employees. Simultaneously, the impressive speed at which AI solves complex problems generates considerable enthusiasm.

AI and Gen AI will impact individuals, influencing how and what they choose to learn, as well as the skills companies seek in a market where AI handles diverse tasks. Concurrently, AI can enhance traditional education, assisting teachers in improving their methods and reducing administrative burdens.

A bibliometric analysis by Kashif Ahmad, Waleed Iqbal, Ammar El-Hassan, Junaid Qadir, Driss Benhaddou, Moussa Ayyash & Ala Al-Fuqaha (2024)[38] explored AI research trends in education from 2014 to 2022. This study, conducted when Generative AI was still emerging, detailed the applications and outcomes of AI in education, highlighting both realized and unfulfilled potential.

The capabilities and limitations of AI are frequently misunderstood. While often used as a replacement for search engines or analytics, AI can produce unsatisfactory results without a defined strategy for integrating and validating data sources, proper search and selection, or appropriate analytical and statistical tools. Without adequate control, in-depth analysis, and cross-referencing, users risk being misled by "stochastic parrots" that merely reiterate mainstream information.

7.1 *Generative AI to support students*

The emergence of GenAI caught universities off guard, despite predictions by scholars and its inclusion in Gartner's analyses for a decade. When ChatGPT launched, students were early adopters, as shown by Vito Giordano, Irene Spada, Filippo Chiarello & Gualtiero Fantoni (2024)[39], who analysed approximately 4 million tweets to understand how people were using the technology. In 2022, university educators either enthusiastically integrated Generative AI into their courses or actively resisted its use within academic settings.

[38] Ahmad, K., Iqbal, W., El-Hassan, A., et al. *Data-driven artificial intelligence in education: A comprehensive review* "IEEE Transactions on Learning Technologies", Vol. 17, pp. 12-31, 2024, doi: 10.1109/TLT.2023.3314610.
[39] Giordano, V., Spada, I., Fantoni, G., et al., *The impact of ChatGPT on human skills: A quantitative study on Twitter data.* "Technological Forecasting and Social Change", Vol. 203, no. 123389, 2024. https://doi.org/10.1016/j.techfore.2024.123389.

GenAI's effectiveness is contingent on the task, purpose, topic, language, user background, and prompting style. Therefore, a comprehensive framework is needed to guide its appropriate use. This framework should first address fundamental questions (i.e. 5W2H[40]) regarding who should use it, where and when it generates the most value, and why its application is significant.

The extensive and often uncritical use of these tools can lead to a measurable decline in skills. A preliminary study of Nataliya Kosmyna, Eugene Hauptmann, Ye Tong Yuan, Jessica Situ, Xian-Hao Liao, Ashly Vivian Beresnitzky, Iris Braunstein & Pattie Maes[41], though not yet peer-reviewed, indicates that consistent reliance on AI writing assistants may diminish neural connectivity during writing tasks. This suggests a reduced cognitive engagement compared to individuals who compose without such external assistance. The observation supports the concept of "loss of skills". The study found that participants using AI showed reduced brain connectivity (in alpha and beta bands) compared to those who wrote without external aids (the "brain-only" group). This suggests that regions of the brain responsible for executive processes, attention, or memory were less active when AI was involved.

In a subsequent session, individuals who initially used AI and then switched to "brain-only" mode performed worse in recalling and citing their previous writing. This implies that relying on AI can diminish one's ability to independently work with material that has not been deeply internalized. The authors introduce the term "cognitive debt", which describes a mental debt incurred when cognitive functions are delegated externally, leading to a weakening of internal capabilities. If certain cognitive operations (such as logical structuring, argument articulation, active memory, and synthesis) are practiced less frequently, it is likely that these "skill losses" will not be isolated. Instead, they could impact higher-level skills. For example, a lack of mastery in constructing independent reasoning may hinder the development of advanced skills like critical thinking, innovation, and complex argumentation. In essence, a localized "skill loss" risks impeding the emergence of higher-level skills that depend on foundational ones.

7.2 *Generative AI to support chairs of programme degree*

Too often chairs of programme degrees are mired in bureaucracy and formalities, and there is little time left for analysis (except for mandatory analysis) and planning. Furthermore, increasingly scarce resources and the growing teaching load delivered by each teacher do not facilitate co-designing and the necessary evolution of content (given new knowledge and technologies) and teaching methods (given the changing incoming population and new pedagogical practices).

AI-powered office automation can significantly reduce bureaucratic burdens and free up time by handling low-value tasks. Beyond this, it can also facilitate the redesign and upgrade of courses. Generative AI, utilizing internal or online data, can prepare analyses, compare courses domestically and internationally, and evaluate the social and economic impact of teaching and learning activities, both overall and on a per-course basis.

[40] 5W2H is the acronym of a well-known management tool used around the world and consists of responding to 7 simple questions defining What action must be completed, How, When, Why, by Whom, Where, and How much it costs.
[41] Kosmyna, N., Hauptmann, E., Yuan, Y. T., et al., *Your brain on ChatGPT: Accumulation of cognitive debt when using an AI assistant for essay writing task*, Cornell University, 2025. https://doi.org/10.48550/arXiv.2506.08872.

7.3 *Generative AI to support teachers*

Tools are neutral, therefore also for teachers GenAI can be a powerful aid or a false friend. Speeding up the process of slide creation or handouts frees up useful time for rethinking the course from both the content and pedagogical perspectives. The role of the teacher becomes more and more a coach, a supervisor, or a challenger.

Teachers can survey topics comprehensively, identify gaps, and suggest removals. They can also focus on creating connections and enhancing elements to capture students' attention and interest. Integrating videos, blogs, and other diverse sources can supplement traditional books, offering a rich mix of stimuli. The teacher's role is to craft an effective learning experience that not only facilitates knowledge acquisition but also addresses misconceptions, biases, and detrimental behaviours. This approach transforms class time into an opportunity to improve attention spans, dedicate more time to understanding concepts, and explore topics in greater depth.

OpenAI has capitalized on students' widespread use of ChatGPT by developing and marketing specialized tools, such as ChatGPT study mode, directly to them. OpenAI marketing claimed it as «a feature that enables ChatGPT to act like a tutor, which encourages learning and critical thinking instead of immediately generating answers like regular AI chats». This approach aims to move beyond simple requests for answers or essays, where Generative AI excels, by integrating questions and connections derived from analysing past interactions.

While Artificial Intelligence, particularly Gen AI, offers powerful tools and resources, it fundamentally lacks the capacity to ignite or cultivate intrinsic human motivation. Furthermore, it cannot bridge the gap between initial motivation and sustained discipline. A critical concern with Gen AI is its potential to foster addiction, drawing individuals away from genuine engagement and critical thinking.

Teachers' roles are evolving towards maieutic, a Socratic method of drawing out understanding. This explanation leads to more potent learning than simple information transfer. To leverage this, traditional approaches can be reversed: microlearning activities could be done at home, allowing students to learn foundational concepts at their own pace. Classroom time would then shift to interactive, project-based, and problem-based workshops. This fosters deeper understanding and critical thinking through active knowledge construction and hands-on engagement.

Educational settings require a fundamental shift. Traditional student-teacher and student-student interactions should change to integrate technology, forming a three-way dynamic. This integration necessitates understanding human limitations with technology, while recognizing its benefits when applied thoughtfully. The goal is to enhance, not replace, human capabilities and interactions, leading to a more profound learning experience.

8. *An actionable roadmap*

In this article, it has been argued that higher education can no longer treat course and curriculum design as a periodic compliance exercise, but rather programmes should be often revised to reflect changes in the discipline and in labour market needs.

It must become an evidence-led, dynamic capability that blends interoperable data, task-appropriate AI, and multi-stakeholder governance. The argument rests on five pillars: (a) From data silos to decision engines, about the strategic use – and re-use – of heterogeneous data; (b) Designing for time on the temporal mismatch and the need to build for uncertainty; (c) Technology, geopolitics, and cultural dependence on events and factors that shape what and how we teach; (d) Learning where the brain works best about cognitive, social, and motivational dynamics that determine whether learning "sticks"; and (e) Students, incentives, and the hidden curriculum of institutions where we discuss institutional operating models and incentives that either unlock or prevent change. The last argument rests on a transversal pillar (f) AI: powerful means, bounded mandate.

Below we synthesize implications and propose an actionable end-state.

8.1 *The pillars*

(a) From data silos to decision engines

Universities sit on vast – yet underexploited – stores of structured and unstructured data: programme forms (e.g., learning outcomes, assessment methods), lecture artefacts (slides, handouts, schedules), teaching evaluations, alumni trajectories, graduate surveys, job vacancies, credential-evaluation repositories, and external labour-market intelligence (e.g. ESCO/O*NET, CEDEFOP tools). Today, these assets are fragmented across offices, formats, and governance regimes; the hidden value lies precisely in cross-analysis. Interoperable schemas, common vocabularies (e.g., ESCO), and metadata standards are not bureaucratic niceties but the precondition for: (i) longitudinal monitoring of curricula; (ii) market-skills mapping at varying time horizons; (iii) continuous programme benchmarking across departments and institutions; and (iv) automated but auditable analytics pipelines to inform revisions. A standing "data & curriculum" function – lightweight but empowered – should steward integrations, quality, and analytical reuse.

(b) Designing for time: closing the 3–5-year gap

The interval between programme choice and labour-market entry (roughly 3–5 years) now spans a regime in which job families can morph, vanish, or be automated. In such conditions, "coverage of content" cannot be the primary risk hedge. Alongside readily accessible knowledge (via search and LLMs), universities must deliberately cultivate behavioural and cognitive capacities: problem-solving under uncertainty, scenario thinking, and metacognitive regulation. Microcredentials are a sensible, modular response – but their impact depends on integration into degree pathways, robust recognition, and transparent reporting, rather than their relegation to peripheral lifelong-learning units. Degree programmes should specify an explicit temporal portfolio: durable foundations, medium-term refresh modules, and fast-cycle micro-updates tied to market signals.

(c) Technology, geopolitics, and cultural dependence

Education does not unfold in a vacuum. Software stacks, hardware supply chains, and platformised learning ecosystems increasingly originate outside Europe. Alongside technological dependence lies cultural dependence: dominant training platforms tend to privilege narrowly operational upskilling. Without counterweights, curricula risk converging on "what the tools make easy", shrinking intellectual breadth and civic aims. A policy-level recalibration is therefore required: align industrial, education, and research agendas; invest in European data/AI infrastructure for education; and articulate a vision of higher education that pairs employability with critical reasoning, ethical judgement, and democratic competencies. Universities should treat vendor content as inputs – not blueprints.

(d) Learning where the brain works best

Evidence from cognitive science suggests that human performance peaks near the "edge of chaos"[42], a dynamic balance between order and variability that supports flexible reasoning, transfer, and creativity. Educational practices can scaffold this state: progressively complex tasks, problem- and project-based learning, reflective enquiry, and (for some learners) contemplative practices that modulate attention and executive control. Conversely, over-scaffolded microlearning, while useful for tool onboarding, risks fragmenting knowledge and eroding deep comprehension if it becomes the default. Gamification can motivate, but if reward schedules replace meaning, it fosters dependency rather than mastery. Institutions should rebalance towards *deliberate difficulty*, interleaving, and spaced retrieval – backed by regular, low-stakes assessments that turn each class into a monitored experiment rather than a one-way transmission.

(e) Students, incentives, and the hidden curriculum of institutions

Student cohorts are changing – prior knowledge, attention habits, expectations, and mobility patterns differ markedly from a decade ago. Employers, meanwhile, increasingly expect "job-ready" graduates and are less willing to fund onboarding. Within universities, incentive structures often privilege research outputs over teaching innovation (especially acute where career paths for researchers and teachers are undifferentiated), while student-satisfaction surveys may inadvertently penalize rigor. If we want better educational outcomes, we must realign incentives: reward high-quality teaching, curriculum leadership, and demonstrable learning gains; protect space for instructors to iterate; and couple student voices with multiple evidence streams (learning analytics, longitudinal outcomes, external peer review).

(f) AI: powerful means, bounded mandate

Generative AI has been adopted unevenly, sometimes with uncritical enthusiasm and sometimes with blanket bans. The right stance is neither. Relying solely on AI or GenAI for tasks traditionally handled by data analysis, statistical methods, and algorithms risks prioritizing efficiency over effectiveness. These tools demand careful attention and a clear purpose. Directly seeking immediate insights from data, rather than elaborating information and translating it into a reasoned interpretation, often sacrifices depth for speed. While Large Language Models (LLMs) can be useful for ontology alignment in skills mapping for a limited number of documents, they prove insufficient when policymakers need to analyze vast quantities of heterogeneous documents, such as patents, papers, and job vacancies. Furthermore, utilizing LLMs for the initial drafting of syllabi can stifle creativity and promote homogenization. Their

[42] Robson, D., *Between order and chaos*, "New Scientist", Vol. 267, no.3559, 2025, pp. 30-34.

more effective application lies in refining or correcting syllabi after they have been elaborated by humans.

Alternatively, more deterministic approaches as BERT[43] by Jacob Devlin, Ming-Wei Chang, Kenton Lee & Kristina Toutanova (2028)[44] could be effectively used to perform tasks such as skill extraction, content extraction, similarity analysis, clustering etc, and obtain more stable and reliable results. At the same time, institutions should guard against cognitive debt: if LLMs routinely do the framing, synthesis, and argumentation, students practice those skills less. A simple operating rule helps: «*AI accelerates production; humans own direction and judgement*». For teachers and chairs of programme degrees, AI can offload bureaucracy, surface comparisons, and simulate options – but final curricular decisions remain human, contextual, and accountable.

8.2 *A forward-looking framework (with an example)*

Vacancy analytics, alumni data, and compulsory employment communications (where accessible) each offer signal – and bias. Duplicates, re-posts, and informal hiring channels distort counts; alumni data are uneven across institutions; compulsory notifications are difficult to access and standardize. The remedy is triangulation: combine near-real-time vacancy trends, medium-term alumni outcomes (e.g., AlmaLaurea-like surveys), and structured occupational taxonomies (ESCO/O*NET) to anchor noisy signals. CEDEFOP's tools can serve as integrators across regions and sectors. Methodological transparency – documenting sources, caveats, and confidence – must be part of every curriculum decision.

To transform principles into actionable strategies, we propose a streamlined and scalable operating framework. This framework begins with establishing robust governance & roles, notably a cross-functional Curriculum Intelligence Hub comprising Career Services, Alumni, Programme Chairs, QA, IT, Legal/GDPR, Industry Liaisons, and Credential Evaluators. This hub would be chartered with maintaining taxonomies, conducting analytics, proposing updates, evaluating impact, and publishing an annual "Curriculum & Skills Observatory" report.

Crucially, interoperability and data architecture are foundational. This involves implementing a skills/learning-outcome ontology layer that is ESCO-aligned with institution-specific extensions. The creation of standard data products – such as program/LO tables, assessment schemas, lecture artefact registries, vacancy snapshots, and alumni outcome panels – is essential. These should be built using reproducible pipelines with versioned code and data lineage, all governed by GDPR-compliant practices.

For continuous improvement, evidence-based curriculum cycles are key. The cadence of the review could be around 12-18 months for each program, following a cycle of market scan, gap analysis, proposals (major/minor), piloting, evaluation, and finally, scaling or rolling back. To facilitate agile updates, microcredential "slots" should be embedded within degrees, with clear recognition and stackability.

[43] Bidirectional Encoder Representations from Transformers (BERT) is a language model introduced in 2018 by Google researchers and was the accelerators for the new generation of Large Language Models.
[44] Devlin, J., Chang, M. W., Lee, K., et al., *BERT: Pre-training of deep bidirectional transformers for language understanding, 2018*. https://doi.org/10.48550/arXiv.1810.04805.

Assessment for learning is paramount, treating each course as a continuous experiment. This entails frequent formative assessments, cohort clustering to identify learning subgroups, targeted interventions, and post-hoc evaluation of design changes. The aim is to balance student satisfaction with objective indicators of deep learning and transfer.

Regarding human development and pedagogy, the design should embrace the edge-of-chaos, incorporating progressively complex, collaborative, and authentic tasks. Explicit training in metacognition and optional contemplative practices for attention and self-regulation are encouraged. It's important to use microlearning and gamification sparingly and purposefully, rather than as default curricular approaches.

Clear AI usage rules are indispensable. This includes publishing a task-to-tool matrix that outlines appropriate AI applications, what remains human, and required documentation and citation. For AI-assisted student work, process artefacts such as prompts, drafts, and rationales should be required, while forbidding AI in specified formative contexts to safeguard practice opportunities. For staff, AI should prioritize analysis preparation and comparative review, not final judgments.

Partnerships and external alignment are vital. This involves formalizing two-way data sharing with industry partners (skills frameworks, placement outcomes) and credential evaluators (fraud signals, recognition insights). Engagement with policy actors is also crucial to co-develop open, anonymized statistical products from compulsory employment communications where feasible.

Finally, incentives and capacity building will drive adoption. This means recognizing curriculum leadership and measurable learning gains in promotion criteria. Furthermore, faculty development should focus on data literacy, learning science, and AI-supported design, while administrative load is reduced through targeted automation.

To illustrate the proposed framework in action, we present a use case example: the revision of a MSc degree in Mechanical Engineering to address the "Green Transition". The case involves the triangulation of data sources described in § 4 and the operational role of the Curriculum Intelligence Hub.

Phase 1: Signal detection and triangulation
The revision cycle is driven not only by intuition but also by data integration. This process draws on three sides:

- Labour Market Signals (Demand side): The Hub aggregates data from online vacancies and identifies a spike in demand for Sustainable Manufacturing and Life Cycle Assessment skills. Concurrently, an analysis of the ESCO v1.2 update reveals new standardized "green skills" and knowledge concepts that were previously absent.

- Alumni Feedback (Outcome): Data from the AlmaLaurea repository (or other sources with similar data) is analyzed, specifically focusing on the "mismatch" indicator. The analysis reveals that recent graduates working in the energy and automotive sectors report a gap between the technical skills acquired and the environmental compliance competencies required by their employers.

- Internal Audit (Supply side): Using Natural Language Processing (NLP) techniques similar to those applied by Spada et al. (2023), the Hub scans the current SUA-CdS (programme description forms) and course syllabi. The audit detects that while "efficiency" is a frequent keyword, specific terms related to "circular economy" and "sustainability reporting" are missing from the declared learning outcomes.

Phase 2: Gap analysis and AI-supported design

The Curriculum Intelligence Hub produces a gap analysis report for the Program Chair. Based on the report evidence the following four tasks are performed:

- Strategic Decision: Rather than waiting three years for a full program overhaul, the Chair decides to implement a fast-cycle micro-update working on the introduction of green skills on single subjects in collaboration with the teachers.

- AI-Assisted Drafting: The Chair employs a Generative AI tool, fed with the specific missing ESCO skill definitions and the current course syllabus. The AI is tasked with suggesting a new module structure that integrates these skills without altering the core engineering foundational constraints. Such proposals are discussed with the faculty and integrated in the more suitable subjects.

- Human Refinement: The faculty reviews the AI-generated syllabus to ensure pedagogical rigor, applying the human-in-the-loop principle where AI accelerates production but humans own the judgment.

- New knowledge and skills: Sustainability is broader than just environmental issues, therefore the faculty, under the emergence of new literature on alternative approaches to the dominating capitalistic paradigm, can decide to provide students with information on civil economy, an economic approach that integrates ethics, politics, and solidarity into the market, proposing an alternative model based not only on profit, but on the common good. Such a choice introduces new elements to develop students' critical thinking.

Phase 3: Implementation via Microcredentials

Let's imagine that the faculty and the Chair decide to launch a 3-ECTS internal microcredential to address the immediate temporal mismatch.

- Format: This modular course is immediately available to current students and offered as a lifelong learning update for alumni.

- Interoperability: The microcredential is tagged with the relevant ESCO metadata, ensuring that the skills acquired are recognizable by the labour market and machine-readable by recruitment algorithms.

Phase 4: Continuous monitoring

The course is treated as a "continuous experiment". Continuous assessment data identifies learning

subgroups, allowing the faculty to adjust teaching methods in real-time if students struggle with the interdisciplinary nature of the new legal-technical content. The impact of the course is analyzed by observing the career evolution of alumni first and of students later. The profiles of participants (alumni) is monitored in order to refine the program also in terms of labour market needs.

9. *Conclusions*

The digital transformation of higher education is not merely a technical challenge of digitizing content, but a structural imperative to realign the ecosystem's core dynamics. Throughout this article, we have argued that the traditional disconnect between Supply (faculty and students) and Demand (the labour market and firms) can no longer be sustained in an era of rapid technological flux. Bridging this gap requires moving beyond anecdotal evidence to a systematic integration of data that respects the complexity of both educational and professional landscapes.

The above alignment depends heavily on the quality and interoperability of the intelligence we gather. As explored in our analysis, this requires a dual approach to data sources. On one hand, institutions must leverage proxies such as online vacancies; while these offer immediate, granular insights into emerging skills, they remain imperfect descriptors of the total labour market, often over-representing digital roles while missing informal hiring channels. On the other hand, we must strive to unlock real data, such as compulsory employment communications and longitudinal alumni tracking. Although these sources are historically difficult to access and standardize, they provide the ground truth necessary to validate trends and correct the biases inherent in digital proxies. The "Curriculum Intelligence Hub" proposed in this work serves precisely this function: to triangulate these diverse signals into actionable insights for programme design.

However, data-driven alignment should not be mistaken for market subservience. While the immediate goal is to reduce skills mismatches, the ultimate mandate of the university remains its civil purpose. A higher education system that looks only to the immediate needs of industry risks preparing students for a world that will have vanished by the time they graduate. True alignment means preparing learners for a future we cannot yet fully predict.

An adaptive university does not chase every technological wave; it learns which waves matter, when, and for whom. Programmes become portfolios with explicit time horizons and specific users (not customers); microcredentials complement – not cannibalize – degrees; student evaluations inform but do not dictate rigor; AI accelerates work without hollowing out cognition; data products flow across previously isolated units; and governance makes trade-offs explicit. Most importantly, graduates leave not only with skills that map to today's vacancies, but with the habits of mind – curiosity, disciplined imagination, ethical reasoning, collaborative problem-solving – that let them thrive when today's vacancies no longer exist.

Education is a societal infrastructure. Cohesive, deliverable visions of the future can mobilize both institutions and learners, but visions must be matched with interoperable data, fit-for-purpose AI, and recognitions that reward what we claim to value (not just incentives). The task before higher education is therefore not to defend yesterday's forms, nor to outsource tomorrow's aims to platforms, but to build a resilient ecology of learning capable of moving at the speed of change without sacrificing depth and judgment, but fostering human flourishing.

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Implications of AI in Academic Writing: Guidelines and Institutional Responses

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| Abstract

Artificial Intelligence (AI) tools, particularly Large Language Models (LLMs) like ChatGPT, are transforming scholarly writing. Researchers and educators are struggling to determine how to integrate these tools responsibly while upholding academic integrity. This paper[1] examines the implications of AI-assisted writing, ethical issues surrounding its use, and the responses of academic institutions and journals. It presents clear guidelines for responsible AI use in scholarly writing and analyses how universities, journals, and international organizations are formulating policies. To this end, we propose a typology of AI interventions in writing and a framework for transparency to standardize disclosure.

The discussion is grounded in editorials from leading journals, policies by publishers, and guidance from organizations. Concrete recommendations are offered for stakeholders to navigate the rapidly evolving landscape of AI in academic writing.

Keywords: Artificial Intelligence (AI), Ethics, Integrity, Intellectual Property, Research, Transparency

1. *Introduction*

The rapid advancement of artificial intelligence (AI)[2], particularly in the domain of Natural Language Processing (NLP)[3] and generative language models, is reshaping the landscape of scholarly

[1] This article was developed in accordance with "AI Assessment Scale (AIAS) Level 2 – AI for Ideation and Outlining", as defined in the typology proposed herein. AI tools were used during the early stages of ideation and planning – for example, to explore potential subtopics and organize section structure. However, all paragraphs, arguments, and final text were written entirely by the author. The author retained full responsibility for content development, source interpretation, and scholarly framing.

[2] The Organisation for Economic Co-operation and Development (OECD) defines artificial intelligence within the *Explanatory Memorandum on the updated OECD definition of an AI system* as «a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment». OECD, *Explanatory Memorandum on the OECD Framework for the Classification of AI Systems and the Updated OECD Definition of an AI System*, Paris, OECD, 2024.

[3] Natural Language Processing (NLP) refers to the capability of a machine to process, analyse, and simulate human language – whether spoken or written – enabling interaction and interpretation in ways that resemble human communication EU–US Trade and Technology Council (TTC), *Terminology and Taxonomy for Artificial Intelligence*, Annex to the Joint Roadmap on Evaluation and Measurement Tools for Trustworthy AI and Risk Management, European Commission & U.S. Government, 2024.

communication. Tools such as OpenAI's ChatGPT, Google's Gemini, Meta's LLaMA, xAI's Grok, DeepSeek, and Anthropic's Claude have brought sophisticated writing capabilities within reach of the global academic community enabling users to generate text, summarize sources, structure arguments, and revise prose with unprecedented ease (Bubeck et al., 2023)[4].

These developments, while offering significant potential to enhance productivity and inclusivity in academic writing, also present complex ethical, epistemological, and institutional challenges that remain underexamined in scholarly discourse[5].

Historically, the evolution of scholarly communication has been marked by transformations driven by technological innovation: from the printing press to digital publishing, and more recently, to open access and preprint servers. Each of these transitions has prompted the academic community to revisit questions of authorship, authority, and access. The rise of generative AI represents a similarly disruptive shift – one that compels institutions, researchers, journal editors, and policymakers to confront urgent questions about originality, transparency, and academic integrity[6]. Unlike prior tools that merely supported the writing process, generative AI can actively shape, suggest, or produce textual content. This blurring of boundaries between tool and co-creator raises fundamental concerns about the provenance of ideas, the authenticity of scholarly voice, and the accountability of authors.

Initial responses from universities, academic publishers, and international organizations reveal a variety of positions. Some have issued permissive guidelines focused on disclosure and oversight, while others have adopted restrictive policies equating AI-generated content with plagiarism or ghost-writing[7]. Journals such as "Nature", "The Lancet", "The New England Journal of Medicine" (NEJM), and the "Journal of the American Medical Association" (JAMA) have explicitly stated that AI tools cannot be credited as authors and require full disclosure of any AI use during manuscript preparation, including how and where such tools were applied[8]. Organizations such as United Nations Educational, Scientific and Cultural Organization (UNESCO), the Council of Europe (CoE) and the European Commission (EC) have begun to develop ethical principles and governance frameworks to address the use of AI in research and education. However, these efforts remain fragmented, and a unified academic standard for AI use in writing has yet to be realized.

[4] Bubeck, S., Chandrasekaran,V., Eldan, R., et al., *Sparks of Artificial General Intelligence: Early experiments with GPT-4*, arXiv preprint arXiv:2303.12712, 2023. https://doi.org/10.48550/arXiv.2303.12712.

[5] Hosseini, M., Resnik, D. B., Holmes, K., *The ethics of disclosing the use of artificial intelligence tools in writing scholarly manuscripts*, "Research Ethics", Vol. 19, no. 4, 2023. https://doi.org/10.1177/17470161231180449.

[6] Thorp, H. H., *ChatGPT is fun, but not an author*, "Science", Vol. 379, no. 6630, 2023, p. 313. https://doi.org/10.1126/science.adg787.

[7] New York University Steinhardt, *Academic integrity and syllabus support in the age of generative AI*, NYU Steinhardt, 2023. https://steinhardt.nyu.edu/faculty-and-staff/academic-affairs/steinhardt-ai-hub/academic-integrity-and-syllabus-support-age. [last access 15 September 2025]. Some institutions have adopted policies that allow the use of AI, provided it is properly disclosed and cited. For instance, New York University states that any AI-generated content used in assignments must be appropriately attributed, and failure to disclose such use may be considered plagiarism. In contrast, the University of Hong Kong (HKU) implemented a temporary ban on the use of ChatGPT and other artificial intelligence (AI) tools in all classes, assignments, and assessments. Any violation was considered plagiarism unless the student obtained prior written consent from the course instructor. CGTN, *University of Hong Kong issues interim ban on ChatGPT*, AI-based tools, 19 febbraio 2023. https://news.cgtn.com/news/2023-02-19/University-of-Hong-Kong-issues-interim-ban-on-ChatGPT-AI-based-tools-1hxWzqgcMxy/index.html. [last accessed 15 September 2025].

[8] Lau, A., *The stance of academic journals on the use of AI*, Elion, 2023. https://elion.nz/the-stance-of-academic-journals-on-the-use-of-ai/. [last accessed 15 September 2025].

This paper addresses the growing need for principled, actionable guidance on the integration of AI into academic writing. It aims to (1) establish robust ethical and methodological guidelines for researchers using AI in scholarly work; (2) analyse the implications of generative AI for authorship, originality, bias, and responsibility; and (3) assess institutional responses through a comparative review of policies adopted by journals, universities, and international bodies.

To facilitate responsible innovation, the paper proposes a typology of AI involvement in writing, as well as a framework – the AI Use Transparency Index – to support consistent disclosure practices. Through this analysis, we aim to contribute to a critical and constructive dialogue on how to preserve the integrity of scholarly communication in an era of accelerating technological change.

2. *Conceptual and Regulatory Foundations*

Recent advances in generative artificial intelligence – particularly the development of large language models (LLMs) – have significantly expanded the scope of content creation, raising pressing questions about authorship and academic integrity. Generative AI[9], in this context, refers broadly to systems designed to produce novel content – such as text, images, or audio – based on patterns identified in extensive datasets[10]. LLMs represent a prominent subclass of generative AI: these are neural networks[11] trained on large-scale text corpora to model language and generate or transform textual outputs. The term "large" denotes the substantial number of model parameters, which, combined with vast training data, typically results in enhanced performance.

In practice, these LLMs often serve as foundation models[12] with broad capabilities: once trained, a foundation model can be adapted or "fine-tuned"[13] for many specific tasks. While these systems offer unprecedented capabilities in content generation, their use in scholarly contexts does not substitute the ethical and epistemic role of human authorship. In academic writing, authorship entails that identifiable human individuals assume intellectual responsibility for the content produced, ensure the accuracy of claims, and uphold standards of integrity, including transparency and proper attribution.

[9] Generative AI refers to artificial intelligence systems capable of producing novel content – such as text, images, music, or code – by learning patterns from large-scale datasets and using this knowledge to generate outputs that resemble human-created material. These models underpin a wide range of applications, including chatbots, text-to-image generators, and advanced language models, facilitating tasks from creative writing to software development. While generative AI offers significant potential for innovation, it also raises critical concerns related to authenticity, intellectual property, and ethical use.

[10] Toner, H., *What are generative AI, large language models, and foundation models?*, Center for Security and Emerging Technology (CSET), 2023. https://cset.georgetown.edu/article/what-are-generative-ai-large-language-models-and-foundation-models/. [last accessed 15 September 2025].

[11] A neural network is a system made up of layers of connected units called neurons. It takes in data, processes it through these layers to find patterns, and learns to make predictions by adjusting connections based on mistakes it makes.

[12] Foundation models are large-scale models trained on broad and diverse datasets and designed to be adaptable across a wide range of downstream tasks. The term "foundation model" is often used interchangeably with "general-purpose AI" (GPAI). While policy and regulatory frameworks – such as the EU AI Act – tend to prefer the term GPAI, the expression "foundation model" is more prevalent in technical and research communities. For the purposes of this study, the term foundation model will be used. These models can be trained on various types of data, including text, images, speech, and 3D signals. Their capabilities include object recognition, sentiment analysis, question answering, instruction following, and image captioning.

[13] Fine-tuning is a process in machine learning where a pre-trained AI model is further trained on a specific dataset to adapt it for a particular task or domain. Fine-tuning allows organisations to customise powerful AI models for their specific needs, improving performance while saving time and resources compared to training from scratch.

Leading publication ethics bodies have clearly stated that AI tools cannot fulfil the requirements for authorship, as they lack accountability and legal standing. This position, including disclosure obligations, is examined in greater depth in the section on authorship below.

These conceptual boundaries are echoed in emerging global ethical frameworks. The UNESCO *Recommendation on the Ethics of Artificial Intelligence*[14] – the first global AI ethics instrument formally adopted by 193 Member States – places human rights, dignity, and agency at the core of AI governance. It articulates key normative principles such as transparency, fairness, accountability, and the indispensability of human oversight in the deployment of AI systems. In a complementary effort, UNESCO's *2023 Guidance for Generative AI in Education and Research* promotes a human-centered approach to technological integration in academic settings. The guidance calls on governments and institutions to «implement immediate actions, plan long-term policies and develop human capacity» to ensure that generative AI strengthens, rather than compromises, educational and research ecosystems[15].

Alongside UNESCO, the OECD's AI Principles articulate a complementary vision: they promote AI that is «innovative and trustworthy» while fully respecting human rights and democratic values[16]. These principles – now endorsed by numerous countries – emphasize the necessity of transparency and explainability, requiring AI actors to provide clear and accessible information regarding a system's capabilities, limitations, and underlying decision-making logic. This enables both users and those affected by AI outputs to understand, assess, and, if necessary, contest automated outcomes.

Accountability is likewise central to the OECD framework, which advises that developers and deployers maintain robust mechanisms for traceability. This includes documenting training datasets, design decisions, and decision pathways to facilitate external auditing and verification of AI-generated outputs. These requirements are closely aligned with UNESCO's recommendations, which call for both technical and institutional safeguards to ensure the auditability and traceability of AI systems, along with mechanisms that embed explainability and independent oversight[17].

Taken together, the guidance offered by these leading international organizations converges on a shared normative foundation – centred on transparency, accountability, traceability, explainability, and human oversight – which is essential to the ethical governance of AI, particularly in domains where the societal and ethical implications are substantial.

In the European Union, the *Artificial Intelligence Act*[18], which entered into force in August 2024, represents the first comprehensive and binding legal framework for AI at the global level. Its overarching

[14] UNESCO, *Recommendation on the Ethics of Artificial Intelligence*, Paris, UNESCO, 2021. https://unesdoc.unesco.org/ark:/48223/pf0000381137. [last accessed 15 September 2025].
[15] UNESCO, *Guidance for Generative AI in Education and Research*, Paris, UNESCO, 2023. https://www.unesco.org/en/articles/guidance-generative-ai-education-and-research. [last accessed 15 September 2025].
[16] OECD, *Recommendation of the Council on Artificial Intelligence (OECD AI Principles)*, OECD Legal No. 0449, adopted 22 May 2019, updated 2024, Paris, OECD, 2024. https://oecd.ai/en/ai-principles. [last accessed 15 September 2025].
[17] UNESCO, *Recommendation on the Ethics of Artificial Intelligence*... cit.
[18] EU Artificial Intelligence Act, *The EU Artificial Intelligence Act Up-to-date developments and analyses of the EU AI Act*. https://artificialintelligenceact.eu. [last accessed 15 September 2025].

objective is to promote the development and deployment of "trustworthy AI" across Europe[19]. The Act adopts a risk-based regulatory approach, prohibiting certain applications deemed unacceptable – such as AI systems that manipulate human behaviour or engage in indiscriminate biometric categorization – while imposing stringent requirements on high-risk systems, including those used in education. These obligations include safeguards to protect fundamental rights, such as transparency, human oversight, and the assurance of data quality. In addition to the binding legislation, the EU has introduced voluntary instruments, such as the *AI Pact*,[20] which encourages AI developers and providers to commit proactively to these standards ahead of formal compliance deadlines.

In parallel, the *Guidelines on the Responsible Use of Generative AI in Research*[21] issued by the European Commission[22] provide structured advice for researchers and institutions on how to uphold established norms of research integrity in the context of AI-assisted work. The guidelines recommend, among other points, that generative AI tools should not be employed in sensitive processes such as peer review, that any use of such tools be thoroughly documented and transparently disclosed, and that institutions establish mechanisms to oversee and support responsible AI use within their research environments. At the level of scholarly publishing, key organizations such as the "Committee on Publication Ethics" (COPE) and the "International Committee of Medical Journal Editors" (ICMJE) have issued position statements emphasizing that generative AI tools cannot meet the conditions for authorship, as they lack legal personhood and cannot assume responsibility. These bodies also require full disclosure of any AI-generated content in submitted manuscripts[23].

In parallel, the *Council of Europe's Framework Convention on Artificial Intelligence*, opened for signature in 2024, obliges signatory states to ensure that the development and deployment of AI systems are fully aligned with human rights, democracy, and the rule of law[24]. The Council's education initiatives reinforce this commitment by stressing that AI in learning contexts must promote accessible and inclusive education, with particular attention to data privacy, algorithmic transparency, and bias mitigation.

Together, these European instruments contribute to operationalizing abstract principles into concrete expectations for academic AI use (full disclosure, human-in-the-loop review, and protection of privacy and IP in data, among others).

Outside the European context, national and regional approaches to the governance of generative AI are evolving rapidly. UNESCO has played a leading role in encouraging global cooperation to implement

[19] European Commission (EC), *Artificial Intelligence Act. Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence*, Brussels, European Commission, 2024.
[20] The AI Pact encourages and supports organisations to plan ahead for the implementation of AI Act measures. European Commission, *AI Pact*. https://digital-strategy.ec.europa.eu/en/policies/ai-pact. [last accessed 15 September 2025].
[21] The EC, together with the European Research Area (ERA) countries and stakeholders, has put forward a set of guidelines to support the European research community in their responsible use of generative artificial intelligence (AI). *European Commission, Living guidelines on the responsible use of generative AI in research*. 15 April 2025. https://research-and-innovation.ec.europa.eu/document/2b6cf7e5-36ac-41cb-aab5-0d32050143dc_en. [last accessed 15 September 2025].
[22] European Commission (EC), *Artificial Intelligence Act. Regulation*... cit.
[23] European Journal of Therapeutics. (n.d.), *Authorship and artificial intelligence (AI) tools*, Gaziantep University Faculty of Medicine, 2025. https://eurjther.com/index.php/home/Authorship-AI. [last accessed 15 September 2025].
[24] Council of Europe (CoE), *Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law*, "Council of Europe Tereaty Series", Vol. no. 225, 5 September 2024. https://rm.coe.int/1680afae3c. [last accessed 15 September 2025].

ethical frameworks, calling on governments to involve diverse stakeholders and to ensure that AI development is «guided by sound scientific research as well as ethical analysis»[25].

In Asia, China introduced the *Interim Measures for the Administration of Generative AI Services* in 2023, representing one of the first regulatory frameworks explicitly targeting AI content providers. These Measures define generative AI providers as responsible entities, obligated to remove illegal or harmful content, report incidents to relevant authorities, and continuously improve their models to prevent recurrences[26]. Furthermore, providers must ensure lawful data-curation practices – respecting intellectual property and data privacy – and guarantee that training datasets are high quality and appropriately labelled. All AI-generated content must be clearly identified, for instance through tagging or watermarking, and user protections are emphasized through restrictions on unnecessary data collection and requirements for user consent regarding personal information.

Importantly, the regulatory framework in China seeks to balance innovation and control. The Measures explicitly advocate for a model of governance that encourages innovation while ensuring compliance with legal and ethical standards. Other countries in the region are similarly developing policies or draft regulations addressing AI use in education and research. Singapore, for instance, has taken steps to address the use of AI in education through the development of the *AI-in-Education Ethics Framework* (AIEd), which builds on the national Model AI Governance Framework and reflects the core values of the teaching profession[27]. Though approaches vary, a common set of principles is emerging transparency through clear labelling and disclosure, accountability through human responsibility, and robust oversight mechanisms to ensure that AI remains a tool under human control.

Taken together, these conceptual and regulatory developments shape the contemporary discourse on generative AI in academic writing, while reaffirming that intellectual control and ethical responsibility must rest with human authors.

Core values of academic integrity – particularly accountability and integrity – are operationalized through the requirement to disclose AI use and the explicit exclusion of AI systems from authorship attribution. The prevailing consensus increasingly treats generative AI as an advanced scholarly tool, whose use must be rigorously documented, critically assessed, and fully supervised by human researchers.

3. *Guidelines for Responsible AI Use in Academic Writing*

Considering the opportunities and risks posed by AI, it is critical to establish robust guidelines for its responsible use in research writing. The following principles provide a foundation to harness generative AI tools ethically and transparently:

(i) Maintain Originality and Avoid Plagiarism: All submitted academic work must remain the

[25] UNESCO, *Recommendation on the Ethics of Artificial Intelligence*... cit.
[26] Cyberspace Administration of China, *Interim Measures for the Administration of Generative Artificial Intelligence Services*, 2023.
[27] Ministry of Education, Singapore, *AI in Education (AIEd) Ethics Framework*, "Student Learning Space", Singapore, 2025. https://www.learning.moe.edu.sg/ai-in-sls/responsible-ai/ai-in-education-ethics-framework/. [last access 15 September 2025].

original intellectual product of the human authors. Using AI to generate substantial text without acknowledgment is essentially plagiarism. In fact, «a submitted academic manuscript must be the original work of the authors, and the wholesale use of ChatGPT without formal acknowledgement is akin to plagiarism»[28]. To uphold integrity, authors should only use AI to assist with ideas or wording that they fully understand and can integrate into their own original argument. Any AI-generated passages should be treated as third-party content – quoted or paraphrased and cited if reproduced verbatim – to clearly distinguish the author's contributions.

(ii) Ensure Transparency Through Disclosure: Full transparency regarding the use of generative AI tools is increasingly recognized as both an ethical obligation and a methodological requirement in scholarly writing. Authors are expected to provide explicit disclosure of whether, how, and to what extent AI technologies were employed during any stage of the research and writing process – including data analysis, drafting, or linguistic refinement. A growing consensus among leading publishers and research ethics bodies affirms that transparency is essential to maintaining the integrity of academic communication. For example, Elsevier now mandates that manuscripts include a dedicated section titled *Declaration of Generative AI and AI-assisted Technologies*, wherein authors must describe any use of AI tools, using a standard template for consistent wording[29]. Similarly, the Committee on Publication Ethics (COPE) and numerous editorial guidelines advise researchers to disclose AI usage even when its contribution is minimal, reinforcing the principle that full accountability rests with the human author[30]. Disclosures should specify the AI tool employed (e.g., GPT-4), the purpose of its use (such as linguistic refinement or drafting a methods section), and the extent of its contribution. Such transparency enables editors, reviewers, and readers to assess the provenance and credibility of the work, thereby reinforcing trust in the publication process.

(iii) Uphold Accountability and Human Oversight: The ultimate responsibility for the content of a paper lies with its human authors, and this responsibility cannot be outsourced to an AI. AI tools must not be listed as authors on papers. This guideline has been endorsed by major publishers and COPE: «AI tools cannot meet the requirements for authorship as they cannot take responsibility for the submitted work»[31]. Human authorship entails duties – conception of ideas, critical interpretation, accountability for the accuracy of data and claims, and the capacity to respond to criticism – which only humans can fulfil. Consequently, authors who employ AI are expected to exercise careful oversight: they should verify all AI-generated content for accuracy, correct any errors, and ensure that no biases or unethical content have been introduced. In practice, this means thoroughly fact-checking AI contributions against source literature and subjecting AI-assisted text to the same level of critical revision as any other source. Publishers like "Springer Nature" underscore that «what's fundamental is that there is clarity [...] We need transparency, as that lies at the very heart of how science should be done and communicated»,

[28] Nature, *Tools such as ChatGPT threaten transparent science; here are our ground rules for their use*, 2023. https://www.nature.com/articles/d41586-023-00191-1. [last accessed 15 September 2025].
[29] Elsevier, *Generative AI policies for journals*, n.d. https://www.elsevier.com/about/policies-and-standards/generative-ai-policies-for-journals. [last accessed 15 September 2025]. Elsevier, *The use of generative AI and AI-assisted technologies in writing for Elsevier*, n.d. https://www.elsevier.com/about/policies-and-standards/the-use-of-generative-ai-and-ai-assisted-technologies-in-writing-for-elsevier. [last accessed 15 September 2025].
[30] COPE, *Artificial intelligence and authorship*, 2023. https://publicationethics.org/news-opinion/artificial-intelligence-and-authorship. [last accessed 15 September 2025]. COPE, *Authorship and AI tools*, 2023. https://publicationethics.org/guidance/cope-position/authorship-and-ai-tools. [last accessed 15 September 2025].
[31] Ibid.

and that authors remain accountable for any content produced with AI assistance[32]. In sum, AI may assist with writing, but it cannot replace the author's intellectual responsibility.

(iv) Define Appropriate Scope of AI Assistance: Researchers should use AI as a support tool, not a replacement for human scholarly effort. Appropriate uses include tasks like language polishing, grammar and spelling correction, formatting assistance, or generating non-substantive text that the author then rigorously reviews[33]. Many journals permit using AI to improve readability and language of a manuscript, especially to help non-native English speakers express their ideas more clearly. For example, Elsevier's guidelines allow AI use «to improve the readability and language of the research article, but not to replace key tasks that should be done by the authors, such as interpreting data or drawing scientific conclusions». By contrast, it is considered irresponsible to rely on AI for core scholarly tasks such as analysing results, formulating arguments, or drawing novel conclusions, since these require human expertise and insight. Authors should also refrain from using AI to generate citations or factual content that they have not verified, as AI-generated references are often fabricated and factual errors can be introduced. The guiding rule is that AI may facilitate expression of the author's ideas, but it must not produce the ideas or analyses themselves.

(v) Mitigate Bias and Validate Accuracy: Any content produced with the aid of AI must be carefully checked for biases, errors, and omissions. LLMs are known to generate text that appears coherent and plausibly accurate, yet may include erroneous or fabricated information, raising concerns about their reliability in knowledge-intensive tasks. They can also inadvertently amplify societal biases present in their training data. Responsible use of AI in academic writing therefore entails rigorous critical evaluation of AI outputs. If an AI tool is used to generate a summary or paraphrase, the author should cross-check the summary against the original sources to ensure fidelity and completeness. If the tool suggests an analysis or interpretation, the author must confirm that it is logically and scientifically sound. Human judgment must remain in charge. Some have suggested a requirement for a "human in the loop" review, meaning no AI-generated text enters the final manuscript unless a human author has scrutinized and approved it. This aligns with emerging international ethics guidelines: UNESCO's *Recommendation on the Ethics of AI* explicitly states that AI systems should not displace human determination, and that humans must retain «ultimate responsibility and accountability» for decisions or content produced by AI[34].

(vi) Protect Data Privacy and Intellectual Property: Responsible AI usage also involves safeguarding confidential data and respecting copyrights. If researchers input portions of an unpublished manuscript or dataset into an online AI service, they risk violating privacy or data protection rules, as well as exposing novel data or ideas prematurely. Many university guidelines (e.g., *Harvard University's Initial Guidelines for the use of Generative AI Tools*)[35] advise never to paste sensitive, proprietary, or unpublished information into generative AI platforms without proper assurances of privacy. Likewise, using AI to generate text does not exempt authors from copyright considerations – authors should

[32] Vincent, J., *ChatGPT can't be credited as an author, says world's largest academic publisher*, The Verge, 2023. https://www.theverge.com/2023/1/26/23570967/chatgpt-author-scientific-papers-springer-nature-ban. [last accessed 15 September 2025].
[33] Singapore Management University, *Disclosure on the use of AI in research manuscripts: How are researchers doing it?*, 2024. https://library.smu.edu.sg/topics-insights/disclosure-use-ai-research-manuscripts-how-are-researchers-doing-it. [last accessed 15 September 2025].
[34] UNESCO, *Recommendation on the Ethics of Artificial Intelligence*...cit.
[35] Harvard University, *Research with Generative AI*, n.d. https://www.harvard.edu/ai/research-resources/. [last accessed 15 September 2025].

not have an AI mimic someone else's writing without attribution, and they must be aware that AI-generated text may not be copyrightable. As a precaution, several publishers (e.g. "Springer Natureù") have even forbidden AI-generated images or figures in publications due to unresolved copyright and integrity issues. Researchers should use AI tools that are compliant with data protection standards or use self-hosted models for sensitive work. By adhering to these guidelines – originality, transparency, accountability, appropriate use, bias mitigation, and privacy – scholars can leverage AI's benefits (efficiency, enhanced expression, expanded ideation) while upholding the rigor and trustworthiness of academic writing.

4. *Ethical and Institutional Implications*

As it was previously mentioned, the rise of AI in academic writing carries far-reaching implications. It challenges traditional notions of authorship, raises novel ethical questions, and necessitates new norms in scholarly communication. Key areas of concern include transparency of AI involvement, plagiarism and originality, biases and reliability of AI outputs, and changes in the research workflow.

This section explores these challenges and analyses how institutions have responded, spanning approaches from integration and experimentation to formal regulation.

4.1 *Transparency and Disclosure as New Norms*

Transparency regarding the use of artificial intelligence has become a central ethical principle in the academic response to LLMs. A primary concern is that undisclosed AI assistance may compromise the credibility of scholarly work. When sections of a manuscript are generated by AI without proper disclosure, readers and peer reviewers may be misled about the origin of ideas, the originality of the language, or the extent of the author's intellectual contribution. Moreover, insufficient transparency obstructs key pillars of academic integrity, such as reproducibility and accountability, since concealed AI-generated content cannot be properly evaluated, scrutinized, or replicated by others.

Academic journals have thus rapidly instituted disclosure requirements. In early 2023, the journal "Science" announced an updated editorial policy banning the use of ChatGPT-generated text "entirely" in submissions and requiring that all content be the original work of the authors[36]. Its editor-in-chief, at that time in fact argued that even using ChatGPT to prepare a paper risked injecting errors and shortcuts that "could be lost" in terms of context and rigor while he insisted that the proper direction for science was deeper scrutiny and not reliance on AI to summarize findings. Most other top journals did not go so far as an outright ban but converged on mandatory disclosure. "Springer Nature" clarified that it permits AI-assisted writing «as long as this contribution is properly disclosed by the authors». In January 2023, "Nature" stated its "ground rules" for AI: «no LLM tool will be accepted as a credited author on a research paper», and any use of such tools for writing or image generation must be documented[37]. This stance was echoed by other major publishers. For example, Elsevier's policy required that authors

[36] The Guardian, *Science journals ban listing of ChatGPT as co-author on papers*, "The Guardian", 2023. https://www.theguardian.com/science/2023/jan/26/science-journals-ban-listing-of-chatgpt-as-co-author-on-papers. [last accessed 15 September 2025].
[37] Nature, *Tools such as ChatGPT threaten transparent science; here are our ground rules for their use*, 2023. https://www.nature.com/articles/d41586-023-00191-1. [last accessed 15 September 2025].

«acknowledge all sources and contributors», including AI, and to document its use appropriately. "Taylor & Francis" itself issued guidance that authors using AI should do so only in accordance with publishing ethics and with explicit acknowledgment in the work.

By mid-2023, disclosing AI assistance had become a *de facto* expectation in scholarly publishing. Some universities and funding agencies similarly encourage or require disclosure in theses and reports, reinforcing that transparency is integral to research integrity. The *European Code of Conduct for Research Integrity*[38] now advises researchers to report any use of AI tools during research and writing as part of maintaining honesty and accountability. This cultural shift towards openness is intended to uphold trust: readers should never be left guessing whether a human or an AI wrote a given sentence or analysis.

The emphasis on transparency is also a response to practical realities. There is currently no foolproof method to detect AI-written text. While software detectors exist, they yield false positives and negatives, and their effectiveness can be undermined by relatively minor modifications in phrasing. Recognizing these constraints, the "International Conference on Machine Learning" acknowledged in its ban on AI-generated submissions that the rise of tools like ChatGPT presents «unanticipated consequences [and] unanswered questions», including unresolved issues around authorship, ownership, and the originality of AI-generated content. The policy prohibits text "produced entirely" by AI, while permitting its use for editing or polishing author-written material[39].

In this context, voluntary self-disclosure emerges as the most reliable and constructive mechanism for identifying AI involvement in scholarly work. Promoting a culture of transparency – rather than one of surveillance – is increasingly viewed as both more effective and more aligned with academic norms. As noted in recent European Commission guidelines, institutions should foster «an atmosphere of trust where researchers are encouraged to transparently disclose the use of generative AI without concerns for adverse effects»[40]. This approach entails both removing the stigma associated with AI-assisted writing and clearly delineating ethical boundaries to ensure responsible and accountable use.

That said, implementing transparency is not without challenges. How should disclosure be formatted? How much detail is enough? Policies vary. Some journals ask for a statement in the Methods or Acknowledgments. Others, like certain Elsevier journals, require a formal declaration section at the end of the manuscript[41]. There is also debate on whether prompts given to AI should be included for context. Since an AI's output depends heavily on the prompt, some argue that providing the exact prompt could be useful for transparency and for other researchers to understand the interaction. Additionally, consistent terminology is still emerging. Terms like "AI-assisted writing" or "generated with ChatGPT" need clear definitions to differentiate between minimal editing versus substantive content generation. Despite these complexities, the trajectory is clear: transparent reporting of AI contributions is becoming a standard part of academic integrity, much like disclosing funding sources or potential conflicts of interest.

[38] ALLEA, *The European Code of Conduct for Research Integrity*, 2023. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/european-code-of-conduct-for-research-integrity_horizon_en.pdf. [last accessed 15 September 2025].
[39] Vincent, J., *ChatGPT can't be credited as an author...* cit.
[40] European Commission, Directorate-General for Research and Innovation, *Responsible Use of Generative AI in Research. Living Guidelines on the Responsible Use of Generative AI in Research*, ERA Forum Stakeholders' Document, Second Version, April 2025, Brussels, European Commission, 2025.
[41] Singapore Management University, *Disclosure on the use of AI in research manuscripts...* cit.

4.2 *Plagiarism, Originality, and Academic Integrity*

A key ethical concern is that AI might enable plagiarism or otherwise erode the originality of academic work. If an AI model generates text, to what extent can an author claim it as their own writing? This question strikes at the heart of academic ethics. Traditionally, plagiarism has been understood as the unacknowledged use of another person's words or ideas. In the case of AI, while the tool is not an author in the human sense, incorporating its generated content without appropriate attribution constitutes a breach of academic norms.

Leading academic journals have taken the position that undisclosed AI-generated writing may amount to plagiarism, as it involves presenting content that the researcher neither authored nor acknowledged[42] COPE reinforces this view, emphasizing that «all parts of the manuscript must be the author's original work», and that any AI-assisted contributions must therefore be transparently disclosed to uphold authorship integrity[43]. This framing situates the use of AI not as inherently unethical, but as requiring clear attribution to preserve academic honesty and accountability.

Another dimension is self-plagiarism and recycling. An author might be tempted to have AI rewrite their own prior publications in new words – this could evade plagiarism detection but would violate norms against duplicate publication. Or an AI could piece together text from various sources in its training data (some of which might be copyrighted). Early experiments showed ChatGPT can produce paragraphs that closely mimic specific articles or internet content. If authors simply copy-paste such output, they risk unintentional plagiarism of those sources. There have already been cases where AI-generated abstracts have successfully fooled peer reviewers, raising serious concerns about the potential for misuse, such as generating fake or plagiarized academic content. Considering these risks, the academic community has responded with caution. This includes banning the listing of tools like ChatGPT as co-authors and promoting clear disclosure of AI use. These actions aim to protect the integrity of scholarly publishing by encouraging transparency and discouraging unethical practices.

From the perspective of universities, AI-assisted cheating by students is a growing concern. Many academic integrity offices have revised their policies to make it clear that submitting AI-generated work as one's own, without proper citation or permission, is considered academic misconduct. This is viewed similarly to contract cheating or copying from other students. Some universities, fearing that students would use tools like ChatGPT to generate essays or exam answers, initially banned these tools from campus networks – New York City public schools, for example, implemented such a ban in early 2023[44].

In short, the community consensus is that AI must not be a shortcut to avoid the hard work of learning, researching, and writing. If misused, AI could encourage a form of academic dishonesty by enabling people to generate passable text that they never deeply engaged with. This threatens the core of scholarship, which is about developing and demonstrating understanding. The responsible path is to treat AI as just another tool – like translation software or statistical packages – that must be used in

[42] Nature, *Tools such as ChatGPT threaten transparent science*... cit.
[43] COPE, *Artificial intelligence and authorship*... cit.
[44] Meckler, L., *New York City schools ban AI chatbot ChatGPT for fear of cheating and misinformation*, "The Washington Post", 2023. https://www.washingtonpost.com/education/2023/01/05/nyc-schools-ban-chatgpt/. [last accessed 15 September 2025].

accordance with ethical guidelines. Just as copying someone's data analysis code without credit is unethical, so is copying AI prose without credit.

Conversely, if used openly and with critical oversight, AI might "reduce" plagiarism by helping writers express ideas in their own voice rather than be tempted to copy-paste from sources. It can also educate users on different ways to phrase content, potentially improving paraphrasing skills (though caution is needed to avoid inappropriate close paraphrasing). Ultimately, maintaining academic integrity in the age of AI comes down to ensuring honesty (about AI use), fairness (not gaining unfair advantage or misrepresenting one's effort), and respect (for the intellectual contributions of others and for the norms of one's discipline).

4.3 *Authorship and Intellectual Accountability*

Authorship carries not only credit but responsibility. A key ethical issue with AI-assisted writing is determining authorship and attributing intellectual responsibility. As mentioned, all major publishers have decreed that AI cannot be listed as an author on papers[45]. The rationale is straightforward: authors must fulfil certain criteria – including contributing to the work, drafting or revising it critically, approving the final version, and agreeing to be accountable for it.

AI systems do not meet the fundamental criteria required for authorship. As noted by experts, software cannot be meaningfully held accountable for a publication, cannot claim intellectual property, and is unable to engage in scholarly dialogue or clarify its contributions[46]. This position is reinforced by the COPE, which emphasizes that AI lacks legal status and agency, and therefore cannot hold copyright, be subject to liability, or formally approve a research manuscript[47]. Authorship remains a human responsibility, inseparable from the accountability it entails.

The integration of AI in the writing process has also brought renewed attention to the concept of human authorship. When researchers rely heavily on generative tools, questions arise regarding the extent to which they remain the true authors of the text. In response, academic journals have increasingly emphasized that human authors must take full responsibility for any AI-assisted content, as if they had written it themselves. "Nature", for example, considers that the use of AI is permissible only when authors assume full accountability for its output (Nature, n.d.). Similarly, "eLife" has noted that the central issue is not whether AI is used, but how its use is disclosed and managed[48]. Authors are expected to describe how AI tools contributed to the work and, by doing so, accept responsibility for the content produced. In practical terms, this means that if an AI generates a flawed or misleading passage, it is the responsibility of the human author to identify and revise it. Failing to do so places accountability on the author, who remains answerable to peer reviewers and readers for any errors, omissions, or instances of plagiarism that may result.

[45] Taylor & Francis, *Taylor & Francis Clarifies the Responsible Use of AI Tools in Academic Content Creation*, Taylor & Francis Newsroom, 17 February 2023. https://newsroom.taylorandfrancisgroup.com/taylor-francis-clarifies-the-responsible-use-of-ai-tools-in-academic-content-creation/. [last accessed 15 September 2025].
[46] Stokel-Walker, C., *ChatGPT listed as author on research papers: Many scientists disapprove*, "Nature", 2023 https://www.nature.com/articles/d41586-023-00107-z. [last accessed 15 September 2025].
[47] COPE, *Artificial intelligence and authorship*...cit.
[48] ELife *Publishing and Peer Review at eLife*, n.d. https://elifesciences.org/about/peer-review [last access 15 September 2025].

The question of "authorship attribution" extends beyond naming and includes the ordering of authors and the allocation of credit. When AI tools are used collaboratively by multiple human authors, the established human authorship order remains unaffected[49]. However, if the AI's contribution is substantial, it may be appropriate to acknowledge its use in a dedicated section (e.g., «Acknowledgments: An AI writing assistant was used to help draft portions of the introduction»). In the future, AI tools might be credited similarly to widely used software or editorial assistance. Indeed, in certain fields – where permitted – authors have already begun to mention tools like ChatGPT in the acknowledgments, treating them as non-human contributors. This practice echoes earlier acknowledgments of statistical programs or proofreading services.

What distinguishes AI, however, is its ability to generate ideas and text that may appear original or even creative. This raises concerns about intellectual provenance: omitting mention of AI tools might obscure the true origin of certain content, while attributing authorship to them risks overstating their capacity for responsibility, intention, or innovation. As a result, a balanced approach is emerging AI should be treated as a tool rather than as an author[50].

The question of intellectual accountability extends beyond the act of writing and is intrinsically linked to the responsibilities that authors bear during peer review, public engagement, and post-publication dialogue. Once a scholarly article is published, it is the human authors – not the AI tools – who are expected to respond to inquiries, clarify ambiguities, and, if necessary, issue corrections or retractions. As Magdalena Skipper, editor-in-chief of "Nature", aptly emphasised, authorship entails «responsibilities that extend beyond publication»[51], including the duty to engage with the scholarly community and uphold the integrity of the scientific record.

There is a growing concern that excessive reliance on generative AI may erode this foundation of responsibility. Authors who incorporate AI-generated content without thorough comprehension risk producing work they cannot adequately defend, thereby undermining the credibility of the research and their own scholarly authority. A useful ethical benchmark in this context is the following: can the author confidently explain, justify, and take responsibility for every statement contained within the manuscript? If sections of the work fall outside the author's expertise or awareness due to the uncritical adoption of AI-generated text, then the integrity of authorship has been compromised. Responsible academic practice requires that AI tools be employed only in ways that authors can fully oversee, validate, and articulate in response to peer or public scrutiny.

In sum, while AI may serve as a valuable support in the writing process, it cannot substitute the author's intellectual accountability. Ultimately, it is the human author's reputation, credibility, and scholarly record that remain on the line.

[49] International Committee of Medical Journal Editors (ICMJE), *Defining the Role of Authors and Contributors, in Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals*, May 2023, https://www.icmje.org/recommendations/. [last accessed 15 September 2025].

[50] Multiple academic and professional bodies have affirmed that AI tools should not be listed as authors but may be acknowledged as part of the research process. The Committee on Publication Ethics (COPE) states that AI cannot assume accountability and thus does not meet the criteria for authorship. Similarly, the Association for Computing Machinery (ACM), the American Chemical Society (ACS), and the American Society of Civil Engineers (ASCE) all maintain that generative AI tools lack legal agency and intellectual responsibility and should be treated as non-authoring tools whose use must be transparently disclosed.

[51] Government Technology, *Can ChatGPT be credited as an author?*, 2023. https://www.govtech.com/question-of-the-day/can-chatgpt-be-credited-as-an-author. [last accessed 15 September 2025].

4.4 *Bias, Accuracy, and the Need for Human Judgment*

AI language models come with well-documented limitations that carry ethical implications for scholarly writing. They can reflect biases present in their training data, produce inaccurate information, and lack the ability to judge truth or relevance. Integrating such tools into academic work thus poses risks to the quality and objectivity of research literature.

One significant implication of using AI tools in scholarly writing is the potential amplification of existing societal biases. Suppose the training data of a language model reflects underrepresentation or stereotypes related to gender. In academic writing, such tendencies can subtly distort how research problems are framed or how populations are represented. A recent study in "Nature" cautioned that large language models may «amplify social biases like sexism and racism» if their outputs are not critically reviewed and corrected[52].

Ethically responsible use of AI requires scholars to remain vigilant for implicit biases in generated text. When AI-produced sections systematically omit certain literatures or perspectives – such as privileging Western sources over others – the human author must intervene to restore balance by integrating the missing viewpoints. Much like an editor correcting bias in a human-authored draft, the academic responsibility here lies with the author to edit and critically assess the AI-generated content.

Another critical concern in the use of large language models is their tendency to generate hallucinations and factual inaccuracies. These models do not possess inherent fact-checking capabilities and often produce incorrect information with a high degree of fluency and confidence. There have been prominent cases in which AI tools fabricated academic citations that, upon verification, were found to be entirely non-existent – an unacceptable error in scholarly contexts.

In fact, in early May 2025, "The New York Times" reported that an OpenAI's investigation into its latest GPT-o3 and GPT-o4-mini LLMs were found to hallucinate between 33% and 48% more compared to earlier versions[53].

As a result, human oversight remains indispensable. While AI tools may expedite the drafting process, the time saved must be reinvested in meticulous fact-checking and validation. Each AI-generated sentence should be cross-referenced with credible sources or verified calculations. This is not merely a matter of due diligence – it is a safeguard against the illusion of precision that AI-generated prose can create. Scholars must resist the temptation to accept fluent outputs at face value and instead apply their critical expertise to assess both the factual and logical soundness of the content. As highlighted in various institutional guidelines, responsible use of AI means treating its outputs as drafts requiring confirmation, not as definitive contributions[54]. The ultimate authority in scholarly communication

[52] Hu, T., Kyrychenko, Y., Rathje, S., et al., *Generative language models exhibit social identity biases*. "Nature", Vol.5 no.1, pp. 1-10, 2024. https://doi.org/10.1038/s43588-024-00741-1. [last accessed 15 September 2025].
[53] According to the New York Times, GPT- o3 hallucinated 33% of the time and GPT-o4 mini 48% of the time when tested on the PersonQA benchmark, significantly higher than the hallucination rate of OpenAI's earlier model GPT-o1. Metz, C., A.I. Is *Getting More Powerful, but Its Hallucinations Are Getting Worse*, The New York Times, 2025. https://www.nytimes.com/2025/05/05/technology/ai-hallucinations-chatgpt-google.html. [last accessed 15 September 2025].

must remain with the human author, whose judgment and analytical rigor cannot be delegated to a machine.

Another challenge posed by using generative AI in academic writing is the lack of source transparency. Most large language models do not cite their sources unless explicitly designed for that purpose – a feature absent in the majority of general-use models. Consequently, authors who rely on AI tools must assume the additional responsibility of sourcing any factual assertions produced by the system.

At the same time, when used critically, AI tools can also contribute to improving scholarly rigor. Through interactive prompts or dialogic exchanges, AI can identify weak points in an argument or suggest areas requiring clarification. Some researchers use tools like ChatGPT as a form of intelligent interlocutor – soliciting critiques, probing questions, or counterarguments in response to draft paragraphs[55]. This engagement can prompt authors to reflect more deeply, refine their reasoning, and address potential gaps in their logic. However, such benefits are contingent on the user's discernment. This type of supervised interaction suggests that, when guided by human expertise, AI can function as a tool to enhance analytical depth and thoroughness in academic work.

As it was already mentioned, international bodies emphasize the importance of human judgment in any AI deployment. In research, this translates to a simple rule: "AI can assist, but humans must decide". The scientist's discernment is the final safeguard to ensure that what goes into the scientific record is accurate and unbiased.

5. *Typology of AI Usage in Academic Writing*

Not all forms of AI assistance in academic writing are equivalent. It is important to differentiate levels of involvement, which may range from minimal linguistic support to the extensive generation of content. In this context, we propose a typology of AI use in scholarly writing, categorized according to the degree and nature of the system's intervention.

Level 0 – No AI Assistance: The manuscript is written entirely by the human author, aside from standard software like spelling/grammar checkers inherent in word processors (which we consider baseline tools). There is no contribution from generative AI and this level represents traditional writing and serves as a reference point.

[54] As emphasised in recent institutional frameworks, generative AI outputs should not be regarded as final academic contributions. Rather, they must be critically assessed, fact-checked, and revised by human researchers who remain fully accountable for the content. The European Commission's *Living Guidelines on the Responsible Use of Generative AI in Research* explicitly state that researchers must remain aware of the limitations of generative tools – including hallucinations, bias, and inaccuracies – and must treat all AI-assisted content as provisional. Similarly, UNESCO's *Guidance for Generative AI in Education and Research* underscores the need for human-centred governance and advocates for ethical validation and oversight in all uses of generative AI in academic contexts. European Commission, *Directorate-General for Research and Innovation*... cit.

[55] Liang, W., et al., *Can large language models provide useful feedback on research papers? A large-scale empirical analysis*, arXiv preprint arXiv:2310.01783, 2023. https://doi.org/10.48550/arXiv.2310.01783. Developed an automated pipeline using GPT-4 to provide comments on full PDFs of scientific papers. Their evaluation revealed that GPT-4's feedback overlapped significantly with human peer reviewers' comments, suggesting its utility in pre-review processes.

Level 1 – AI as Copyediting Aid: AI is used for "non-substantive editing" and polishing of text. This includes grammar correction, spell-checking, formatting references, or improving syntax and style at the sentence level. The content and ideas are all human-generated; the AI just refines expression. For example, an author might use a tool like Grammarly or an LLM-based rephraser to fix awkward sentences or to suggest more concise wording. This is akin to having a very advanced proofreader. Many journals explicitly permit such use without requiring formal disclosure, considering it similar to using any writing enhancement software. However, some guidelines recommend acknowledging even this level if the changes are significant or if a generative AI (like ChatGPT) was used for it, just to be transparent[56]. Ethically, Level 1 is low risk as long as the author reviews all changes to ensure meaning is preserved.

Level 2 – AI for Ideation and Outlining: AI is used to "generate ideas", "suggest outlines", or "summarize sources", but the actual prose of the manuscript is written by the human author. In this scenario, a researcher might prompt an AI for brainstorming («What are potential subtopics I should cover in my literature review on X?») or ask it to explain a concept as a starting point, or to condense a set of articles into key points. The AI might also help organize thoughts (e.g., proposing a logical section structure). However, when it comes to writing paragraphs and crafting arguments, the human does the heavy lifting. This may enhance both efficiency and creativity, functioning as a form of ideation support or conceptual scaffold. Since the AI's role is limited to the planning phase, it typically does not result in any directly AI-generated text appearing in the final manuscript. Some disclosure might still be prudent (e.g., «Note: an AI tool was used to assist in initial brainstorming for this article»), but since all final text is original to the author, the main ethical consideration is ensuring the ideas taken from AI are properly verified and cited if they are not common knowledge. Level 2 blurs into standard research work (researchers often get "ideas" from many sources), except that AI can provide those ideas quickly on demand.

Level 3 – AI-Generated Draft Passages with Human Revision: At this level, the AI generates some portions of text, which the human author then 2heavily edits", "fact-checks", and "integrates" into the manuscript. For instance, an author could have ChatGPT draft a generic introduction based on key points the author provides, then rewrite most of it in their own voice, adding specifics and correcting any AI errors. Or an author might use AI to create a rough summary of a certain subtopic, then refine it extensively. Here, the AI is a co-drafter, but the human remains the chief writer who curates and modifies the content. This mode of use requires meticulous oversight: the author must ensure no factual inaccuracies survive and that the style is made consistent. Disclosure is essential at this level, as portions of the text did originate from AI (even if altered). A statement might read: «An initial draft of the Background section was generated with the assistance of ChatGPT and was subsequently revised for accuracy and completeness by the authors». Some journals might ask for identifying which sections had AI input. The ethical acceptability of Level 3 depends on the degree of human revision. When revisions are merely superficial, the outcome may resemble the characteristics of Level 4 use. However,

[56] For instance, Elsevier permits the use of AI-assisted technologies to improve the readability and language of a manuscript. Authors are expected to maintain oversight and control, ensuring the content's accuracy. Disclosure is encouraged to promote transparency. The IEEE clarifies that while the use of AI tools for editing and grammar enhancement is common practice and generally does not require disclosure, any content generated by AI (text, figures, images, code) must be disclosed in the acknowledgments section. SAGE differentiates between assistive AI tools and generative AI. Tools that enhance language, grammar, or structure are considered assistive and do not require disclosure. However, the use of generative AI tools that produce content must be disclosed.

if the AI-generated output is treated as raw material and substantively reworked by the human author, its role may be more accurately described as that of an assistant or ghostwriter operating under the author's direction. This level constitutes a critical area of ongoing debate, as it occupies a grey zone: to what extent does AI-generated content compromise authorial integrity? How can we ensure that the author's intellectual contribution and voice remain central? In such cases, transparent disclosure and clear attribution of responsibility are essential safeguards to uphold academic accountability.

Level 4 – AI-Generated Text with Minimal Human Edits: In this category, significant parts of the manuscript are written by an AI and the human author does only light editing – fixing a few sentences or errors but largely accepting the AI's output. For example, an author might prompt an AI to "write a literature review on Y" and then copy-paste the result into their paper with only minor changes. This level is highly problematic and not considered responsible practice by most standards. The human's contribution to the writing is marginal; effectively the AI is doing the composition, raising questions of originality and authorship. Even if sources are accurate, the author cannot claim to have independently constructed the narrative or arguments. Such use is likely to violate academic standards and the editorial policies of many journals or conferences, even if disclosed[57]. If such an approach is taken, it would require at least clear and explicit disclosure – for example: «Section 2.1 was generated by ChatGPT using prompts provided by the author and has undergone only minor editing». However, it is questionable whether such a paper would be publishable in a reputable journal, as it fails the criterion of being the author's original work. Level 4 use may be more applicable in non-research contexts, such as the production of books or institutional reports, where authors might employ AI tools to generate large volumes of prose. In the context of academic research, however, this level of reliance on AI is widely regarded as unethical – comparable to outsourcing the writing of a manuscript and subsequently claiming authorship.

Level 5 – Fully AI-Generated with Human Curatorial Role: This extreme would be a paper essentially written by AI from start to finish, with the "author" only curating the process (providing prompts, maybe selecting the best outputs). The human might not do any substantial writing or editing at all. At Level 5, the human role is largely reduced to assembling AI-generated outputs or prompting the system through iterative refinements. Ethically, this level is not meaningfully distinct from Level 4; in fact, it may be more problematic, as the human contribution to the written content becomes minimal or even negligible. The resulting work amounts to automated writing, and the submission of such material as original scholarship would constitute a clear violation of authorship and academic integrity standards. Under existing academic norms, this is considered a form of academic misconduct, insofar as the human presents AI-generated content as their own.

The only context in which this use might be acceptable is within scholarship that explicitly examines AI-generated text as an object of study. In such cases, the inclusion of AI-produced content must be clearly labelled and confined to demonstrative purposes. However, as a general method for producing research papers, Level 5 lies outside the boundaries of acceptable academic practice.

[57] When authors use generative AI tools to draft portions of a manuscript – such as an initial introduction or summary – and then significantly revise the content for accuracy, coherence, and style, most academic publishers require transparent disclosure. Leading publishers like Elsevier, Springer Nature, and JAMA emphasize that even when the AI's contribution is heavily edited, its initial involvement must be acknowledged. These policies aim to maintain authorship integrity while allowing responsible integration of AI in the writing process.

While some have speculated about a future in which AI systems could autonomously produce publishable research, such a scenario would fundamentally challenge prevailing definitions of authorship and scholarly responsibility. Current policies address this concern pre-emptively by prohibiting AI from being credited as an author.

Most real-world cases of AI use in 2023/2024 fall into Levels 1–3. Levels 4–5 are discouraged and would likely lead to rejection or retraction if discovered. It is useful for institutions to define these levels because it helps communicate what is acceptable[58].

By delineating levels, we move away from a binary "AI or not" view, and toward a nuanced understanding that some AI uses are relatively low impact (similar to hiring an editor), whereas others fundamentally shift who is actually doing the intellectual work away from the researcher.

6. *Framework for AI Transparency: Toward an "AI Use Transparency Index"*

To operationalise the above guidelines and typology, we propose developing an "AI Use Transparency Index" (AUTI) as a framework for standardizing how researchers report AI involvement in their work. The goal of the AUTI is to promote consistent disclosure and set clear expectations for transparency. This index would rate or categorize the extent of AI usage and corresponding transparency measures. It is considered useful that an AI Use Transparency Index (AUTI) be promoted and established as a framework by an international body such as the Council of Europe or UNESCO, rather than as a voluntary element arising from the initiative of a few institutions or research groups dealing with these issues.

Key components of the AI Use Transparency Index might include:

Level of AI Intervention: A straightforward classification of how much AI contributed to the writing. For example, an author might be required to self-identify the usage level (1 through 5) when submitting a manuscript. This level could then be published alongside the article (e.g., a small note on the first page: «AI Use Transparency Index: Level 2 – AI-assisted brainstorming and language editing, with all content written by authors».). This gives readers immediate context about AI's role. It also holds authors accountable to not misrepresent their usage, since claiming a lower level than actually used would be an ethical breach.

Disclosure Statement Quality: The index would encourage not just "if" AI was disclosed, but "how thoroughly". It could have criteria or a scoring for disclosure statements. For instance, a complete disclosure might need to mention the specific tool (e.g., GPT-4), the version, the exact purpose (editing vs drafting vs summarizing), and an affirmation of human verification. An AUTI scoring rubric could award higher transparency scores for disclosures that include all these elements. In contrast, a vague

[58] *UNESCO Guidance for Generative AI in Education and Research* proposes key steps to the regulation of GenAI tool, including mandating the protection of data privacy, and setting an age limit for the independent conversations with GenAI platforms. To guide the proper use of the tools in education and research, the Guidance proposes a human-agent and age-appropriate approach to the ethical validation and pedagogical design processes.

statement like “an AI was used” without details would be considered low transparency. Journals could set a required threshold (e.g., a minimum transparency score) for acceptance.

Verification and Accountability Measures: Part of the framework may involve authors describing how they verified AI-generated content. This could be an additional statement or checklist. The AUTI could include an indicator (yes/no or brief description) of the verification process. For example: «All AI-generated text was reviewed for accuracy against primary sources and edited for clarity by the authors». Permission and Compliance Checks: The framework can tie into institutional compliance by logging whether the AI usage was in line with the relevant policies. For instance, some sensitive research might forbid using external AI due to data privacy. The AUTI disclosure could note, «Use of AI was reviewed and approved by the Institutional Review Board (IRB) or Data Protection Officer» if applicable or simply affirm that no confidential data was exposed to AI.

Standardization of Reporting Language: Over time, an AUTI would benefit from standard phrases or templates. Consistent phrasing can make it easier for meta-analyses or searches to identify how AI was used across the literature. For example, a standardized statement: «The authors used [Tool name] (version X) to assist with [specific task]. The authors have reviewed and take responsibility for the content generated».

Scoring System (Optional): One might envision an AI transparency “score” on a scale (say 0 to 5 or 0 to 10) for each paper, where a higher score means more transparent and responsible use reporting. For instance, a paper that used no AI or only minimal AI (Level 0–1) might score 5/5 on transparency by stating that clearly. A paper that used AI but gave a full account might also score 5/5. But a paper that used AI and gave an incomplete disclosure or needed editor extraction might score lower.

The proposed AI Use Transparency Index (AUTI) is designed to benefit multiple stakeholders in scholarly communication. For authors, it provides clear expectations on how to disclose AI use; for reviewers, it offers a standardized checklist to assess compliance; for readers, it ensures immediate visibility into a paper’s AI context; and for ethicists, it facilitates the tracking of emerging trends. Beyond its practical utility, AUTI would also serve a normative function by formalizing AI disclosure and reinforcing that non-disclosure is unacceptable.

7. *Conclusions and Recommendations*

The integration of artificial intelligence into academic writing presents both opportunities and challenges. While it offers unprecedented support in articulating ideas and streamlining the drafting process, it also raises critical ethical and practical concerns. This paper has examined key dimensions of this evolving landscape – including transparency, plagiarism, bias, oversight, authorship, and institutional policy – alongside the emerging responses from academic journals, universities, and international organizations committed to preserving the integrity of scholarly communication in the context of AI.

At its core, responsible AI use in academia implies the augmentation of scholarly work without

compromising its integrity. When deployed appropriately, AI can assist researchers in refining expression, reducing linguistic barriers, and enhancing productivity, particularly for those with limited proficiency in the language of publication or with accessibility needs. It may also serve as a catalyst for creativity by suggesting alternative formulations or perspectives. However, these potential benefits are contingent upon the author's sustained critical engagement with the writing process. AI should operate strictly as a supportive instrument – not as a substitute for genuine intellectual labour. Its use becomes ethically problematic, and may constitute academic misconduct, when it obscures authorship, circumvents scholarly rigor, or introduces unverified content without transparent disclosure.

As of 2025, there is a growing consensus – reflected in institutional policies and editorial guidelines – that AI-assisted writing is permissible only when accompanied by full transparency and retained human responsibility throughout the research and publication process.

The academic community is actively contributing to the development of normative frameworks to guide the ethical integration of AI into scholarly practice. Given the pace of technological advancement, sustained dialogue among researchers, educators, editors, and ethicists will be essential to refine standards and ensure that academic values are upheld in an increasingly AI-mediated research environment.

Considering the analysis, several actionable recommendations can guide the ethical and effective integration of AI in academic writing across stakeholder groups.

For Researchers (Authors): Authors should approach AI as a supportive tool – useful for refining expression or generating ideas – while retaining complete intellectual control and critical oversight. Any AI involvement must be disclosed with specificity in publications. Researchers are encouraged to stay informed about discipline-specific guidelines, consult ethical bodies when in doubt, and contribute to collective learning by sharing their experiences with AI use in scholarly work.

For Academic Journals and Publishers: Journals should establish and publicly display clear policies on AI authorship and usage. Submission systems should include mandatory AI disclosure statements, and editors and reviewers should be trained to assess compliance. Journals should harmonize standards, adopt frameworks like the AI Use Transparency Index, and ensure responsible use of AI-detection tools, always accompanied by human judgment.

For Universities and Educational Institutions: Academic integrity policies must be updated to explicitly address generative AI, distinguishing between permitted and prohibited uses. AI literacy training should be embedded across curricula, covering not only technical use but also ethical citation and disclosure. Educators should receive support to redesign assessments that emphasize critical thinking. For Research Funders and Policymakers: Funding agencies should incorporate AI disclosure requirements into grant conditions and support empirical research on the impact of AI on scholarly communication. Policymakers, including those shaping legislation like the EU AI Act, should consult with academic communities to balance innovation and integrity. International organizations such as UNESCO and OECD should continue facilitating dialogue and producing harmonized guidance, particularly to support lower-capacity institutions. Moreover, companies providing AI tools should be encouraged to implement transparency features aligned with academic needs.

For Students and Early-Career Researchers: As they form foundational research habits, students and junior scholars should be taught to use AI as a learning aid, not a substitute for their own work. Responsible experimentation – for instance, comparing AI outputs with their own writing – can foster skill development. Mentorship and open dialogue can help guide ethical usage. Early-career researchers should also be encouraged to engage publicly in conversations on AI use, contributing to the evolving academic norms with their insights and lived experiences.

Finally, the academic community has shown a notable degree of adaptability in response to the rapid emergence of generative AI technologies. Rather than hindering scholarly progress, the responsible integration of AI into academic writing practices may serve to enhance inclusivity, support multilingual researchers, and improve overall research efficiency – so long as its use is governed by transparency, critical oversight, and a steadfast commitment to academic integrity. Moving forward, it is essential that authors explicitly acknowledge their use of AI and retain full responsibility for the content produced. Under these conditions, generative AI need not be viewed as a threat, but rather as a constructive partner in the pursuit and dissemination of knowledge.

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Sostenibilità e Assicurazione della Qualità nella Formazione Superiore: Analisi Critica e Prospettive Future

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Abstract (IT)

Il contributo analizza criticamente l'integrazione della sostenibilità nei processi di assicurazione della qualità (AQ) nelle istituzioni della formazione superiore. Attraverso una revisione sistematica della letteratura e un'analisi comparata di pratiche e framework internazionali, l'articolo indaga le dimensioni intrinseche (ambientale, economica ed energetica) ed estrinseche (impatti organizzativi e reputazionali) della sostenibilità in ambito AQ. Sebbene esistano politiche di riferimento come gli SDGs e il Green Deal europeo, la loro concreta applicazione nei processi di AQ risulta ancora eterogenea e talvolta marginale. Vengono presentate buone pratiche e casi studio di agenzie e università che hanno avviato percorsi di integrazione sostenibile, pur tra ostacoli culturali, economici e metodologici. L'autore propone un approccio olistico che valorizzi l'interazione tra sostenibilità e qualità accademica, suggerendo azioni strategiche per il futuro: definizione di standard condivisi, digitalizzazione dei processi, formazione del personale e incentivazione di pratiche sostenibili. L'articolo evidenzia infine la necessità di un cambiamento culturale per rafforzare la resilienza e la responsabilità sociale delle istituzioni educative.

Parole chiave: Sostenibilità, Assicurazione della qualità, Istruzione superiore, Obiettivi di sviluppo sostenibile (SDGs), Digitalizzazione, Politiche educative.

Abstract (EN)

This paper critically analyzes the integration of sustainability within quality assurance (QA) processes in higher education institutions. Based on a systematic review of literature and a comparative analysis of international frameworks and practices, the study examines both intrinsic (environmental, economic, energy) and extrinsic (organizational, reputational) dimensions of sustainability in QA. Although policy frameworks such as the SDGs and the European Green Deal exist, their actual implementation in QA remains uneven and often marginal. The paper presents best practices and case studies from QA agencies and universities that have begun to embed sustainability, despite facing cultural, economic, and methodological challenges. The author advocates a holistic approach that aligns sustainability with academic quality and proposes strategic actions for the future: shared standards, process digitalization, staff training, and incentives for sustainable practices. Ultimately, the paper underscores the need for cultural change to enhance institutional resilience and social responsibility in higher education.

Keywords: Sustainability, Quality assurance, Higher education, Sustainable Development Goals (SDGs), Digitalization, Educational policies

1. *Introduzione*

L'assicurazione della qualità (AQ) nelle istituzioni della formazione superiore rappresenta un processo centrale per garantire l'eccellenza e la trasparenza dei percorsi educativi, poiché

> «nelle sue varie forme può verificare l'efficacia dell'assicurazione [...] della qualità di una Istituzione, fungere da catalizzatore del miglioramento ed offrire nuove prospettive all'Istituzione stessa. Inoltre, fornisce informazioni atte a garantire all'Istituzione ed al pubblico la qualità delle attività svolte»[1].

I processi di AQ devono inoltre dimostrare di essere «affidabili, utili»[2]. Parimenti, la sostenibilità è un concetto multidimensionale che ha assunto negli anni un'importanza crescente nel discorso globale (nonostante un'apparente flessione in tempi recenti della centralità delle tematiche ambientali), influenzando (a diversi livelli di profondità) molteplici settori, incluso quello della formazione superiore[3].

Dal canto loro, le istituzioni della formazione superiore (HEIs) non solo contribuiscono alla formazione delle nuove generazioni ma svolgono anche un ruolo chiave nella ricerca, nella promozione e nell'implementazione di strategie per uno sviluppo sostenibile; hanno inoltre la responsabilità di formare individui consapevoli e capaci di affrontare le sfide di un mondo in continua evoluzione e la sostenibilità è diventata un elemento fondamentale di questa formazione[4]. Tuttavia, l'integrazione di tematiche legate allo sviluppo sostenibile e alla sostenibilità nei sistemi di assicurazione della qualità, sia interna che esterna, appare ancora frammentario e caratterizzato da sfide concettuali, metodologiche e operative: fin da una prima ricognizione della letteratura più recente appare possibile apprezzare l'esistenza di significative discrepanze tra le politiche di sostenibilità dichiarate da governi e organismi nazionali e internazionali e le obiettive difficoltà nell'adottare e sviluppare specifiche pratiche nel campo della AQ[5]. Da un lato, l'Agenda 2030 delle Nazioni Unite e i relativi Obiettivi di Sviluppo Sostenibile (SDGs)[6], in uno con le politiche legate al cd. Green Deal europeo[7], il NextGenerationEU e le varie missioni del Recovery Fund legate alla sostenibilità hanno fornito un quadro normativo di riferimento per l'integrazione della sostenibilità nelle strategie istituzionali[8]. Dall'altro, le modalità con cui tali obiettivi sono integrati e

[1] *Cfr.* European Association for Quality Assurance in Higher Education (ENQA), *Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG),* Brussels (Belgium), s.e, s.l., 2015, p. 15.
[2] Ivi, p. 18.
[3] Per approfondimenti si vedano: Aleixo, A. M., Leal S., Azeiteiro U. M., *Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: An exploratory study in Portugal*, "Journal of Cleaner Production", Elsevier, 2016, p. 1 ss.; Commissione Europea, Accompanying the document Proposal for a Council Recommendation *"Europe on the move" – learning mobility opportunities for everyone*, COM(2023) 719 final - SWD(2023) 720 final, Brussels (Belgium), s.e. 2023, p. 61. Mria, P. G., *Quality Assurance in Higher Education – Where do we go from here?*, QUALITY AND QUALIFICATIONS IRELAND, 2023, p. 54. Si veda anche il documento ENQA Strategic Plan 2021-2025, s.e., s.l., laddove si afferma che: «ENQA highlights the importance of quality assurance as an instrument to support universities and institutions of higher education in fulfilling their mission. Quality assurance is sensitive to the diversity of missions and contributes to successful and enduring institutions which, in turn, contribute to broader sustainability in society».
[4] In questo senso: Inga Žalėnienė I. e Paulo Pereira, *Higher Education for Sustainability: A Global Perspective*, "Geography and Sustainability", Vol. 2, Elsevier B.V. and Beijing Normal University Press (Group) Co., LTD, s.l., 2021, pp. 99 ss.
[5] Per un'ampia revisione, si veda: Gonçalves Serafini, P., Morais de Moura, J., Rodrigues de Almeida, M., et al., *Sustainable Development Goals in Higher Education Institutions: a systematic literature review*, "Journal of Cleaner Production", Vol. 370, Elsevier, 2022. https://doi.org/10.1016/j.jclepro.2022.133473.
[6] Organizzazione delle Nazioni Unite (ONU), *Trasformare il nostro mondo: l'Agenda 2030 per lo Sviluppo Sostenibile*, s.e., s.l., 2015.
[7] Cfr. Commissione Europea, *Il green deal europeo per diventare il primo continente a impatto climatico zero.* https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_it. [ultimo accesso 25 luglio 2025].
[8] Cfr. Disponibile sul sito della Unione Europea: https://next-generation-eu.europa.eu/make-it-green_it. [ultimo accesso 25 luglio 2025].

valorizzati nell'ambito delle attività di assicurazione della qualità (interna ed esterna) risultano ancora eterogenee e, in alcuni casi, marginali nei processi di accreditamento e valutazione.

Eppure, l'integrazione della sostenibilità nei processi di AQ appare in grado di migliorare l'efficienza operativa, ridurre l'impatto ambientale e contribuire alla resilienza istituzionale nel lungo termine[9]: infatti, un'assicurazione della qualità, tradizionalmente orientata alla verifica di parametri accademici e organizzativi, che tenga anche conto degli aspetti ambientali, sociali ed economici della sostenibilità può rappresentare uno strumento strategico per integrare questi principi di lungo periodo all'interno dei processi decisionali e gestionali e contribuire a creare una cultura della sostenibilità all'interno delle istituzioni della formazione superiore, influenzando le politiche, le pratiche e la reputazione delle istituzioni[10].

Nella consapevolezza di quanto la tematica oggetto di approfondimento sia ancora frammentaria e fluida, oltre che complessa, questo articolo si propone di approfondire il ruolo della sostenibilità nelle attività di AQ nelle istituzioni della formazione superiore. Attraverso l'analisi di diverse fonti e documenti di riferimento, saranno esaminate le dimensioni intrinseche ed estrinseche della sostenibilità nell'assicurazione della qualità, le possibili strategie e le buone pratiche potenzialmente capaci di favorire l'integrazione della sostenibilità nelle attività di AQ e nelle Istituzioni della formazione superiore, le sfide e gli ostacoli da superare, nonché le implicazioni per le politiche e le pratiche di assicurazione della qualità.

2. *Metodologia*

L'analisi condotta in questo studio si basa su una revisione critica della letteratura scientifica esistente, includendo articoli accademici, report istituzionali e linee guida di agenzie di assicurazione della qualità a livello globale. Sono stati considerati casi studio, rapporti istituzionali e documenti normativi per identificare prassi esistenti, sfide e opportunità di sviluppo. Il metodo adottato combina un'analisi comparativa con una valutazione critica dei modelli esistenti, evidenziando gli elementi chiave per un'integrazione efficace della sostenibilità nei sistemi di assicurazione della qualità, concedendo particolare attenzione a buone pratiche e approcci innovativi applicabili a livello sistemico. In particolare, è stata utilizzata una metodologia qualitativa basata su analisi documentale e confronto con framework internazionali consolidati. La raccolta di dati è stata accompagnata da un'analisi delle politiche adottate da istituzioni leader nel settore dell'istruzione superiore per comprendere meglio le variabili che influenzano il successo dell'integrazione della sostenibilità nei processi di assicurazione della qualità. La selezione delle fonti ha seguito criteri di: (i) rilevanza (le pubblicazioni dovevano affrontare il tema della sostenibilità e/o dell'assicurazione della qualità nel contesto dell'istruzione superiore), (ii) attendibilità (sono stati privilegiati studi peer-reviewed e documenti istituzionali di riconosciuta autorevolezza) e (iii) aggiornamento temporale (sono state incluse prevalentemente fonti pubblicate negli ultimi dieci anni, per garantire l'allineamento con gli sviluppi più recenti). Eccezioni sono state fatte per testi ritenuti fondamentali per la comprensione dell'evoluzione storica del tema.

[9] Cfr. Xiong, W., Mok, K. H., *Sustainability Practices of Higher Education Institutions in Hong Kong: A Case Study of a Sustainable Campus Consortium*, "Sustainability", Vol. 12, no. 2:452, 2020, p. 2. https://doi.org/10.3390/su12020452.
[10] Cfr. Sursock, A., Trends 2015: *Learning and Teaching in European Universities*, European University Association publications, s.l., 2015, p. 56; Salvioni D. M., Franzoni, S., Cassano, R., *Sustainability in the Higher Education system: an opportunity to improve quality and image*, "Sustainability", Vol. 9, no.6:914, 2017. https://doi.org/10.3390/su9060914.

3. *Sostenibilità nell'Assicurazione della Qualità*

Come ogni attività antropica, anche le attività di AQ comportano oramai un impatto significativo in termini di sostenibilità ambientale, economica ed energetica delle istituzioni della formazione superiore. La sostenibilità, declinata nell'ambito dell'assicurazione della qualità, può essere osservata su due dimensioni principali:

1. Intrinseca: relativa agli impatti diretti delle attività di QA, dal punto di vista ambientale, economico ed energetico.
2. Estrinseca: relativa agli effetti di queste attività sull'assetto organizzativo delle istituzioni, nonché sull'implementazione di politiche sostenibili di più ampio respiro.

3.1 *Dimensione intrinseca: impatto ambientale, economico ed energetico*

Nell'ambito dell'assicurazione della qualità, l'analisi della dimensione intrinseca impone di considerare in che misura questi processi possano generare effetti tangibili sull'ambiente, sull'economia e sulle risorse energetiche. Infatti, le attività in esame comprendono una vasta gamma di processi potenzialmente impattanti: si pensi a mero titolo esemplificativo ma non esaustivo agli effetti ambientali delle visite in loco e dei viaggi, nonché dell'uso ancora diffuso della documentazione cartacea e del consumo energetico e di materiali che esse possono provocare[11], incidendo in maniera significativa sull'impronta ecologica che l'intero sistema della formazione superiore produce[12].

In tutti questi casi, una prima risposta sembra essere data da una comune benché articolata soluzione: i processi di trasformazione digitale. Infatti, in linea generale, l'implementazione di strumenti digitali e la trasformazione digitale dei processi, l'acquisto di software adeguati, la formazione del personale[13], nonché l'adozione di criteri, standard e metodologie di valutazione che favoriscano la valutazione a distanza possono rappresentare strategie cruciali per migliorare in futuro l'efficienza dei processi e ridurre le emissioni e l'impronta delle attività di assicurazione della qualità[14]. Inoltre, investimenti mirati nella sostenibilità e la transizione verso sistemi più efficienti (come, ad es. l'adozione di soluzioni innovative e a basso impatto ambientale, la trasformazione digitale, l'ottimizzazione delle strutture fisiche e l'uso di energia rinnovabile) potrebbero tradursi in maggiore efficienza operativa e riduzione delle spese a lungo termine.

Tuttavia, anche queste soluzioni che - prima facie - sembrano in grado di favorire un rapido sviluppo di sistemi sostenibili e la graduale integrazione di essi tra i criteri da considerare nelle ordinarie attività di

[11] Sonetti, G., Barioglio, C., Campobenedetto, D., *Education for Sustainability in Practice: a review of current strategies within Italian universities*, "Sustainability", Vol. 12, no.13:5246, 2020. https://doi.org/10.3390/su12135246. Gonçalves Serafini, P., Morais de Moura, J., Rodrigues de Almeida, M., et al., *Sustainable Development Goals*..., cit.
[12] Nguyen H. T., Nguyen M. N., Tran T. T. T., et al., *Sustainable Development of Higher Education Institutions in Developing Countries: Comparative Analysis of Poland and Vietnam*, "Contemporary Economics", Vol. 16, no. 2, 2022, pp. 195-210.
[13] Gonçalves Serafini, P., Morais de Moura, J., Rodrigues de Almeida, M., et al., *Sustainable Development Goals*..., cit.
[14] Tanto da essere incluse tra i criteri di valutazione della formazione dei dottorandi da parte dell'*Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur (Hcéres): cfr.* Hcéres, *Référentiel d'évaluation des formations du 3e cycle (Campagne d'évaluation 2025-2026, Vague A)*, s.e., s.l., 2024, laddove si parla dell'integrazione degli «*enjeux de la transition écologique*», nei lavori di ricerca dei dottorandi. Tale previsione, peraltro, risulta in linea con il *Plan climat-biodiversité et transition écologique de l'Enseignement supérieur et de la Recherche*. Invece, per quanto attiene alle infrastrutture tecnologiche, il medesimo documento menziona proprio l'uso di risorse digitali per la documentazione e la «diffusion de la formation» (diffusione della formazione. Ad es. formazione a distanza e accesso alle risorse digitali).

assicurazione della qualità, sono da considerare con estrema attenzione, poiché l'impatto economico che può derivarne non appare secondario: anche in tal caso, infatti, è necessario compendiare con attenzione i costi e i benefici, in termini di sostenibilità (stavolta economico-finanziaria). Infatti, se da un lato l'introduzione di infrastrutture IT a supporto di una diffusa trasformazione digitale (ad es. per audit virtuali o processi di e-governance) possono costituire nel medio-lungo periodo strategie efficaci per ridurre – ad esempio – le emissioni derivanti dai trasporti, dall'altro, garantire il mantenimento delle sopracitate infrastrutture comporta affrontare nell'immediato importanti costi sia energetici che economici[15], potenzialmente in grado di incidere sulle disponibilità delle singole istituzioni[16], e conseguentemente, sulla dimensione estrinseca della sostenibilità[17].

3.2 *Dimensione estrinseca: impatto sulla sostenibilità istituzionale*

Come accennato, l'influenza che l'implementazione di procedure e criteri correlati ai temi della sostenibilità è in grado di svolgere potrebbe non limitarsi a una dimensione intrinseca: appare interessante valutare il possibile impatto di questi processi sulla sostenibilità delle istituzioni nel loro complesso. Se, da un lato, i sistemi di assicurazione della qualità possono avere una parte a livello intrinseco nell'impronta ecologica che esse lasciano (come sopra esposto e, comunque, se non accompagnate da politiche innovative), dall'altro possono senz'altro svolgere un ruolo propulsivo nell'incoraggiare pratiche istituzionali sostenibili e nel promuovere una cultura della sostenibilità all'interno delle istituzioni della formazione superiore, influenzando le politiche[18], le pratiche e soprattutto rivelandosi un fattore chiave nella costruzione della reputazione delle istituzioni della formazione superiore in materia di sostenibilità. In un contesto in cui la visibilità e il posizionamento competitivo sono cruciali per l'attrattività istituzionale, l'adozione di standard di qualità che includano la sostenibilità può rafforzare il prestigio e la credibilità, sia a livello nazionale che internazionale[19]. I benefici reputazionali sono già riconosciuti dalle università come risultato delle loro attività di sostenibilità ambientale. Un posizionamento eticamente coerente sulle sfide climatiche e ambientali può consentire alle istituzioni di diventare più attrattive per studenti, accademici e personale amministrativo[20], così come rivelarsi un elemento chiave nelle strategie di finanziamento e nelle partnership accademiche[21]. Pertanto, attraverso la definizione di standard e criteri di qualità che tengano conto della sostenibilità, le procedure di assicurazione della qualità possono incidere sulla sostenibilità istituzionale a vari livelli: dalla promozione di una gestione più efficiente e trasparente[22], al rafforzamento della reputazione dell'istituzione come attore chiave nella transizione ecologica. Questo approccio, oltre a migliorare la

[15] Chang, Y., Lien, H., *Mapping course sustainability by embedding the SDGs inventory into the University curriculum: a case study from National University of Kaohsiung in Taiwan*, "Sustainability", Vol. 12, no.10, 2020. https://doi.org/10.3390/su12104274. Sonetti, G., Barioglio C., Campobenedetto, D., Education for Sustainability..., cit.

[16] Blasco, N., Brusca, I., Labrador, M., *Drivers for Universities' contribution to the Sustainable Development Goals: an analysis of Spanish Public Universities*, "Sustainability", Vol. 13, no.1:89. 2021. https://doi.org/10.3390/su13010089.

[17] *Cfr. infra* § 3.2.

[18] Sursock, A., *Trends* 2015..., cit.

[19] Javed, Y., Alenezi, M., *A Case Study on Sustainable Quality Assurance in Higher Education*, "Sustainability", Vol. 15, no.10:8136. 2023. https://doi.org/10.3390/su15108136.

[20] Sul punto si veda: European University Association (EUA), *A Green Deal roadmap for universities*, European University Association, 2023, p. 12.

[21] Al riguardo, si veda ad esempio:, Xiong, W., Mok, K. H., *Sustainability Practices*..., cit., da cui è possibile desumere che, ad esempio nel caso di Hong Kong, le università che adottano pratiche sostenibili a livello di governance e rendicontazione migliorano la loro reputazione istituzionale e il loro impatto sociale, aumentando la loro capacità di influenzare le politiche pubbliche e accedere a risorse finanziarie dedicate alla transizione ecologica.

[22] Anche se, sul punto, l'esperienza africana evidenzia come l'assenza di un'integrazione concreta della sostenibilità nei processi di valutazione della qualità possa minare l'effettivo raggiungimento di questo effetto. Di tal ché apparirebbe indispensabile un cambiamento strategico che colleghi la governance universitaria agli obiettivi di sviluppo sostenibile: *cfr*. Ogunode N. J., *Nigerian Universities and their sustainability: challenges and way forward*, "Electronic Research Journal of Behavioural Sciences", no. 2, 2019.

competitività e l'attrattività internazionale[23], contribuisce a consolidare un'identità istituzionale basata sull'innovazione e sul miglioramento continuo (come, ad esempio, nel caso dell'apprendimento basato su dati e dell'intelligenza artificiale)[24].

Conseguentemente, pur con le necessarie ponderazioni cui si è accennato al paragrafo precedente[25], includere la sostenibilità tra i parametri di valutazione appare potenzialmente idoneo a favorire l'integrazione di principi ambientali, sociali ed economici nella governance accademica e nelle politiche educative, con i vantaggi menzionati. Tuttavia, l'assenza di standard e framework specifici e univoci rende difficile confrontare l'impegno delle università verso la sostenibilità, ostacolando la creazione di benchmark internazionali efficaci[26].

4. *Integrazione della sostenibilità nelle Agenzie di AQ e nelle Istituzioni della Formazione Superiore*

4.1 *Strategie attuali e buone pratiche*

Come visto, la crescente consapevolezza del valore dei temi legati alla sostenibilità e degli Obiettivi di Sviluppo Sostenibile (SDGs) delle Nazioni Unite[27]:

> that cover a broad range of issues related to socio-economic, environmental and technological development, is gradually impacting on all walks of life and the higher education system is no exception. As part of their broad remit, the SDGs expanded the focus beyond primary and secondary education to include tertiary education [...] In particular, SDG 4 calls for equal access to tertiary education, including university, as part of the promotion of lifelong learning opportunities for all. So, what is the relevance of the SDGs for QA? The EHEA produced a «Rome Communiqué» in November 2020 which highlighted the key role HE could play in delivering sustainable development goals[28].

Da tali consapevolezze e posizioni politiche e sociali sono state «conducted a comparative analysis» dalla dottrina[29], così come le agenzie di assicurazione della qualità hanno iniziato a valutare l'inclusione di temi legati alla sostenibilità nelle loro procedure, per esempio:

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[23] Pacher, C., Valakas, G., Adam, K., *Raw materials curricula and sustainable development. Assessment of curricula towards the achievement of Sustainable*, "GAIA", Vol. 29, no. 4, 2020, pp. 269-271.

[24] Bauer, M., Kummer, B., Bormann, I., et al., *Sustainability Governance at Universities: Using a Governance Equalizer as a Research Heuristic*, "Higher Education Policy", Vol. 31, no. 4, 2018, pp. 491-511. https://doi.org/10.1057/s41307-018-0104-x. Javed, Y., Alenezi, M., A Case Study..., cit.

[25] *Cfr. Supra* § 3.1.

[26] Agència de Qualitat de l'Ensenyament Superior (AQUA), Agencia de Calidad y Prospectiva Universitaria de Aragón (ACPUA), *Proposal of indicators to embed the SDGs into institutional quality assessment*, s.e., s.l., 2019.

[27] Su cui si veda: ONU, *Trasformare il nostro mondo...*, cit.

[28] Mria, P. G., *Quality Assurance in Higher Education...*, cit., p. 55. Sul punto, per ulteriori approfondimenti, si vedano altresì: Chankseliani, M., McCowan, T., *Higher education and the sustainable development goals*, "Higher Education", Springer Nature, 81, no.1, 2021, pp. 1-8. https://doi.org/10.1007/s10734-020-00652-w. Stukalo N., Lytvyn, M., *Towards Sustainable Development through Higher Education Quality Assurance*, "Education Sciences", Vol. 11, no.11, 2021. https://doi.org/10.3390/educsci11110664. Relativamente al quarto obiettivo di sviluppo sostenibile, il quale afferma la necessità di «Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all», c*fr. ONU, Trasformare il nostro mondo...*, cit.

[29] Mria, P. G., *Quality Assurance in Higher Education...*, cit., p. 55, laddove si parla degli studi condotti da Holm, T., K Sammalisto, K., Vuorisalo, T., *Education for sustainable development and quality assurance in universities in China and the Nordic countries: a comparative study*, "Journal of Cleaner Production", Vol. 107 2015, pp. 529–537. https://doi.org/10.1016/j.jclepro.2014.01.074.

> AQUA (Andorra Quality Assurance Agency) in partnership with ACPUA (Aragon Agency for Quality Assurance and Strategic Foresight in Higher Education (based in the Autonomous Community of Aragon in Spain) are amongst the pioneering agencies focusing attention and support on quality-led pathways for embedding sustainable development into higher education and SDGs into higher education QA and quality enhancement systems[30].

A conferma della distinzione della natura intrinseca ed estrinseca dei temi legati alla sostenibilità, è interessante notare il crescente interesse che tali tematiche suscitano sia a livello accademico che istituzionale (latamente inteso).

Da un lato, l'integrazione degli obiettivi di sviluppo sostenibile e – analogicamente – delle tematiche legate alla sostenibilità, sta emergendo come una priorità per molte università[31], le quali hanno preso il comando in questo settore, rafforzando la comprensione empirica e concettuale di come gli obiettivi di sviluppo sostenibile possano essere raggiunti attraverso la formazione superiore ed educando le future generazioni sulle sfide globali più significative[32]. L'analisi di diversi casi studio offre una panoramica delle strategie adottate dalle istituzioni di istruzione superiore per integrare la sostenibilità nei loro processi di AQ, evidenziando approcci diversi a seconda del contesto geografico e istituzionale. In Italia, ad esempio, le università sembrano mostrare un crescente impegno in tal senso, adottando programmi formativi mirati e iniziative di governance sostenibile per allinearsi agli obiettivi globali[33]. Allargando lo sguardo alla regione dell'Europa sud-orientale, emerge come molte università abbiano riconosciuto l'importanza di rivedere i propri curricula formativi per rispondere meglio alle esigenze del mercato del lavoro e garantire un allineamento efficace con gli SDGs[34]. Nei paesi in via di sviluppo, le sfide legate all'integrazione della sostenibilità nell'istruzione superiore assumono una dimensione ancora più complessa. In Nigeria, ad esempio, le università si trovano ad affrontare difficoltà strutturali e finanziarie che ostacolano l'inserimento di tematiche legate agli SDGs nei programmi di studio. Nonostante vi sia una diffusa consapevolezza dell'importanza della sostenibilità, le limitazioni economiche e infrastrutturali rappresentano un ostacolo significativo[35]. In Asia, alcune istituzioni stanno sperimentando soluzioni innovative per favorire l'integrazione della sostenibilità nei percorsi accademici. A Taiwan, la National University of Kaohsiung ha sviluppato un sistema di mappatura dei corsi, utile a monitorare e migliorare il grado di inclusione degli SDGs nei programmi di studio[36]; a Hong Kong, invece, la collaborazione tra più istituzioni si è rivelata una strategia efficace: l'Hong Kong Sustainable Campus Consortium riunisce otto università pubbliche in una rete di iniziative condivise per promuovere la sostenibilità nei campus e nella didattica[37]. Questi esempi dimostrano come l'integrazione degli SDGs

[30] Cfr. AQUA, ACPUA, *Proposal of indicators*..., cit.
[31] Mori Junior, R., Horne R. E., Fien, J., Implementing the UN SDGs in universities: Challenges, opportunities, and lessons learned, "Sustainability: The Journal of Record", 2019, pp. 1-5. Ruiz-Mallén, I., Heras, M., What Sustainability? Higher Education Institutions' Pathways to Reach the Agenda 2030 Goals, "Sustainability", Vol. 12, no.1, 2020, pp. 1-18. https://doi.org/10.3390/su12041290.
[32] Ibid.
[33] Sonetti, G., Barioglio, C., Campobenedetto, D., *Education for Sustainability*..., cit; tuttavia, uno studio condotto su nove università italiane ha evidenziato che la conoscenza e la consapevolezza degli SDGs tra gli studenti rimane ancora limitata, suggerendo la necessità di una maggiore integrazione della sostenibilità nei curricula accademici: cfr. Smaniotto, C., Battistella, C., Brunelli, L., et al., *Sustainable Development Goals and 2030 Agenda: Awareness, Knowledge and Attitudes in Nine Italian Universities, 2019*, "International Journal of Environmental Research and Public Health", Vol. 17, no. 23, 2020. https://doi.org/10.3390/ijerph17238968.
[34] Pacher, C., Valakas, G., Adam, K., *Raw materials*..., cit.
[35] Ogunode N. J., *Nigerian Universities*..., cit.
[36] Chang, Y., Lien, H., *Mapping course sustainability*..., cit.
[37] Xiong, W., Mok, K. H., *Sustainability Practices*..., cit.

nei sistemi di AQ dell'istruzione superiore stia diventando una priorità globale, seppur con modalità e livelli di implementazione differenti a seconda delle risorse, delle politiche istituzionali e del contesto socioeconomico di riferimento. È in ogni caso interessante notare come pratiche di allineamento con gli SDGs appaiano più diffuse al di fuori dell'Europa, dove – in assenza di politiche comuni – si segue direttamente l'Agenda ONU. Nei Paesi dell'UE, invece, si fa riferimento più esplicitamente alle politiche europee su questi temi, evidenziando un diverso livello di orientamento strategico nell'integrazione della sostenibilità nei processi di istruzione superiore[38].

Dall'altro, a livello nazionale e internazionale, il dibattito sullo sviluppo di diverse strategie e buone pratiche per integrare la sostenibilità nelle attività di AQ sembra oramai ampiamente avviato. Si è già accennato, al progetto promosso dall'Agència de qualitat de l'ensenyament superior (AQUA) e dall'Agencia de calidad y prospectiva universitaria de Aragón (ACPUA)[39], con il quale ci si è interrogati circa l'integrazione della sostenibilità nei framework di assicurazione della qualità dell'istruzione superiore. Inoltre, l'analisi di alcuni framework di assicurazione della qualità adottati da diverse agenzie nazionali – condotta per la redazione del presente contributo – evidenzia un graduale ma concreto riconoscimento della sostenibilità come elemento chiave nelle strategie di valutazione e miglioramento dell'istruzione superiore. Nel caso della Universitet Kanslers Ämbetet (UKÄ – *Swedish Higher Education Authority*), sebbene la sostenibilità non sia un criterio autonomo nei processi di AQ, essa può essere indirettamente considerata attraverso il miglioramento della qualità dell'istruzione e il suo impatto sulla società. Il sistema svedese segue le linee guida europee ESG 2015, focalizzandosi sulla cultura della qualità e sul monitoraggio delle pratiche accademiche, senza un'esplicita integrazione degli SDGs[40]. Quality and Qualifications Ireland (QQI) adotta un approccio simile, ma con un accento particolare sulla sostenibilità digitale e istituzionale. Le linee guida più recenti per i programmi di apprendimento misto e completamente online enfatizzano la necessità di investimenti mirati in infrastrutture tecnologiche sostenibili, l'adozione di pratiche inclusive e accessibili, la formazione continua del personale e la protezione dei dati. Sebbene non vi sia un riferimento esplicito agli SDGs, il documento evidenzia come l'uso responsabile delle risorse digitali e la pianificazione strategica siano elementi chiave per garantire la qualità nell'istruzione online e minimizzare l'impatto ambientale dell'uso delle tecnologie digitali[41]. La Quality Assurance Agency for Higher Education (QAA – UK) fa un passo avanti, integrando la sostenibilità ambientale nei propri standard di AQ. Le università britanniche sono incoraggiate ad allineare le proprie politiche di qualità agli SDGs, attraverso una gestione responsabile delle risorse di apprendimento e l'adozione di pratiche sostenibili a livello organizzativo e didattico. In particolare, il framework britannico richiede che i processi di AQ supportino equità, diversità, inclusione e sostenibilità ambientale, promuovendo un'istruzione superiore che tenga conto delle sfide globali[42]. Infine, il modello francese dello Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur (HCÉRES) sembra rappresentare una

[38] Tali conclusioni sembrano peraltro indirettamente evincibili dai verbali dell'ultimo incontro del Bologna Follow-Up Group (BFUG), tenutosi a Varsavia il 24 e 25 febbraio 2025: https://ehea.info/page.php?id=670. [ultimo accesso 25 luglio 2025].
[39] *Cfr*. AQUA, ACPUA, P*roposal of indicators*..., cit.
[40] *Cfr*. Universitet Kanslers Ämbetet (UKÄ), *Guidelines for the Evaluation of First and Second-Cycle Programmes*, s.e., s.l., 2023; ID., *Guidelines for the evaluation of third-cycle programmes*, s.e., s.l., 2024.
[41] *Cfr*. Quality and Qualifications Ireland (QQI), *Statutory Quality Assurance Guidelines developed by QQI for use by all Provider*, s.e., s.l., 2016; ID. *Statutory Quality Assurance Guidelines for Providers of Blended and Fully Online Programmes*, s.e., s.l., 2023.
[42] Quality Assurance Agency for Higher Education, *Mapping the UK Quality Code for Higher Education and the Office for Students Conditions of Registration*, s.e., s.l., 2024; ID., Mapping the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (2015) to the 2024 UK Quality Code, s.e., s.l., 2024.

delle pratiche potenzialmente più avanzate in termini di integrazione della sostenibilità nei processi di AQ. Nei riferimenti di valutazione dei programmi di 1°, 2° e 3° ciclo, viene esplicitamente richiesto che le formazioni accademiche considerino gli obiettivi della transizione ecologica in linea con il Plan Climat-Biodiversité et Transition Écologique del Ministero dell'Istruzione Superiore e della Ricerca. Questo implica che l'accreditamento dei corsi e dei dottorati deve includere criteri di sostenibilità, ponendo il sistema francese all'avanguardia nella formalizzazione dell'integrazione degli SDGs nei processi di AQ[43]. Queste diverse esperienze dimostrano come la sostenibilità stia progressivamente entrando nei framework di Assicurazione della Qualità, con livelli di integrazione differenti a seconda del contesto nazionale. Mentre alcuni sistemi, come HCÉRES e QAA, hanno già formalizzato l'integrazione della sostenibilità, altri, come UKÄ e QQI, lasciano ancora spazio a un'integrazione più indiretta o discrezionale. Tuttavia, il dibattito è ormai avviato e le strategie per la sostenibilità nell'AQ dell'istruzione superiore sembrano destinate a diventare sempre più centrali nelle politiche accademiche e istituzionali.

4.2 *Sfide e ostacoli*

Dall'analisi sinora svolta appare possibile comprendere come l'integrazione della sostenibilità nelle attività di assicurazione della qualità presenti molteplici sfide e ostacoli. Emerge chiaramente da quanto sinora esposto che una delle principali barriere per il percorso di integrazione in parola consiste nella mancanza di consapevolezza e di conoscenza del concetto di sostenibilità, così come in possibili costi iniziali per lo sviluppo di infrastrutture adeguate, carenza di risorse finanziarie e umane o, ancora, nella resistenza al cambiamento, nel rischio che l'integrazione di tali obiettivi venga percepita solo come un esercizio di compliance o di audit (piuttosto che come un'opportunità per un cambiamento nelle istituzioni), nell'assenza di una visione univoca di standard e framework specifici e nella difficoltà di misurare l'effettivo impatto che attività e politiche di AQ possono produrre sulla sostenibilità[44]. Per superare queste sfide e questi ostacoli, appare necessario promuovere la formazione e lo sviluppo professionale del personale coinvolto in tali attività, così come creare incentivi per l'adozione di pratiche sostenibili e la disseminazione della consapevolezza, nonché sviluppare strumenti di misurazione dell'impatto delle attività di assicurazione della qualità sulla sostenibilità[45].

5. *Discussione e implicazioni*

5.1 *Analisi critica dei risultati*

L'adozione di pratiche sostenibili nell'assicurazione della qualità è un processo ancora in forte evoluzione, influenzato da variabili come il quadro normativo, la disponibilità di risorse e la cultura organizzativa[46]. La sostenibilità intrinseca, legata soprattutto agli aspetti ambientali ed economici, risulta spesso trascurata, concentrandosi l'attenzione su parametri più tradizionali (qualità della didattica, gestione amministrativa, output di ricerca). Al contrario, la sostenibilità estrinseca si manifesta con maggiore visibilità, in quanto esercita un impatto reputazionale e strategico di immediato riscontro. L'analisi

[43] Hcéres, *Référentiel d'évaluation des formations du 1er et du 2e cycle. Haut Conseil de l'évaluation de la recherche et de l'enseignement supérieur*, s.e., s.l., 2024.
[44] AQUA, ACPUA, *Proposal of indicators*..., cit.
[45] In tal senso anche Aleixo A. M., Leal, S., Azeiteiro U. M., *Conceptualization of sustainable*..., cit.
[46] Sursock, A, *Trends 2015*..., cit.

delle dimensioni intrinseca ed estrinseca della sostenibilità nelle attività di assicurazione della qualità condotta ha evidenziato come vi siano:

i. Ancora importanti criticità, in grado di affliggere lo sviluppo del tema affrontato: appare evidente come l'integrazione della sostenibilità nei sistemi di AQ non risulti ancora pienamente realizzata sia per la mancanza di standard condivisi e di indicatori unificati che permettano una valutazione coerente della sostenibilità nelle istituzioni di formazione superiore[47], sia per la presenza di resistenze culturali e istituzionali al cambiamento[48].

ii. Crescenti consapevolezze sull'importanza di un approccio olistico all'integrazione della sostenibilità. Appare necessario considerare sia l'impatto diretto delle attività di AQ sull'ambiente, sull'economia e sulle risorse energetiche, sia l'impatto indiretto sulla cultura, le politiche e la reputazione delle istituzioni. Le strategie e le buone pratiche presentate offrono spunti interessanti per l'integrazione della sostenibilità nelle attività di AQ, ma appare importante valutare criticamente la loro applicabilità e il loro impatto in contesti diversi. I risultati emersi dall'analisi hanno importanti implicazioni per l'assicurazione della qualità e la sostenibilità delle HEIs, evidenziando la necessità di un cambiamento culturale e di un impegno concreto da parte di tutti gli attori coinvolti.

5.2 *Sinergie universitarie per la sostenibilità*

Integrare la sostenibilità fin dall'istruzione di base è cruciale per formare comunità consapevoli e per il raggiungimento del SDG 11 nelle città sostenibili[49]. Le università, attraverso ricerca, didattica e impegno sociale, hanno un ruolo centrale: lo studio su un ateneo italiano evidenzia infatti che insegnamento e ricerca, pur con tempi diversi di sviluppo, tendono a rafforzarsi reciprocamente, generando nuove opportunità di integrazione[50].

Dal punto di vista operativo, i corsi universitari possono diventare hub di pratiche sostenibili se fondati su sei pilastri (educazione, energia, sussidi verdi, ambiente, comunità energetiche, lavoro) e quattro risorse chiave (collaborazione, pragmatismo, fiducia nei giovani, altruismo)[51]. Le implicazioni di questi risultati riguardano la necessità di politiche universitarie che valorizzino il nesso tra didattica e ricerca, incentivino la sperimentazione di pratiche innovative e favoriscano la formazione di comunità accademiche più coese e orientate alla transizione sostenibile.

5.3 *Implicazioni per le politiche e le pratiche di AQ*

Dal punto di vista operativo, l'adozione di modelli di governance più flessibili e orientati alla sostenibilità potrebbe favorire una maggiore sinergia tra assicurazione della qualità e strategie ambientali. In particolare, l'inclusione di parametri ambientali nei sistemi di valutazione e accreditamento consentirebbe di premiare le istituzioni che adottano pratiche sostenibili e incentivare un cambiamento diffuso e

[47] Aleixo A. M., Leal, S., Azeiteiro U. M., *Conceptualization of sustainable*..., cit. AQUA, ACPUA, *Proposal of indicators*..., cit.
[48] Per analoghe conclusioni si vedano: Ibid.
[49] Basilico, P., D'Adamo, I., Uricchio, A. F., et al., *Sustainable Schools and Knowledge Management: Driving Urban and Social Transitions for Sustainable Development*, "Sustainable Development", 2025, pp.1-20. https://doi.org/10.1002/sd.70215.
[50] Leoncini, A., Chiarello, F., Martini, A., et al. 2025. *How academics at an Italian University respond to the sustainability challenge: a quantitative study of the research-teaching nexus*, "Studies in Higher Education", 2025, pp. 1–18. https://doi.org/10.1080/03075079.2025.2523498.
[51] Biancardi, A., D'Adamo, I., Uricchio, A. F., et al., *Strategies for developing sustainable communities in higher education institutions*, "Scientific Reports", Vol., 13, no. 20596, 2023. https://doi.org/10.1038/s41598-023-48021-8.

l'inserimento esplicito di parametri di sostenibilità nei processi di accreditamento potrebbe fungere da catalizzatore per l'adozione di strategie più responsabili e orientate al futuro[52]. Ciò, chiaramente, purché un simile sviluppo porti con sé un adeguato supporto che consenta di garantire l'accessibilità e l'equità di tali soluzioni a tutte le istituzioni[53].

Sul tema, appare di particolare interesse seguire anche i lavori avviati per la prossima revisione degli ESG[54], annunciata con il Comunicato ministeriale di Tirana[55], nonché le attività coordinate della European Association for Quality Assurance in Higher Education (ENQA) e del Sistema Iberoamericano de Aseguramiento de la Calidad de la Educación Superior (SIACES) per l'allineamento degli ESG con i Principi di Buona Pratica (PBP)[56], i quali già contengono rinvii agli obiettivi di sviluppo sostenibile e all'Agenda ONU 2030[57]. Con buona probabilità, allo stato, entrambe le iniziative non saranno la sede adatta per un'evoluzione in seno integrativo dei prossimi strumenti condivisi per l'AQ delle HEIs. Tuttavia, non può escludersi che una sinergia di queste attività possa – se non facilitare – almeno avviare una più profonda riflessione sull'opportunità (rectius: necessità) di un'integrazione sistematica della sostenibilità nelle politiche di AQ a livello europeo[58].

6. *Conclusioni e prospettive future*

Il presente contributo ha inteso approfondire il ruolo della sostenibilità nelle attività di assicurazione della qualità nelle istituzioni della formazione superiore. L'analisi ha evidenziato l'importanza di un approccio olistico all'integrazione della sostenibilità, considerando sia le dimensioni intrinseche che quelle estrinseche. Sono state presentate strategie, buone pratiche, sfide e ostacoli per l'integrazione della sostenibilità nelle agenzie di AQ e nelle HEIs. Appare evidente come l'integrazione della sostenibilità nelle attività di AQ rappresenti al contempo (i) un'opportunità per migliorare l'efficienza e la resilienza delle istituzioni della formazione superiore e (ii) una necessità urgente e non più differibile per rendere il sistema educativo più resiliente e allineato agli obiettivi globali di sviluppo sostenibile.

[52] Di particolare importanza al riguardo appaiono anche le strategie adottate dall'EUA nell'ambito del Green Deal Roadmap, con cui si rafforza il ruolo delle università nella transizione verso un'istruzione superiore più sostenibile: cfr. EUA, *A Green Deal roadmap*..., cit.; inoltre, per un riferimento trasversale e potenzialmente interdisciplinare, si noti come il progetto Ministero dell'Ambiente "Mettiamoci in RIGA" e l'esistenza del "Kit di replicabilità delle buone pratiche per l'ambiente e il clima", offrano strumenti operativi per implementare strategie di sostenibilità e l'adozione di buone pratiche ambientali: Ministero dell'Ambiente e della Sicurezza Energetica. https://www.mase.gov.it/pagina/mettiamoci-riga-rafforzamento-integrato-della-governance-ambientale. [ultimo accesso 25 luglio 2025].

[53] Conformemente anche in Sonetti, G., Barioglio, C., Campobenedetto, D., Education for Sustainability..., cit.

[54] Si veda il comunicato dell'ENQA: European Higher Education Area, *Revision of the ESG: briefing note on process and structures*. https://www.enqa.eu/wp-content/uploads/ESG-revision-process-and-structures_briefing-note-October-2024.pdf. [ultimo accesso 25 luglio 2025].

[55] In cui, peraltro, si afferma il supporto nei confronti delle HEIs *"in strengthening their contribution to society and their local communities, responding to the Sustainable Development Goals (SDG) and the green transition in the area of higher education"*. Disponibile sul sito della European Higher Education Area: https://ehea.info/Immagini/Tirana-Communique1.pdf, pp. 5 e 8. [ultimo accesso 25 luglio 2025].

[56] Per l'accordo di cooperazione, disponibile sul sito della European Network for Quality Assurance, https://www.enqa.eu/news/enqa-siaces-agreement/. [ultimo accesso 25 luglio 2025]; per approfondire il progetto: https://www.enqa.eu/projects/alignment-of-siaces-enqa-quality-guidelines-in-higher-education-for-strengthening-bi-regional-trust-esg-pbp-alignment/. [ultimo accesso 25 luglio 2025]. Per i *Principios de Buenas Prácticas* (Principi di Buona Pratica), disponibile sul sito della Sistema Iberoamericano de Asequeamiento de la Calidad de la Educación Superior (SIACES). https://www.siaces.org/wp-content/uploads/2021/09/DeclaracionPrincipiosBuenasPracticas.pdf. [ultimo accesso 25 luglio 2025].

[57] ONU, *Trasformare il nostro mondo*..., cit.

[58] Nonostante la consapevolezza di ENQA «of its social responsibility in developing its criteria and processes. In its communication with stakeholders, ENQA promotes social responsibility in quality assurance and its contribution to the United Nations Sustainable Development Goals.». *Cfr.* ENQA, *ENQA Strategic Plan*..., cit., p. 2.

In questo contesto, promuovere la creazione di comunità accademiche sostenibili può favorire lo scambio di pratiche virtuose, rafforzare la cooperazione tra studenti, docenti e stakeholder, e trasformare le HEIs in veri e propri hub di innovazione sociale e ambientale, contribuendo così a costruire un ecosistema educativo più resiliente e responsabile.

Per il futuro, appare essenziale (a) sviluppare standard internazionali comuni per la valutazione della sostenibilità nelle istituzioni accademiche, (b) incentivare finanziamenti e politiche di sostegno per le università che implementano strategie sostenibili, (c) promuovere la trasformazione digitale per migliorare l'efficienza e ridurre l'impatto ambientale dei processi di AQ e (d) rafforzare la cooperazione tra stakeholder per favorire la diffusione di best practices.

L'evoluzione normativa e l'integrazione di modelli innovativi rappresentano strumenti chiave per guidare il settore accademico verso un futuro più sostenibile e inclusivo, contribuendo alla creazione di un sistema educativo più equo, efficiente e sostenibile. Tuttavia, nonostante il processo di aggiornamento degli standard ESG offra una opportunità concreta per introdurre criteri di sostenibilità nei sistemi di AQ, la tematica sembra rimanere ancora marginale nel dibattito in corso[59] evidenziando come si sia ancora lontani dal riconoscerne la centralità e dall'integrarla in modo strutturale nei processi di assicurazione della qualità dell'istruzione superiore.

Tuttavia, parimenti evidente appare come il tema della sostenibilità sia in generale in continua evoluzione e richieda ulteriori ricerche e approfondimenti.

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[59] Anche in questo caso, si vedano i verbali del BFUG, cit.

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Students' perceptions of education fraud. An evidence-based study to explore their role in combating it

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Abstract

What is the role of students in combating education fraud? To what extent do they feel protected by the academic community? Do they see themselves as playing an active role in preventing education fraud? What impact do new technologies and artificial intelligence have? Education fraud is a global phenomenon that affects all levels of education, with increased efforts at different levels to counter it. Among the actors involved in the fight against education fraud, students can play a significant role.

This article analyses the main findings of a study conducted by the Council of Europe Platform on Ethics, Transparency and Integrity in Education (ETINED) in cooperation with the Academic Equivalence Mobility Information Centre (CIMEA), in light of existing literature on students' perception of fraud in education and the role of new technologies. The aim is to support the identification of strategies for strengthening the culture of academic integrity within the wider academic community.

Keywords: education fraud; students; ETINED; ethics; Artificial Intelligence; academic integrity.

1. *Identifying strategies to combat educational fraud based on students' perceptions of the phenomenon*

The phenomenon of academic fraud is not recent whatsoever. Historical evidence suggests that issues such as certificate sales and academic misconduct were already prevalent at the dawn of the first universities in the Middle Ages (15th century). Since then, a variety of fraudulent activities have been perpetrated, including plagiarism, forgery of academic documents, contract cheating, and phenomena with explicit intent to defraud, such as *essay mills, visa mills*, – respectively providers of contract cheating services and false visa selling, *diploma mills* – non recognised institutions issuing academic qualifications, and *accreditation mills* – institutions providing unreliable accreditation certificates[1].

Studies carried out on the occurrence of academic misconduct in higher education have demonstrated that the proportion of students engaging in plagiarism and other "questionable activities", including copying from other students and cheating in examinations, has increased significantly from 27% in 1966[2] to 54% in 1996[3]. A systematic review conducted by Newton confirmed that, in samples collected between 2014 and 2018, the percentage of students admitting to paying someone else to undertake their work was 15.7%, potentially representing approximately 31 million students worldwide[4].

Considering the role that the academic community as a whole can play in combating education fraud and promoting academic integrity, a significant number of studies have been conducted focusing on the perceptions of students and lecturers regarding the issue. The findings of these studies have the potential to inform the creation of policies that adopt a systemic and participatory approach to combating education fraud, involving the entire academic community. In 2014, Beasley analysed 298 responses from students who were formally reported for cheating, focusing on their suggestions about what might have prevented their dishonest behaviour. Among the main reasons mentioned by students, there was ignorance about what constitutes cheating[5]. Other reasons for engaging in unethical actions include intense academic pressure, the inability to achieve desired results through legitimate means, and a lack of time[6]. Furthermore, students may employ neutralisation techniques to rationalise their actions, usually by deflecting blame onto external factors, particularly their professors, criticising them for unrealistic expectations, failing to monitor exams, not clarifying rules sufficiently, not caring, or not

[1] CIMEA, *Guide on diploma mills and other dubious institutions*, 2018. https://www.cimea.it/Upload/Documenti/Guidelines-on-Diploma-Mills.pdf. Council of Europe, Recommendation CM/Rec(2022)18 on countering education fraud, Strasbourg 2022. https://www.coe.int/en/web/education/-/countering-education-fraud. [last accessed 23 September 2025].
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[3] Ibid.
[4] Newton, Philip M., *How Common Is Commercial Contract Cheating in Higher Education and Is It Increasing? A Systematic Review*, "Frontiers in Education", Vol. 3, 2018. https://cronfa.swan.ac.uk/Record/cronfa43662. [last accessed 23 September 2025].
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providing adequate support[7]. Subsequent studies have reiterated the concept of neutralisation, reporting that students may mitigate the consequences of their dishonesty by minimising the harm caused or by blaming systemic pressures, such as excessive workloads and intense competition[8]. In literature, another cognitive mechanism of self-justification that enables individuals to commit dishonest acts while still perceiving themselves as honest or non-criminal is rationalisation. One common form of rationalisation is blaming the system. In this particular case, students argue that examinations do not adequately measure performance and that institutions should adopt alternative assessment criteria[9]. A related mechanism is the displacement of responsibility, which shifts accountability to the instructor[10]. Another interesting perspective is provided by studies comparing perceptions of students and lecturers. In contrast to the perceptions of lecturers, students have a significantly lower opinion of the effectiveness of fraud prevention strategies in terms of detection and monitoring[11]. However, both groups agree that a combined approach involving education, consistent policy enforcement, and supportive academic environments is necessary to prevent fraud[12], while rejecting the obligation to report peers for unfair behaviour[13].

2. *The work of the Council of Europe Platform on Ethics, Transparency and Integrity in Education (ETINED)*

Education fraud has been the subject of study from various perspectives, given its impact at the international, national, institutional, and individual levels. Firstly, it is essential to note that episodes of fraud have the potential to compromise the quality of the education system and the mutual trust that exists among nations[14]. Secondly, the aforementioned factors have been demonstrated to have a detrimental effect on an institution's shared values, academic quality, and standards[15]. Thirdly, there is a concern about the erosion of the knowledge and skills acquired by students[16]. Furthermore, the concept that an individual can attain a degree without exerting significant effort devalues the genuine achievements of those who pursue rigorous education. Against this background, the work of ETINED, the Council of Europe Platform on Ethics, Transparency and Integrity in Education, has extensively addressed the topic with specific reference to legislation as well as the roles that different actors in higher education can play in combating fraud and promoting academic integrity.

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[12] Ibid.
[13] Yakovchuk, N., *Staff and student perspectives on the potential of honour codes in the UK*, "International Journal for Educational Integrity", Vol. 7, no. 2, 2011, pp. 37-52. https://ojs.unisa.edu.au/index.php/IJEI/article/view/762. [last accessed 23 September 2025]. Ramos, R., Gonçalves, J., Gonçalves, S. P., *The unbearable lightness of academic*... cit.
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ETINED was officially launched in 2015, with its roots in the Final Declaration of the Council of Europe Standing Conference of Ministers of Education on Governance and Quality Education, which took place in Helsinki in 2013[17]. The platform aims to foster the exchange of best practices and relevant information, contribute to developing solutions to the challenges posed by corruption, and nurture an environment where all stakeholders support ethical principles[18]. In 2022, following four years of work by ETINED, the Committee of Ministers of the Council of Europe adopted the Recommendation CM/Rec(2022)18 on countering education fraud, along with its explanatory memorandum, on 13 July 2022[19]. The Recommendation is based on four main dimensions identified to combat education fraud and promote ethics and integrity in education: (i) prevention, (ii) prosecution, (iii) international cooperation, and (iv) monitoring. Furthermore, the text proposes six main recommendations:

- protect pupils, students, researchers, and staff at all levels of education from organisations and individuals engaged in selling (and advertising) fraudulent services.
- Provide support for the implementation of preventive and protective measures, as well as for a culture of equality of opportunity at all levels and in all sectors of education and training, and in the transition between these sectors.
- Monitor technological developments that could support new forms of fraud.
- Facilitate international cooperation in the field.
- Support the wide dissemination of the Recommendation[20].

As reflected in the six recommendations, students are particularly connected to the spheres of prevention and protection. This aligns with a previous study presented during the ETINED 3rd Plenary Session, held in Prague on 28 November 2019[21], which clearly identifies students and potential applicants to higher education institutions as the primary actors in combating the phenomenon of education fraud.

Another point that emerges in the Recommendation CM/Rec(2022)18 and is recalled in point 2 of its appendix is the «Use of digital solutions»[22]. Within the discourse surrounding education fraud, new technologies are frequently viewed as representing two sides of the same coin. On one hand, technological innovation can be seen as part of the problem of education fraud, as it offers easy and

[17] Council of Europe Standing Conference of Ministers of Education: "Governance and Quality Education", *Final Declaration on the Conference Theme*, Helsinki, Finland, 26-27 April 2013. https://rm.coe.int/med24-final-declaration-confmin-april13-en/1680909525. [last accessed 20 September 2025].
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[20] Council of Europe, *Recommendation CM/Rec(2022)18*... cit.
[21] ETINED-Council of Europe Platform on Ethics, Transparency and Integrity in Education website, *3rd ETINED Plenary Session (2019)*. https://www.coe.int/en/web/ethics-transparency-integrity-in-education/3rd-etined-plenary-session-2019-. [last accessed 23 September 2025].
[22] Ibid.

inexpensive ways to forge documents. Moreover, the global online market facilitates the operations of diploma mills and essay mills. On the other hand, new technologies constitute a powerful part of the solution in preventing and combating education fraud. The use of digital tools to enable the secure exchange of digital student data and verify the authenticity of qualifications could support the fight against education fraud[23].

The recent introduction of generative Artificial Intelligence (AI) tools and their widespread availability have opened the doors to new opportunities and, simultaneously, new challenges for academic integrity, particularly regarding plagiarism[24]. Although AI is perceived as beneficial for improving understanding, creativity, and productivity[25], many students express concerns about its costs[26]. Some of these costs are personal, including the risk of increased laziness[27], reduced motivation, and diminished individual cognitive capacities. Others relate to ethical considerations, such as the erosion of independent thinking[28], threats to academic integrity[29], the devaluation of education, and concerns about privacy and data security[30].

The rise of AI forces higher education institutions to reconsider how they define and address misconduct. It is not just a matter of updating policies but also of understanding how students themselves see the boundary between legitimate help and fraud. That blurred line is now at the heart of the debate, and the literature on students' perceptions of academic fraud in relation to AI is an emerging field. At the centre of this debate lies the concept of *AI-giarism*, a neologism that combines AI and plagiarism, capturing the ethical dilemmas introduced by generative AI tools such as ChatGPT[31]. Eaton proposes the concept of post-plagiarism, arguing that historical definitions of plagiarism, which often focus on the literal cutting and pasting of text without attribution, may soon be obsolete or will be transcended rather than rewritten due to AI[32].

[23] Johansson, E., Finocchietti, C., *The digital alternative*, in Draper, M., Farrington, D., Finocchietti, C., et al., (eds), *Means to counter education fraud - Legislation, practices and instruments*, ETINED- ouncil of Europe Platform on Ethics, Transparency and Integrity in Education, Vol. 7, Council of Europe Publishing, Strasbourg, 2023, pp. 67-79. https://rm.coe.int/prems-023823-gbr-2512-etined-vol-7-16x24-web-4-/1680addf63. [last accessed 15 September 2025].
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[28] Ibid.
[29] Ka Yuk Chan, C., *Students' perceptions of 'AI-giarism': Investigating changes*... cit.
[30] Ahmad, S. F., Han, H., Alam, M. M., et al., *Impact of artificial intelligence on human*... cit. Ka Yuk Chan, C., *Students' perceptions of 'AI-giarism': Investigating changes*... cit.
[31] Ibid.
[32] Eaton, S. E., Curtis, G. J., Stoesz, B. M., et al. (eds.), *Contract Cheating in Higher Education*, Palgrave Macmillan Cham, 2022. https://doi.org/10.1007/978-3-031-12680-2.

3. *Main findings from the study on students' perceptions and awareness of education fraud*

The ETINED platform, in collaboration with CIMEA, the Italian National Information Centre responsible for the recognition of qualifications, conducted a study titled *Student Perceptions and Awareness of Education Fraud*[33]. The study builds on previous research developed under the Erasmus+ project FraudS+ (False Records, Altered Diplomas, and Diploma Mills Qualifications Collection), which resulted in the publication *Knowledge and Awareness of Fraud in Education: A Student Perspective*[34]. To follow up on this publication, a new survey was developed in line with Recommendation CM/Rec(2022)18 and targeted at higher education students from the States Parties to the European Cultural Convention, as represented at the Steering Committee for Education (CDEDU) of the Council of Europe. The active engagement of the CDEDU representatives, who supported the dissemination of the survey, enabled the collection of 5.333 responses across 40 countries. The survey results were published in Volume 10 of the ETINED publications, which presents students' perceptions of educational fraud, focusing on six key dimensions: knowledge, experience, community – including protection and prevention – and technology. The last part of the study is dedicated to new technologies, which represented a "study within the study" since the questionnaire included a substantial section related to this topic.

This paper outlines the main findings presented in Volume 10 of the ETINED publications, situating them within the existing literature on the topic, and aims to contribute to the debate on combating education fraud, as well as to identify potential strategies for promoting ethics and integrity in education.

3.1 *Knowledge and experience*

The first aspect examined, knowledge, reveals significant limitations in student familiarity with education fraud. Overall, students admitted only a partial understanding of the phenomenon: only 15% said they were "definitely aware" of what constitutes education fraud, while 54% were unsure or not familiar with the concept. Familiarity with specific types of fraud was similarly uneven. Plagiarism was the most widely recognised, with 69% of respondents indicating familiarity. Other forms of misconduct were far less known, with only 12% familiar with visa mills. Indeed, although students are generally aware of the existence of education fraud, only a small minority demonstrates a clear understanding of its various forms, while plagiarism remains the most well-known.

Despite these knowledge gaps, there is a clear consensus on the negative impact of educational fraud on the quality of education, particularly in terms of its impact on the equity and reputation of the education system. Students ranked the transparency of national education systems as one of the main aspects that are negatively affected.

When it comes to students' direct experience with educational fraud, this aspect closely aligns with their familiarity with the phenomenon. Plagiarism remains the most frequently encountered form of fraud, with 32% of respondents reporting direct experience, followed by essay mills, with 16% of students

[33] Petrucci, E.,Tardioli, M, Ratto Vaquer, G, *Student perceptions and awareness of education fraud, ETINED-Council of Europe Platform on Ethics, Transparency and Integrity in Education*, Vol. 10, Council of Europe Publishing, Strasbourg, 2025, https://rm.coe.int/prems-050724-gbr-2512-etined-10-web/4880283e72. [last accessed 15 September 2025].
[34] Lantero, L., Finocchietti, C., Petrucci, E., et al., *Knowledge and awareness of fraud in education*... cit.

reporting having direct experience with this type of fraud. The primary source of information for students who have encountered fraud in education is made up of the students themselves (64%), followed at a considerable distance by advertising and online platforms. Social media is the least mentioned source, with only 34% of respondents mentioning it.

3.2 *Community, protection, and prevention*

38% of respondents reported not feeling protected by their academic community. Furthermore, a considerable percentage of students stated that they did not report instances of fraud. This was either because they did not consider themselves responsible for reporting it or because they were unsure who to contact. Among those who did report incidents of fraud, the most common point of contact was the course professor, cited by 28% of respondents. 14% reported to the students' ombudsperson or ethics committee, while a small proportion selected «other», specifying academic coordinators, institutional authorities, or even confrontation with the individual involved in the fraudulent activity. 50% of respondents indicated that they were not aware that the activity they witnessed constituted illegal or unethical behaviour, which prevented them from reporting the incident. The survey reveals that many students feel uncertain or unprotected if they report fraudulent activities: only 38% reported that they would be protected, while 42% were unsure, and 20% felt they would not be protected.

When it comes to preventing education fraud, students have clearly expressed the need for more secure and transparent reporting mechanisms. Their suggestions fell into three main themes. The most frequently cited concern was ensuring confidentiality throughout the reporting process. Students also emphasised the importance of transparency regarding both investigation processes and institutional actions and highlighted the need to improve understanding of which authorities handle fraud cases and their effectiveness.

The findings reveal that most students have not received targeted instructions on educational fraud. Over half of the students (54%) reported not having received any training on education fraud, and another 16% were unsure whether academic integrity was included in their curriculum.

When asked how educational fraud could be more effectively prevented, students suggested actions aimed at empowering them with the knowledge and skills needed to avoid committing fraud. These include skill development in critical thinking and academic writing, as well as awareness campaigns. Other suggested actions to improve fraud prevention focus on protecting the legitimacy of academic qualifications and institutions. Students also see themselves and the academic community as active players in combating fraud. Among the leading actors responsible for addressing education fraud, they highlighted universities, teaching staff, students, and student associations. Regarding the role of national governments, students emphasised their importance not only in enforcing legal standards but also in fostering an environment of trust, transparency, and ethical behaviour in education.

3.3 *New technologies and AI*

The section on new technologies aims to provide insights into the perceived relationship between technology and fraud, as well as students' familiarity with AI tools. Over half of the respondents believe that technology plays a role in fraudulent activities within the education sector. They do not view new technologies related to education fraud as inherently problematic, acknowledging the importance of

higher education institutions adapting to them. On this note, new technologies are seen equally as both a potential problem and a possible solution in relation to education fraud. Over half of respondents see technology as contributing to fraudulent activities in education, with 37% agreeing and 15% strongly agreeing. Many expressed concern that new technologies could facilitate the falsification of documents and the creation of fake qualifications, viewing them as part of the problem. Conversely, technologies are also seen as tools to prevent and combat educational fraud. They can enable secure digital data exchanges and support online platforms for credential verification. 39% of students expressed confidence in this potential, with an additional 9% showing strong confidence.

Regarding students' familiarity with AI, the study revealed a certain level of uncertainty surrounding all aspects connected to it. The surveyed students are equally divided into two groups: those who are aware of and use existing AI tools, and those who are either unaware of AI tools and their applications or are unsure about them. The vast majority of students who use AI tools do so for learning purposes.

Opinions are divided on whether AI usage constitutes plagiarism, reflecting ongoing debate in academic contexts: 51% of respondents stated that whether AI use counts as plagiarism depends on how it is used, while the remaining students were almost evenly split, with 24% agreeing that AI use should be considered plagiarism and 25% disagreeing. Those who did not consider AI use as plagiarism reported using it primarily for everyday questions (69%) or entertainment purposes (16%). The study highlights students' ambivalent attitudes toward AI and new technologies, underscoring the need for digital literacy and awareness initiatives within academic communities to reduce uncertainty and promote ethical use of AI in education.

4. *Considerations on the main findings*

Although some students appear to have a general understanding of the phenomenon, only a limited percentage of them expressed a certain level of awareness of fraudulent activities, with plagiarism being the type of education fraud with which respondents are most familiar. Furthermore, there is a clear consensus regarding the negative impact of education fraud on the quality of education, particularly in terms of equity and the reputation of the education system.

Students feel the need for protection of anonymity and privacy, as well as for training and awareness. The study revealed a belief that actions to prevent education fraud should be primarily carried out within the academic community, starting with universities, teaching staff, and students themselves. These efforts can be fully effective when supported by a systemic approach and cooperation.

Lastly, a final reflection concerns student approaches to new technologies. Students' attitude towards new technologies in relation to fraud seems to be ambivalent, reflecting in some way the dual nature of the technological dimension itself, which can be used both to combat the phenomenon and to support it.

5. Conclusions

The jointly conducted study by ETINED and CIMEA contributes new, evidence-based information and a broader geographical coverage to the existing literature. While most preceding works have been conducted at the institutional or national level, the study's broad geographical coverage, spanning 40 countries, represents an innovative research element. A key finding of the study is that students perceive themselves as integral to the academic community and as active participants in combating academic fraud. This aspect, which pertains to the potential contributions of students and the academic community towards preventing educational fraud by fostering a culture of academic transparency and integrity, calls for further research.

A secondary element that necessitates further research is the perceived necessity for students to enhance transparency and protection by the academic community. Whilst this may be regarded as a rationalisation, it would be relevant to ascertain how the level of awareness of education fraud and the protection of privacy could be enhanced to generate a greater sense of protection among students within their academic community.

Another element that stems from the study and requires further research is the role of new technologies and AI in combating education fraud, as well as the blurred boundary between legitimate help and fraud that appears unclear to students. It is interesting to note that students perceive technologies as both contributing to the problem of education fraud and as having the potential to provide a solution to this issue. Nevertheless, the uncertainty expressed in relation to the use of AI tools as potentially connected to cheating, as well as their need for digital literacy, confirms the interest in exploring this topic as emerging in the extant literature.

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Digital Transformation and Educational Resistance: Case Studies of Palestine and Afghanistan

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Abstract

The digitalisation of education raises urgent questions of equity, transparency and academic integrity, particularly in contexts of conflict and crisis. Drawing on a comparative qualitative analysis of two cases: Palestine and Afghanistan, this article shows how universities, lecturers and students adapt digital tools to secure continuity of teaching and the circulation of knowledge, circumventing physical closures, territorial fragmentation, and barriers related to equity and gender. Technology and digitalisation thus emerge both as a vital space of educational resistance and as a terrain dense with dilemmas and challenges. This study offers an ethically grounded and practice-oriented account of digital resistance methods and related solutions, conceptualising them as infrastructures that safeguard the right to education, equity and academic integrity.

Keywords: Digital Ethics, Educational Resistance, Academic Sovereignty, Palestine, Afghanistan

1. *Introduction*

Over the past two decades, higher education has undergone a profound digital transformation. In parallel, the underlying value framework has also matured: the statement of core values within the European Higher Education Area (EHEA) is relatively recent, having been formalised in the *Paris Communiqué* (2018)[1] and reaffirmed in the Rome Communiqué (2020a; 2020b)[2]. These values include academic freedom and integrity, institutional autonomy, the participation of students and staff in governance, and public responsibility for higher education.

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[2] European Higher Education Area, *Bologna Process, Rome Ministerial Communiqué*, 2020. https://ehea.info/page-ministerial-declarations-and-communiques [last accessed 15 October 2025].

Moreover, the integration of educational technologies (EdTech) has reshaped university life and learning processes, with the aim of translating next-generation promises into practice and enhancing adaptability, focusing on greater efficiency, precision education, personalisation, advanced analytics and a progressive reduction of inequalities[3]. This trajectory accelerated sharply during the COVID-19 pandemic, driving pedagogical innovation and, at least potentially, widening access to knowledge.

Although digitalisation is often presented as a driver of modernisation, efficiency and democratisation, its application in contexts marked by protracted conflict and fragile infrastructure exposes complex ethical issues. A World Bank report on the impact of COVID-19 on education, by way of illustration, concludes that the mere availability of technologies is necessary but not sufficient for effective remote learning; education remains a highly interactive endeavour and the role of teachers is more crucial than ever. The report also notes that the crisis has amplified inequalities while creating an opportunity to rethink the traditional school-centred model of learning[4].

In this context, although views differ on the advantages and disadvantages of technology use, in some settings it is the only practicable means of ensuring continuity of study at multiple levels. In the cases of Palestine and Afghanistan, the adoption of digital technologies is not a simple technological transition; it takes shape as a profoundly political and social process. It reshapes the right to education, the transparency of academic processes, the integrity of assessment and data protection, in scenarios where universities and schools resort to distance learning not as a strategic choice but out of necessity: to survive campus closures, territorial fragmentation, censorship and pervasive insecurity.

This article also focuses on two national contexts with markedly youthful demographic structures, where access to education is both a primary need and a critical challenge. According to the latest data from Afghanistan's National Statistics and Information Authority, published in 2021, over 60% of the population is under 25 years of age and, within this cohort, 50% are female[5]. Palestine, in turn, presents an even lower median age at 20.34 years, with 40% of the population under 14[6]. In light of these figures, the digitalisation of education systems emerges as a strategic factor for many students facing complex challenges. Within this frame, this article compares two countries: Afghanistan, marked by regime change, and Palestine, characterised by persistent territorial fragmentation and instability. The challenges surrounding access to and implementation of educational digitalisation are examined in detail in the following sections.

It is precisely in these settings that forms of "digital resistance" emerge: a set of practices, platforms and informal networks that enable lecturers and students to maintain continuity of learning and the circulation of knowledge despite stringent material and regulatory constraints. The notion of resistance is not used here in a merely rhetorical or negative sense. It describes the capacity of academic actors to repurpose digital tools, such as learning management systems, open access repositories and community networks, to rebuild reliable learning spaces where institutional ones are inaccessible or

[3] Facer, K., Selwyn, N., *Digital technology and the futures of education – towards 'non-stupid' optimism*, UNESCO, 2021, p. 11.
[4] Rodriguez, B., Rebeca, M., Romani, C., et al., *Remote Learning During the Global School Lockdown : Multi-Country Lessons*, Vol. 1, Washington, D.C., World Bank Group, 2022. http://documents.worldbank.org/curated/en/668741627975171644. [last accessed 15 October 2025].
[5] National Statistics and Information Authority (NSIA), *Afghanistan Statistical Yearbook 2020*, no. 42, NSIA 2021, p. 8.
[6] World Population Review, *Palestine*, 2025. https://worldpopulationreview.com/countries/palestine. [last accessed 15 October 2025].

compromised. These practices are decentralised and aim to guarantee low-threshold access, guided by a core principle: *do no harm*[7]. The imperative is twofold: on the one hand, to protect students, lecturers and staff, safeguard sensitive data and avoid harmful tracking; on the other, to ensure a minimum quality of service so that study paths and academic careers are not interrupted. The constant tension that defines this resilient approach lies in balancing the urgency of widening access with the responsibility not to create new vulnerabilities.

A further dimension of EdTech in this account is that it cannot be treated as a neutral infrastructure; it is a field of power. Platforms, standardised metrics and imposed assessment models often act as vehicles of epistemic hierarchies, reproducing technological and intellectual dependencies on the Global North and producing forms of *data colonialism*, that is, the systematic extraction and control of user data for profit or surveillance. Decolonising educational technology therefore does not mean rejecting it, but redirecting its purposes, governance and practices. The project places local community needs, data sovereignty and algorithmic transparency at the centre[8]. In this perspective, digital resistance takes on its deeper meaning: it emerges when students, lecturers and institutions operating under conditions of closure, censorship or personal risk manage to assemble tools and networks creatively in order to defend the right to study, academic integrity and intellectual freedom. Resistance is thus not a refusal of technology; rather, it is the critical reappropriation of the digital for emancipation, academic survival and the overcoming of challenges, especially in contexts of crisis and conflict[9].

2. *Theoretical and ethical framework in the digital sphere*

The analysis of educational practices in crisis contexts is guided by a tripartite ethical framework that problematises the dominant narrative of digitalisation as an intrinsically enabling force. It challenges the rhetoric of digitalisation as a neutral solution, interrogating distributive effects, power relations and surveillance risks. These perspectives allow digital resistance to be read as a situated reappropriation and to be assessed against explicit criteria: access and digital literacy, data security and protection, freedom from censorship, and the forms of educational poverty produced or amplified by digitalisation.

2.1 *Ethical pillars: equity, transparency and integrity under conditions of crisis*

The promise of equity through expanded digital access collides with the harsh realities of conflict-affected settings. In such scenarios, digitalisation risks multiplying pre-existing inequalities. Disparities are evident not only in connectivity and device availability, but also in digital literacy and, crucially, in the personal safety of students and lecturers. In crisis contexts, educational quality is evaluated in terms of capability expansion, understood as the set of substantive freedoms that enable a student to convert resources into valued "functionings", such as learning safely or obtaining academic recognition[10]. For

[7] Marelli, M., (eds), *Handbook, on Data Protection in Humanitarian Action*, Cambridge University Press & Assessment, 2024, p. 24.
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[10] Nussbaum, M. C., *Creating Capabilities: The Human Development Approach*. Cambridge, MA: The Belknap Press of Harvard University Press, 2011, pp. 17-20, 33-34.

this reason, the capabilities approach remains an essential theoretical tool for dismantling superficial rhetoric about digital access and for revealing the substantive meaning of equity in fragile settings.

The ethical question therefore shifts from who access to the conditions of access: hidden costs, security risks, and the subsequent formal recognition of learning and qualifications[11]. This point is especially salient when examining a country in conflict, such as Palestine, or a country that has undergone regime change towards religious authoritarianism, such as Afghanistan, where access to higher education is extremely limited for women.

Operational frameworks for *education in emergencies*[12] and for data responsibility in humanitarian action (ICRC 2024; OCHA 2025)[13] suggest concrete principles: *do no harm*, data minimisation, differentiated safety for at-risk groups, redundancies and continuity plans. This supports interpreting EdTech not as an end in itself, but as infrastructure for the right to study, a system that must function despite low bandwidth, forced mobility, blackouts and tracking risks. Dependence on digital platforms introduces significant opacity through *algorithmic mediation*[14], visible in *proctoring systems*[15], automated content curation and the analysis of behavioural logs. This technical opacity combines dangerously with the already limited institutional accountability typical of crisis settings, undermining student trust, the validity of examinations and the accuracy of academic records. The transparency required is therefore not merely procedural; it must evolve into epistemic transparency, including the explainability of automated decision-making and full disclosure of risks associated with third-party providers.

The transition to digital poses complex challenges for academic integrity. On the one hand, it is necessary to guarantee the authenticity of assessment, equitable access to resources and the prevention of abuses, from plagiarism to impersonation. On the other hand, indiscriminate control strategies can prove counterproductive and, in some contexts, actively harmful. In environments marked by pervasive surveillance and repressive risk, invasive verification measures endanger the physical and digital safety of the academic community. Preserving integrity, therefore, requires a proportionate balance between

[11] As the Organisation for Economic Co-operation and Development (OECD) Notes, «"safe digital technologies improve the life of those who have the skills to use them" From one perspective, people can seize digital opportunities provided they have the skills often termed "digital literacy". Conversely, "digital technologies entail a major inequality risk for society, as they introduce a digital divide between those who have the skills to use them and those who do not"», OECD, *How's Life in the Digital Age? Opportunities and Risks of the Digital Transformation for People's Well-Being*, OECD Publishing, Paris, 2019, pp. 12-13.

[12] Inter-agency Network for Education in Emergencies (INEE), *Minimum Standards for Education: Preparedness, Response, Recovery*, INEE, 2024, https://inee.org/minimum-standards. [last access22 October 2025].

[13] United Nations Office for the Coordination of Humanitarian Affairs (OCHA), *OCHA Data Responsibility Guidelines*, OCHA Centre For Humanitaria Data, 2025. International Committee of the Red Cross (ICRC), *Professional Standards for Protection Work: By Humanitarian and Human Rights Actors During Armed Conflict and Other Violence*, 2024, see chapture 7. See also Marelli, M., (eds), *Handbook on Data Protection in Humanitaria Action*, Cambridge University Press, 2021.

[14] «L'opacità algoritmica, in particolare, costituisce una sfida significativa per la trasparenza, soprattutto perché: (i) si ricorre a big data, che per volume, varietà e velocità rendono difficoltosa la tracciabilità e l'intelligibilità delle decisioni; (ii) la capacità di alcuni algoritmi – in particolare machine learning e deep learning – di auto apprendere e di "decidere" in autonomia rendono tali processi intrinsecamente imprevedibili». Istituto di Ricerca sulla Pubblica Amministrazione (IPRA), *Orizzonti: gli Editoriali dell'OS, l'attività amministrativa algoritmica per principi: limiti e prospettive*, no.9, January 2025, IRPA. https://www.irpa.eu/orizzonti-gli-editoriali-dellosd-numero-9-. [last accessed 15 October 2025].

[15] «An online proctoring system is an advanced AI integrated system developed to ensure a secure test environment when a test-taker writes an online test remotely. Anti-cheating proctoring tools, proctoring integration with any LMS, and the ability to detect cheating instances with optimum reliability form the crux of an ideal proctoring system. Proctoring system is an entire process concerning online proctoring. It is an advanced setup, combining AI-powered services and tools that secure the test environment when a test-taker writes an online test remotely. An online proctoring system serves the needs of academia and students as it streamlines and automates the process of conducting secure examinations, from authenticating, invigilating and measuring». Proctoring System: https://mettl.com/glossary/p/proctoring-system/. [last access15 October 2025].

certification needs and the primacy of personal protection, favouring *privacy-by-design*[16] protocols, data minimisation and low-impact verification tools.

In the two case studies examined here, Palestine and Afghanistan, this balance is further complicated by access blockages, uneven investment, limited standardisation of digital infrastructure, economic poverty and low levels of digital literacy. These factors make it difficult to align with the service levels typical of many European universities and necessitate gradual, proportionate and safety-conscious solutions.

2.2 *Theoretical framework: technology, power and resistance*

In crisis contexts, the "imposition of the digital" raises ethical and practical issues, yet technological resistances are not a rejection of education; they are its safeguard. In Palestine and Afghanistan, opposition to, evasion of, or critical reappropriation of imposed technologies evolves from a gesture of protest into an essential strategy for continuity of teaching.

To frame the phenomenon, a holistic perspective is needed that connects technology, power and structural inequality. Digitalisation interacts with two key dynamics: *data colonialism*, that is, *extractivism* that reproduces dependency and exploitation through control of infrastructures and platforms[17]; and the power–knowledge nexus, whereby critical mastery of tools determines access to services and educational programmes[18], and in parallel, the *platformisation of education* entrenches dependence on private actors, relocating curricular choices, assessment processes and educational governance onto external platforms[19]. From this follows the notion of digital educational sovereignty: the capacity of an academic community to determine its own contents, methods and spaces of knowledge. Within the SCOT approach (Social Construction of Technology)[20] and *domestication* theory, resistive practices become collective efforts to reconfigure potentially oppressive tools so they fit local needs. This reconfiguration entails processes of data production, collection and circulation that raise questions of responsibility, transparency and power. *Data justice* offers criteria for assessing legitimacy: who collects which data, for what purposes, and with what forms of return to communities. In this sense, resistance ceases to be mere opposition and becomes enabling[21]. This digital resilience takes shape through a myriad of tactics. The use of encrypted platforms and informal channels, for example, exemplifies what Michel de Certeau would call a "tactic" of the weak against the "strategies" of a dominant technocratic apparatus, a resourceful way of operating within the adversary's field[22]. At the same time, the insistence

[16] PrivacyEngine, *Understanding Privacy by Design Principles*, 7 November 2023. https://www.privacyengine.io/blog/understanding-privacy-by-design-principles. [last accessed 15 October 2025].
[17] See also chapter Six: Couldry, N., Mejias U. A., *The Costs of Connection: How Data Is Colonizing Human Life and Appropriating It for Capitalism*, Stanford: Stanford University Press, 2019.
[18] Foucault, M., *Power/Knowledge: Selected Interviews and Other Writings*, 1972–1977, (eds) Colin Gordon, New York: Pantheon, 1980, spec. "Two Lectures". pp. 142-143.
[19] Williamson, B., Learning in the 'platform society': *Disassembling an educational data assemblage*, "Research in Education" 98, no. 1, 2017, pp. 59-82. https://doi.org/10.1177/0034523717723389. Decuypere, M., Grimaldi, E., Landri, P., *Introduction: Education and the Platform Society, "European Educational Research Journal"*, Vol. 62, no. 1, 2021. pp.1-16. https://doi.org/10.1080/17508487.2020.1866050.
[20] Bijker, W. E., Hughes, T. P., Pinch, T. J., (eds), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, University of Michigan Press, 2012, pp. 9-25, 24-28.
[21] Dencik, L., Hintz, A., Redden, J., et al., *Data Justice: Exploring Fairness in Datafication*, "Information, Communication & Society", Vol. 22, no. 7, 2019, pp. 873–881. https://doi.org/10.1080/1369118X.2019.1606268. Heeks, R., e Renken, J., *Data Justice for Development: what is means?* "Information Development ", Vol. 34, no. 1, 2018, pp. 90-102. https://doi.org/10.1177/0266666916678282.
[22] De Certeau, M., *The Practice of Everyday Life* (Steven Rendall, Trans.), Berkeley: University of California Press, 1984, pp. 29-42.

of teachers on maintaining elements of direct human relationship, despite pressure towards total digitalisation, can be read through Joan Tronto's ethics of care as resistance to a logic of pure efficiency at the expense of educational wellbeing[23]. Where official digital infrastructure may serve as a vehicle of surveillance, a phenomenon Shoshana Zuboff situates within "surveillance capitalism", the decision to avoid such platforms becomes an act of data self-defence and a precondition for free teaching[24]. The practices documented alongside this research on Palestine and Afghanistan, from the adoption of alternative platforms to data protection, thus find clear political justification: they are not mere survival tactics, but constitutive acts of sovereignty. Ultimately, this everyday resistance is not a symptom of backwardness; it is an expression of civic resilience that, through the digital, defends the right to study where it is most threatened, and frames low-tech, low-surveillance choices as ethical options rather than residual ones.

3. *Palestinian case study: learning despite fragmentation*

In the Palestinian context, higher education is conceived as a crucial sphere for collective agency and for the reconfiguration of power relations. In response to structures of domination that deny self-determination, knowledge acquires an intrinsically political value and becomes a form of epistemic resistance. This theoretical framework positions the university not merely as a teaching institution but as a site of counter-hegemony, where the construction of an autonomous body of knowledge and the solidarity networks that arise from it become fundamental to imagining and laying the groundwork for a future sovereign and flourishing society. In this perspective, access to knowledge is an act of self-determination and the primary instrument of both cultural and political liberation.

From 1967 onwards, many Palestinians seeking higher education turned to universities in neighbouring Arab countries such as Jordan, Egypt, Lebanon and Syria. This trajectory changed radically as Israeli authorities progressively tightened cross-border restrictions in the West Bank and the Gaza Strip. The system of restricted mobility increasingly constrained students' ability to attend institutions abroad, making such pathways costly and risky. In response, an endogenous process emerged to consolidate and transform pre-existing institutes in the Palestinian territories into universities and to build an internal quality-assurance system. In 1977, the Council for Higher Education was established as an autonomous accreditation body that ensured institutional continuity and, following the Oslo Accords (1994), came under the supervision of the Palestinian Ministry of Higher Education[25]. The Palestinian education system has historically faced multidimensional challenges, which have intensified significantly in recent decades. Numerous studies indicate that, from the Second Intifada (September 2000) onwards, the system was severely compromised by prolonged closures and mobility restrictions. The situation worsened sharply with Israel's construction, begun in June 2002, of the separation barrier, termed by Palestinians the 'wall of segregation'. Crossing many towns and villages, the barrier disrupts territorial

[23] Tronto, J., *Moral Boundaries: A Political Argument for an Ethic of Care*. New York: Routledge, 1993, pp. 101-108, 131-138.
[24] Zuboff, Sh., *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*, New York: PublicAffairs, 2019, pp. 1-20, 195-230.
[25] Al-Botmeh, S., *Palestinian higher education: resistance to settler colonialism in the face of erasure*, "Globalisation, Societies and Education", 2025, pp. 1-9.

continuity and obstructs daily movement, effectively separating students and lecturers from their schools and universities[26].

In this context, the multiplication of military checkpoints and the raising of the wall produced systemic effects: delays and forced absences, disruption of academic calendars, and an overall reduction in access to educational services. The combination of physical barriers and control mechanisms has turned access to education into an uncertain and unequal journey, with deep consequences for the quality, equity and continuity of learning processes, as well as for the psychosocial wellbeing of an entire generation[27]. Many of these knock-on effects remain unresolved. A further factor is that, although the digitalisation of education expanded dramatically during COVID-19, its effects have been far from uniform. Distance learning and the use of technology were already employed by Palestinian students before the pandemic, often because physical access to institutions was obstructed. In 2020, however, more than seven thousand Palestinians living south of Hebron (West Bank) lacked communication lines and a fixed network, and most families did not own a computer, which exacerbated inequalities tied to online learning. Sixteen villages in the area fall within Area C, where the Palestinian telecommunications company is not authorised to extend the telephone network; this zone is under full Israeli administrative and security control pursuant to the 1993 Oslo Accords between the Palestine Liberation Organization (PLO) and Israel[28].

3.1 *Digitalisation and the education crisis in the context of conflict*

In parallel, several higher-education digitalisation programmes were developed. In the three years preceding the October 7 conflict, the Palestinian ecosystem benefited from structural initiatives launched before 2023, including Erasmus+ TEFL-ePal (2019), which reformed English teaching through Learning Management Systems (LMS), open educational resources and teacher training (2019–2022); a school digitalisation programme in the West Bank funded by international cooperation (2019), which introduced pedagogical uses of Information and Communication Technologies (ICT)[29] across hundreds of schools; UNRWA's digital learning strategy (2020)[30] for Palestinian refugees, created during the pandemic to ensure continuity through online platforms and tablet provision in West Bank and Gaza schools; and the E-Pal project (NORHED II) (2021)[31], focused on systemic strengthening of *technology-enhanced learning* in universities, including institutional capacity, governance and standards for *blended* courses. These initiatives, launched respectively in 2019, 2020 and 2021, laid the groundwork for blended practices, digital infrastructures and staff competences that, though developed in "ordinary"

[26] UNICEF, *State of Palestine: Country Report on Out-Of-School Children*, Middle East and North Africa Out-Of-School Children Initiative, July 2018. https://www.unicef.org/mena/media/2566/file/SoP-OOSCIReport-July2018.pdf.pdf. [last accessed 15 October 2025].
[27] Cf., Ramahi, H., *Education in Palestine: Current Challenges and Emancipatory Alternatives*, Rosa Luxemburg Stiftung Regional Office: Ramallah, Palestine, 2015, pp. 1-51.
[28] Matt Smith, M., Scott, H., *Distance Education under Oppression: The Case of Palestinian Higher Education*, "Education Science", Vol., 13, no. 7:729, 2023, pp. 1-13. https://doi.org/10.3390/educsci13070729.
[29] Scott, H., Smith, M., *Innovation from necessity: digital technologies, teacher development and reciprocity with organisational innovation Icon*, "Open Learning: The Journal of Open, Distance And E-Learning", Vol. 39, no. 2, 2024. pp. 170-187. https://doi.org/10.1080/02680513.2024.2307627.
[30] United Nations Relief and Works Agency for Palestine Refugees in the Near East, the UN Agency. See also the new programme launched in 2022: *UNRWA Digital Transformation Strategy* (2022 – 2026). https://www.unrwa.org/resources/strategy-policy/unrwa-digital-transformation-strategy-2022-%E2%80%93-2026. [last accessed 15 October 2025].
[31] «E-Pal is a six-year research and development project aimed at strengthening technology-enhanced learning in the Palestinian higher education sector, where staff at the LINK Centre for Learning, Innovation and Academic Development and Oslo Metropolitan University collaborate with Palestinian colleagues at Palestine Polytechnic University in the West Bank and University College of Applied Sciences in Gaza to develop new technological, pedagogical and organizational approaches to technology-enhanced teaching and learning. The project also aims at strengthening ICT and education as a research field in Palestine». https://www.uio.no/link/english/e-pal/. [last access 15 October 2025].

times or during the pandemic, proved essential to educational resilience in subsequent periods. Official data indicate that in 2017, roughly 80% of the 87,000 students enrolled in higher-education institutions in the Gaza Strip attended universities, while the remaining 20% were in colleges. On the eve of the 2023 conflict, the Palestinian higher-education system comprised 21 universities and 32 colleges, with 34 campuses in the West Bank and 19 in Gaza. Data for the years immediately preceding the war show a steadily growing student population and a marked majority of female enrolments, signalling high levels of schooling even compared with many low- and middle-income countries[32].

Subsequently, Palestinian universities faced military closures and systematic raids, with prolonged suspensions that in some cases lasted years, pushing higher education underground, with classes held in homes and community centres. Campuses continue to experience incursions, undercover operations and arrests of student representatives, alongside damage to and seizure of teaching and laboratory equipment. Such actions have endangered the lives of students, lecturers, researchers and university staff, especially during military operations, periods of heightened tension and war[33]. In this context, and also as a form of resistance, universities developed practices of educational resilience ranging from clandestine teaching to digital innovation. During past campus closures, teaching continued "discreetly" in private houses and community centres, with networks of lecturers and students organising alternative lessons and self-managed materials, an experience documented by Birzeit's *Right to Education Campaign* and by the literature on "underground" schools and universities[34].

Post-2023, given the destruction of facilities and laboratories, provision has shifted to lightweight environments: recorded lectures, discussion groups on messaging applications such as WhatsApp, low-bandwidth learning units and community spaces with shared connectivity. In parallel, plans have enabled students in Gaza to enrol in online courses delivered from the West Bank, and international initiatives such as UNESCO's *Gaza Virtual Campus and Temporary Learning Spaces* have supported tens of thousands of university students. The *Virtual Campus* aims to allow each university to recreate a full academic environment within a shared digital platform, enabling Gaza institutions to continue operating and students to pursue courses, interactive learning and assessment even when physical campuses remain closed[35]. Because distance learning ensures continuity but cannot replace campus life, the *Virtual Campus* is coupled with UNESCO's *Temporary Learning Spaces*, which provide digital resources, stable connectivity and psychosocial support[36]. Despite these measures, pressure on campuses remains high, with repeated raids and seizures affecting institutions such as Birzeit, arrests of student representatives and damage to equipment[37]. Beyond disrupting teaching continuity,

[32] Ibid. Cf., Palestinian Central Bureau of Statistics (PCBS), *Distribution of Students Enrolled in Palestinian Higher Education Institutions by Specialization and Sex*, 2021/2022. Ministry of Higher Education & Scientific Research, 2023. https://www.pcbs.gov.ps/Portals/_Rainbow/Documents/Higher_Education_2021_02E%20.html. [last accessed 15 October 2025].
Palestinian Central Bureau of Statistics (PCBS), *Issues a Press Release on the Impact of the Israeli Occupation Aggression on the Right to Education in Palestine during 07/10/2023-11/11/2023*, 2023. https://www.palestine-studies.org/en/node/1654633. [last accessed 15 October 2025].
[33] Rabaia, I. S. I, Lourdes Habash, *The Hidden War on Higher Education: Unmasking the 'Educide' in Gaza*, https://pomeps.org/the-hidden-war-on-higher-education-unmasking-the-educide-in-gaza. [last access 15 October 2025].
[34] Brizeit University, *The Right to Education Campaign*, https://www.birzeit.edu/en/right2edu?utm. [last accessed 15 October 2025].
[35] «Through UNESCO's Gaza Virtual Campus, 20,000 higher education students will be able to resume their education in the first phase, with plans to expand its reach to all 88,000 university students in Gaza», UNESCO, *In Gaza, UNESCO supports students amid a devastated education landscape*. https://www.unesco.org/en/articles/gaza-unesco-supports-students-amid-devastated-education-landscape?utm. [last accessed 15 October 2025].
[36] Ibid.
[37] Brizeit University, *The Right to Education Campaign*..., cit.

these episodes confirm universities' role as spaces of civil resistance, consistent with Gene Sharp's *198 Methods of Nonviolent Action*[38] and with the idea of educational institutions as infrastructures of collective agency in contexts of domination and occupation, which also extends to digital resistance for the continuity of the struggle.

Since October 2023, higher education in the Gaza Strip has faced unprecedented challenges threatening its very survival. Shortages of essential goods, widespread insecurity, the destruction of infrastructure and prolonged interruptions to electricity and connectivity make any form of distance learning extremely difficult. Even so, students and lecturers continue to treat study as an anchor, both material and symbolic, and student motivation becomes a decisive resource for maintaining continuity[39]. The Palestinian experience shows that, despite conflict and shortages of devices and connectivity, digital transformation has become a mode of resilience and educational "resistance". This digital bridge has enabled classes, inter-university collaboration and international openings, overcoming closures and blockages. At the same time, the transition has exposed profound problems: the digital divide in access to devices and the internet, high costs, privacy concerns and the quality of online teaching.

4. *Afghanistan case study: digitalisation and invisible education*

The digitalisation of education is promoted across diverse geopolitical contexts as a strategy to secure equity and access to knowledge. This takes on particular contours in settings of protracted conflict or authoritarian rule, where it becomes a tool of educational resilience. In Palestine, digitalisation has been systematically adopted for decades in response to structural restrictions on higher education, functioning as an adaptation and resistance to occupation. In Afghanistan, by contrast, the digital turn reached a critical juncture after the Taliban takeover in August 2021 and the subsequent ban on women's higher education, which led to the *de facto* dismantling of the traditional university system. In response to this institutional rupture, a dense network of underground digital education has emerged. Through this informal infrastructure, lecturers and civil-society organisations run clandestine online courses for female students, despite precarious internet connectivity and limited device availability. Within this shadow system, the Afghan academic diaspora plays a pivotal role by providing distance teaching and creating digital archives, not only to maintain continuity of learning but also to preserve the secular curricular heritage and the cultural production of the pre-Taliban period for transmission to future generations.

At the same time, although digitalisation is often presented as a vehicle for equity and inclusion, in many contexts it fails to reduce, and sometimes amplifies, gender gaps. Inequalities concern not only access to devices and connectivity but also digital skills, socio-cultural norms that limit women's and girls' autonomous use of technology, lower household resources, online and offline safety, family control over access, and quality of use, which results in lower participation in advanced training and in digital entrepreneurship. In low-income or rural areas, where connectivity is expensive and public access points

[38] Sharp, G., 198 *Methods of Nonviolent Action*. https://commonslibrary.org/wp-content/uploads/GeneSharp_198Tactics.pdf. [last accessed 15 October 2025].
[39] «The role of the university in promoting personal, economic, local and national survival and development in Palestine has long been recognised. It is directly linked to attempts to "strengthen the survival capacities of Palestinians" and to develop their "means of personal survival and national salvation"». Hallaj, M., *The Mission of Palestinian Higher Education*, "Journal of Palestine Studies", Vol. 9, no. 4, 1980, pp. 75-95, online version: 4 February 2021. https://doi.org/10.2307/2536125.

are scarce or unsafe, the promise of digital inclusion can turn into additional barriers to education, work and services, with cumulative effects on economic autonomy and civic participation. Policies limited to distributing devices or providing basic literacy are therefore insufficient. Integrated interventions are needed that combine affordability, continuous gender-sensitive training, safe learning and working environments, appropriate governance of data and content, and targeted actions to counter stereotypes and *bias* across the education and employment system. Only from this perspective can digital transformation become genuinely enabling rather than reproducing pre-existing inequalities[40].

Stepping back, education in Afghanistan has been shaped by decades of armed conflict, political instability and regime change, with direct effects on access, quality and governance. From the monarchy to Soviet influence and more recent governments, each phase set different orientations for structures, curricula and aims. The Soviet occupation (1979–1989) promoted a centralised model, curricula inspired by socialist principles, the use of Russian as a medium of instruction and an expansion of girls' education. These reforms met strong resistance and were partly dismantled after the communist regime collapsed in 1992. Subsequent fragmentation produced uneven school provision, while millions of refugees in Pakistan and Iran established schools and even some universities in camps and host communities. With the rise of the Taliban in the late 1990s, formal education was sharply curtailed. Girls' access was drastically restricted, many schools were closed or converted into madrasas, and key subjects such as history, geography and the natural sciences disappeared from the curriculum, with more than half of school time devoted to religious subjects. Arabic replaced Pashto and Dari in textbooks. In this context, informal and clandestine home-based education developed to preserve a broader curriculum[41].

After 2001, in areas under the Islamic Republic of Afghanistan with international support, a significant reconstruction of the education sector began: schools reopened and new ones were built, teacher-training programmes were launched, and curricula were updated to reintroduce religious education alongside science, mathematics, Dari and Pashto literature, English, history, culture, art and civic education. Sports were promoted for girls and boys. Schooling was compulsory to the ninth grade and, despite large urban–rural disparities and continued attacks on schools, especially girls' schools, girls' access registered progress. Upper-secondary enrolments rose from about 8,000 to around 400,000 between 2001 and 2021, across 39 public and 128 private universities. The Taliban's return in 2021 reversed many of these gains: university staff fled, international funding was frozen, numerous private universities closed, and enrolment is estimated to have fallen by about 50%. Women were progressively banned from secondary school and then from university, excluding more than 1.4 million girls from education, with severe limitations even at upper levels except in narrow fields such as midwifery. Women teachers were restricted largely to girls' primary schools and madrasas expanded, with thousands of new religious institutes in the early years of the new regime. Recent surveys indicate a rise in religious instruction at the expense of secular subjects and a contraction of qualified staff[42].

[40] Mariscal, J., Mayne, G., Aneja, U., et al., *Bridging the Gender Digital Gap, "Economics: The Open Access, Open-Assessment e-Journal"* Vol. 13, no. 9. 2019, pp. 1-12. https://doi.org/10.5018/economics-ejournal.ja.2019-9.

[41] Finocchietti, C., Spitalieri S., Zakeri, Sh., (eds) *Istruzione in Afghanistan: evoluzione e riconoscimento dei titoli in Italia*, 2024. https://www.cimea.it/Upload/Documenti/Istruzione-in-afghanistan_2024.pdf. [last accessed 15 October 2025].

[42] Mohibbi, A., A., Coburn, N., *How Taliban Rule Has Reshaped Higher Education in Afghanistan*, "The Diplomat", 8 August 2024. https://thediplomat.com/2024/08/how-taliban-rule-has-reshaped-higher-education-in-afghanistan/. [last accessed 15 October 2025]. Ahmadi B., Sultan H., *Taking a Terrible Toll: The Taliban's Education Ban*, United State Institute of Peace, 13 April 2023. https://www.usip.org/publications/2023/04/taking-terrible-toll-talibans-education-ban. [last accessed 15 October 2025].

During the pandemic, distance-learning programmes via television, radio and mobile phones were introduced, but their impact was limited by low literacy, high connectivity costs, scarce technological provision and unequal access. Before 2021 only a minority of students could benefit consistently. After 2021, initiatives in the diaspora and neighbouring countries, including online schools for girls, sought to provide remote education and psychosocial support. These experiments, however, are constrained by intermittent connectivity, high data costs, scarce devices and, in some cases, government restrictions on networks and platforms that deliberately interrupt or slow access. In many countries, digitalisation is conceived primarily as a lever for access to tertiary education; in Afghanistan, it is first a basic enabling device to be introduced locally by training people to use digital tools and supporting literacy, especially for women. The gap remains wide: in 2022 adult literacy stood at 37.3% (women 22.6%, men 52.1%), while among 15-24 year-olds it reached 62.66% (females 44.17%, males 83.40%), confirming a significant gender disparity. Despite slight improvements in recent years, Afghanistan remains among the lowest in the world[43].

4.1 *Digitalisation of education in Afghanistan: the dilemma facing female students*

Regarding the digitalisation of the education system in Afghanistan, prolonged politico-military instability and restrictions imposed by the Taliban regime have structurally reduced educational opportunities for women, widening the gender digital divide. Despite 3G coverage above 85% and connected devices among roughly one third of the population, more than 90% of women still lack basic digital skills and effective access to the internet[44]. A further vulnerability has emerged in recent years: partial and total internet shutdowns, deliberate reductions in bandwidth, targeted platform blocks, and extensive content control and filtering[45]. These practices of limitation (throttling) and disconnection (internet shutdowns), implemented for reasons of public order and security, amount to a de facto suspension of the right to information and to digital services, disproportionately affecting women and girls who already face constraints on mobility and schooling. Various projects, therefore, adopt *low-tech*[46] approaches to mitigate these challenges.

Tables 1 and 2 analyse selected digitalisation projects active in the country, highlighting feasibility, trajectories, limits and risks, with particular attention to initiatives focused on basic competences (STEM and English) and on the inclusion of female students.

[43] Zakeri, Sh., *L'evoluzione dell'istruzione in Afghanistan: tra storia, politica e sfide contemporanee*, in Finocchietti, C., Spitalieri S., Zakeri Sh., (eds) Istruzione in Afghanistan: evoluzione e riconoscimento dei titoli in Italia, 2024. pp. 11-17. https://www.cimea.it/Upload/Documenti/Istruzione-in-afghanistan_2024.pdf. [last accessed 15 October 2025].
UNESCO, *Afghanista: Country Profile*, October 2022. https://www.uil.unesco.org/sites/default/files/medias/files/2022/11/gal_country_profiles_afghanistan.pdf. [last sccessed 15 October 2025].
[44] Nazari, Z., Musilek, P., *The Gender Digital Divide and Education in Afghanistan: A Review, "2023 IEEE International Humanitarian Technology Conference* (IHTC)", Santa Marta, Colombia, 2023, pp. 1-7. *http://dx.doi.org/10.1109/ihtc58960.2023.10508864*.
[45] Kozul-Wright, A., *Afghanistan imposes internet blackout: What has the effect been so far?* Aljazeera News Agencies, 30 September 2025. https://www.aljazeera.com/news/2025/9/30/afghanistan-imposes-internet-blackout-what-has-the-effect-been-so-far. [last accessed 15 October 2025].
[46] *Low-tech* in education refers to digital solutions with minimal bandwidth and complexity – e.g., educational radio/TV, SMS/WhatsApp delivery, and offline-first asynchronous content – designed for fragile infrastructures. Such tools lower accesscosts and increase operational resilience, but require strong pedagogical mediation (tutoring, simple assessment) to prevent quality loss and learner attrition. Brazilian Network Information Center – NIC.br (eds), *Education and Digital Technologies: Challenges and Strategies for the Continuity of Learning in Times of Covid-19*, Brazilian Internet Steering Committee – CGI.br, São Paulo, 2021, pp. 43-44.

Table 1 - Project Profile and compact

Project	Delivery type	Subjects/Focus	Target	Period	Channels/Tech	Notes/Impact
LEARN Afghan[47] (Pashtana Durrani)	Digital schools & online classes	Digital literacy; general curriculum; basic STEM	Girls and women	2021 →	WhatsApp, smartphones, offline kits	Teacher training on digital literacy; local *low tech* networks
SOLA – SOLAx[48] (WhatsApp Academy)	Asynchronous WhatsApp academy	English; general subjects; life skills	Primarily girls	2022 →	WhatsApp/ chatbot; audio/text micro lessons	Ultra low bandwidth access; multilingual content (EN/Dari/ Pashto)
Children on the Edge[49] – Online education for girls	Protected online classes	Core curriculum; English	Girls	2022 →	Video platforms; volunteer tutors	800+ beneficiaries; adapted to *low spec devices*
Afghan Scholars in Exile (AUP/ AUAF & network)	Online university level courses	Academic English; social sciences; IT	Female students excluded from university	2021 →	Zoom/LMS; repositories	Mentoring by exiled faculty; informal credits[50]
UNESCO – media based programmes	Radio/TV + digital supplements	Literacy; PSS; foundational skills	Women and girls	2022 →	Community radio; educational TV; online repositories	Nationwide reach; resilience via broadcast
Noor Initiative	Multi channel (TV, radio, online)	STEM (math/ science); English; digital skills	Girls	2023 →	TV/radio; WhatsApp tutoring; chatbot	Scalable content; remote homework support
Afghan Geeks (coding)	Online bootcamps/ courses	Programming; ICT for remote work	Women and girls	2022 →	LMS; GitHub; Zoom	Employability focus; freelancing mentorship
Vision Online University	Free online university	Languages; IT; humanities	Female students	2023 →	Web platform; mobile app	Thousands of enrolments; modular paths
Diffuse platforms (Zoom/ WhatsApp)	Informal lessons & micro courses	English; Kankor prep; basic IT	Girls and boys (mixed)	2021 →	Zoom; WhatsApp; PDFs/audio	Grass roots ecosystem; flexible scheduling

[47] «Finding innovative ways to ensure education for all is essential for overcoming the challenges caused by poverty, lack of social and educational infrastructure, and some cultural issues that hinder the progress of education in Afghanistan». LEARN Afghan, *Building brighter futures for Afghan girls and communities through education, healthcare, and innovation*. https://learnafghan.org/. [last accessed 15 October 2025].
[48] «SOLAx isn't a replacement for SOLA. It's not an equivalent to SOLA, or an equivalent to in-person, in-classroom learning. It's an alternative for girls whose educational lives are on pause and maybe have been that way for years. It's a light of hope and an initial step on a path that leads back to the classroom». School of Leadership Afghanistan (SOLA), https://www.sola-afghanistan.org/introducing-solax. [last accessed 15 October 2025].
[48] Children on the Edge has been supporting her organisation since 2022. Partnership with "Afghanistan Education Action" to help strengthen the organisation as it grows. https://childrenontheedge.org/how-we-help/education/online-education-for-girls-from-afghanistan. [last accessed 15 October 2025]. The AEA include also two other programms: Herat Online School launched in 2021 after the Taliban takeover, and Persian Online School - a dedicated path for committed students ready for a formal, internationally recognised education through our AEA International School. https://www.afghanistaneducationaction.org/. [last accessed 15 October 2025].
[50] The group is working in the direction by standardizing the curriculum and collaborating with outside educational institutions for partnerships and accreditation.

Table 2 – Risk and Challenges

Project	Risks & Challenges
LEARN Afghan (Pashtana Durrani)	Frequent connectivity outages; scarcity of devices; safety and surveillance risks for learners and teachers; donor funding volatility.
SOLA / SOLAx (WhatsApp Academy)	Dependency on a single platform; risk of content exposure; limited assessment and external recognition of learning.
Children on the Edge	Privacy and safeguarding concerns; intermittent bandwidth; sustainability of a volunteer driven model.
Scholars in Exile (AUP/AUAF & network)	Unclear credential recognition; variable quality assurance; digital security risks for participants and faculty.
UNESCO – media based programmes	Editorial constraints; difficulties in measuring learning outcomes at scale; continuity of funding.
Noor Initiative	Quality assurance at scale; monitoring/surveillance risks; infrastructure and power outages.
Afghan Geeks (coding)	Limited absorption by the local job market; sanctions and payment hurdles for remote work; sustained internet requirements.
Vision Online University	Lack of formal accreditation; platform and data security; continuity of service and maintenance.
Diffuse ecosystem (Zoom/WhatsApp)	High variance in instructional quality; safeguarding challenges; vulnerability to shutdowns and throttling.

Adopting digital transformation in Afghanistan is feasible only within a hybrid, low-tech architecture (broadcast radio and TV, low-bandwidth messaging, asynchronous content) that can mitigate intermittent networks, scarce devices and security risks for learners and teachers. In 2022, only 6% of women in Afghanistan had access to the internet, compared with 25% of men[51].

However, digital exclusion is not merely an infrastructural issue. It stems from the interaction of socio-economic factors (poverty, low literacy, the cost of connectivity), cultural norms (patriarchal restrictions on mobility and information consumption) and institutional constraints (inadequate regulatory frameworks, bans on women's education and employment). Under such conditions, digitalisation tends to reproduce and even accentuate pre-existing inequalities, especially gender-related ones, when effective user competences, substantive freedoms, safe environments and service continuity are lacking. The mapped cases show the most robust results where provision combines basic digital literacy and secular content (English, STEM, ICT) with targeted tutoring, safeguarding protocols and minimal recognition of learning (micro-credentials, employment references). It follows that programmes to strengthen women's digital skills, accompanied by measures to protect access, data security and

[51] CALLUP, *Digital Freedom Out of Reach for Most Afghan Women*, 7 march 2023. https://news.gallup.com/opinion/gallup/471209/digital-freedom-reach-afghan-women.aspx?deliveryName=DM192133. [last accessed 15 October 2025].

freedom of expression, are a necessary condition for restoring minimal educational rights, enabling remote learning and work, and supporting a genuinely inclusive transition to a digital society. Despite low connectivity, several pilot projects demonstrate the feasibility of educational digitalisation and show positive outcomes, even when initial participation involves a minority share of beneficiaries. These initiatives have acted as *proof-of-concept*, spurring new programmes launched in 2025, for example Sahar in partnership with grassroots networks, and *Secret Scholars Online*, a flexible, teacher-supported programme offering Afghan women and girls interactive English and Mathematics courses from beginner to advanced levels via the *Learning Upgrade platform*[52]. These cases indicate that, where pedagogical support, safety and low-tech access are assured, provision can be scaled gradually while maintaining quality and inclusivity.

5. Conclusions

Across the Palestinian and Afghan cases, the digital transformation of education should not be read as a linear vector of modernisation, but as a socio-technical assemblage of resilience and resistance shaped by distinct structural constraints. In Palestine, the dominant vulnerabilities are infrastructural and security-related (destruction of schools and networks, power intermittency, restrictions on movement and information flows), which disrupt instructional continuity and compress institutional delivery capacity. In Afghanistan, the bottleneck is normative, cultural, and strongly gender-related: bans on women's education and work, low basic literacy, access costs, and social-institutional surveillance that reduce effective demand regardless of technical supply.

Comparative findings indicate that positive outcomes arise where programmes are hybrid and low-tech (broadcast radio and TV, low-bandwidth messaging, offline-first content), coupled with pedagogical mediation (targeted tutoring, assessable micro-modules), safeguarding (privacy, data security, protected spaces) and recognition of learning (micro-credentials, employment references). Four systemic fragilities persist in both contexts: intermittent connectivity and dependence on third-party platforms; safety risks for students and staff (surveillance, reprisals); difficulty in assuring the quality and transferability of credentials; and financial volatility and discontinuous project cycles.

Theoretically, these cases show that digital resistances are situated reappropriations. They articulate digital educational sovereignty against the asymmetries of *platformisation* and data *colonialism*, translating the three ethical pillars discussed earlier (equity, transparency, integrity) into concrete choices. In this perspective, digitalisation works when it is enabling in relation to EHEA values (academic freedom and integrity, institutional autonomy, participation), not when it substitutes them with mere technical efficiency.

Operational implications diverge across the two countries. In Palestine, where digital education has been invested in for decades at national level and through international bodies and the Palestinian diaspora, and where there is broad familiarity with teaching tools, priorities are the protection of civil infrastructure (energy, networks, devices), the creation of technical-humanitarian corridors for continuity of digital services, and the definition of minimum Service Level Agreements (SLA) and emergency continuity plans

[52] Sahar. *https://www.sahareducation.org/current-programs*. [last access 15 October 2025].

for teaching. In Afghanistan, effectiveness is possible only by circumventing gender barriers (women-only community hubs, asynchronous and home-based delivery, peer mentoring), by sequencing basic digital literacy before advanced provision, and by adopting privacy-by-design protocols. In short, digitalisation works when three criteria are met: additionality (closing real gaps without replacing what already exists), safety first (data, access, psychosocial support) and usability (English, STEM and ICT with verifiable micro-credentials). Only under these conditions can it shift from emergency response to durable educational capital, reducing the risk of amplifying structural inequalities in both contexts.

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Diploma mills and fraudulent credentials: The cost of fraud in education

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| Abstract

To what extent is counterfeiting present in the field of educational qualifications? How many people are affected, how many fake qualifications are in circulation, and how much money is generated by this phenomenon? What is its economic and social impact? The article attempts to answer these questions by drawing parallels between the wider fraud industry and the fraud industry in Higher education. The focus is on diploma mills and fraudulent credentials, and the analysis of the extent of these phenomena. The article refers to tools to prevent and account for these phenomena, including the latest possibilities offered by the use of artificial intelligence.

Keywords: Fraud, Diploma Mills, Credentials, Higher Education, cost of counterfeit, ethics.

1. *Introduction*

What is the extent of counterfeiting in the field of educational qualifications? How many "customers" are there, how many qualifications are in circulation, and what is the turnover generated by this phenomenon? What is the economic and social impact? Answering these questions is far from straightforward. This article aims to provide avenues for research to formulate possible answers, based on available data and research. Starting with the fraud industry as a whole, the article focuses on counterfeiting in the field of educational qualifications, with particular reference to higher education. The focus is on what is defined as commercial fraud, or organised fraud, i.e., fraud organised by criminal groups[1]. The aim is to contribute to the debate on the scale and economic and social impact of the phenomenon, also in light of the new perspectives and risks introduced by digital transformation and, in particular, the use of artificial intelligence.

[1] Cfr, Eaton, S. E., Carmichael, J. J., H., *Fake Degrees and Fraudulent Credentials in Higher Education, "Ethics and Integrity in Educational Contexts"*, Vol. 5, Springer Cham, 2023. United Nations Office on Drugs and Crime (UNODC), Organized fraud, Issue paper, Vienna, 2024. https://www.unodc.org/documents/organized-crime/Publications/IssuePaperFraud-eBook.pdf. [last accessed 3 October 2025].

2. *Is education a commodity and a sellable good?*

While fraud in education is as old as universities themselves[2], the modern reference to education as a "product" has its roots in the General Agreement on Trade in Services (GATS), which came into force in 1995 under the newly established World Trade Organisation (WTO), itself founded in 1995 as the successor to the General Agreement on Tariffs and Trade (GATT). While GATT, founded in 1948, primarily focused on goods, GATS represented a significant innovation by extending multilateral trade rules to the service sector, including higher education. Services under GATS were divided into 12 traded sectors, one of which is education[3]. GATS also introduced a structured framework for liberalising trade in services through four modes of supply (cross-border supply, consumption abroad, commercial presence, movement of natural persons), which influenced, inter alia, the literature and practice in higher education, such as in the case of so-called transnational education (TNE)[4]. While the commodification of education inherent in the GATS framework has sparked critical debate regarding the implications for educational quality, regulatory oversight, equity of access, and the erosion of education's social and civic functions, it has, in fact, allocated the concept of education in the context of tradable services. This is evident, inter alia, by the fact that some countries present education as a voice of their exports[5]. Starting from this assumption, without entering into the debate on the social, ethical, and public consequences of this conceptualisation, the counterfeit industry in higher education can be read in the broader context of the counterfeit industry at large, also from an economic point of view. This parallelism allows, on the one hand, the use of certain conceptual frameworks related to the fraud industry and counterfeit trade in a broader sense and, on the other hand, is justified by a series of characteristics that also recur in the field of fraud in education, as one of the various areas of organised crime.

3. *The trade in counterfeit goods: a global and growing business*

When looking at the phenomenon of counterfeit goods trade as a whole, evidence and data are limited[6]. In 2018, counterfeiting was the most significant criminal enterprise in the world, with estimated sales of between 1.7 and 4.5 billion US dollars per year, more than the drug market and human trafficking[7].

[2] Lantero, L., Finocchietti, C., (a cura di), *Lauree 30 e frode*, Prefazione [Lorenzo Fioramonti], Roma, 2019. Cfr, Moulin, L., *La vita degli studenti nel Medioevo*, Jaca Book, 1992.
[3] Business, communications, construction and engineering, distribution, education, environment, health, tourism and travel, recreation (cultural and sporting), transport, financial, and 'other' services.
[4] Jandhyala, T., *Trade in higher education: The role of the General Agreement on Trade in Services (GATS)*, "Fundamentals of educational planning" 95, UNESCO: International Institute for Educational Planning, Paris, 2011. World Trade Organisation (WTO) General Agreement on Trade in Services (GATS): objectives, coverage and disciplines. https://www.wto.org/english/tratop_e/serv_e/gatsqa_e.htm. [last accessed 3 October 2025].
[5] One example: GOV.UK, Explore education statistics, *UK revenue from education related exports and transnational education activity*, 19 June 2025. https://explore-education-statistics.service.gov.uk/find-statistics/uk-revenue-from-education-related-exports-and-transnational-education-activity/2022. [last accessed 3 October 2025].
[6] Bharadwaj, V., Brock, M., Heing, M., et al., *U.S. Intellectual Property and Counterfeit Goods— Landscape Review of Existing/Emerging Research*, Federal Research Division, Library of Congress, U.S. Department of Commerce, February 2020.
[7] Fontana, R., Girod, S. J.G., Králik, M., *How Luxury Brands Can Beat Counterfeiters, Harvard Business Review*, 24 May 2019. https://hbr.org/2019/05/how-luxury-brands-can-beat-counterfeiters. [last accessed 2 October 2025]. Shepard, W., *Meet The Man Fighting America's Trade War Against Chinese Counterfeits (It's Not Trump)*, Editor's Pick Asia, Forbes, 29 March 2018. https://www.forbes.com/sites/wadeshepard/2018/03/29/meet-the-man-fighting-americas-trade-war-against-chinese-counterfeits/#%20db934f51c0d6. [last accessed 3 October 2025].

One of the reference publications is the annual Organisation for Economic Co-operation and Development (OECD) European Union Intellectual Property Office (EUIPO) *Mapping Global Trade in Fakes 2025: Global Trends and Enforcement Challenges* report, which provides an overview of the evolution of the phenomenon over the years. According to the latest report (2025), in 2021, the value of global trade in fakes is estimated at 467 billion US dollars, corresponding to 2.3% of world trade. Looking at the European Union, the value of imports of fakes into the EU in 2021 is estimated at 99 billion euros, accounting for 4.7% of EU imports from the rest of the world[8].

Looking at the Italian case, according to the Abstract Intellectual Property Elaborated Report of the Investigation on Counterfeiting (IPERICO) 2024 by the Ministry of Enterprise and Made in Italy (MIMIT), the value of counterfeit products is €187.9 million for 2023, up from the previous year[9]. The top types of counterfeit goods, both internationally and nationally, are clothing, clothing accessories and footwear.
The scale of this illicit trade is influenced by changes related to globalisation, trade facilitation, the growth of e-commerce and the specialisation of industries across countries, which have reshaped the way products are designed, manufactured and delivered. While these changes in global trade have produced numerous benefits, for example, by enhancing the welfare of nations, boosting consumer satisfaction, and driving economic growth, they have also introduced new levels of complexity and vulnerability[10].

Although these data are very relevant and provide a valuable international benchmark, by their very nature, they represent only a small part of the trade in counterfeit goods: seizure data can provide at best a baseline of counterfeit activity, but they do not give a clear sense of the full scale of the problem. What's more, seizure data capture only goods transported across an international border, completely missing domestic counterfeit trade; and, furthermore, they provide information only on tangible goods, not on "pirated" and counterfeit intangible (or less tangible) goods, as is the case with credentials and qualifications. These analyses indeed concern material products and use customs control data, while there is a lack of information on the volume of intangible goods, which are nevertheless exposed to the counterfeit market[11].

Although data is still limited and incomplete, the consequences of the counterfeit market are clear and include, among other things, damage to the wealth of countries and businesses operating legally, lower tax revenues and job losses, as well as a threat to global health, innovation and public safety.

4. *Education fraud industry: challenges in data collection*

Assessing the scale and impact of fraud in education, as well as the fraud industry as a whole, remains complicated today by several cultural and factual factors, which can be described as both subjective and objective. One reason is the fragmented and unsystematic nature of existing data. As recalled above, while customs controls provide valuable statistical data for quantifying the phenomenon of

[8] OECD/EUIPO, *Mapping Global Trade in Fakes 2025: Global Trends and Enforcement Challenges*, Illicit Trade, OECD Publishing, Paris, 2025.
[9] MIMIT, *Rapporto Iperico 2024. La lotta alla Contraffazione in Italia nel periodo 2008-2023, 2024*. https://www.uibm.gov.it/iperico/home/RAPPORTO_IPERICO_2024.pdf. [last accessed 3 October 2025].
[10] OECD/EUIPO, *Mapping Global Trade in Fakes 2025*... cit.
[11] For an analysis of the literature on the Overall Magnitude of Counterfeit Markets, see Bharadwaj, V., Brock, M., Heing, M., et al., ivi. pp. 8-9.

material goods, albeit partially, it is much more complicated to assess an "intangible" object such as a false qualification, for which the "customs" are varied and vary according to the purpose for which the qualification is presented: the national authority responsible for recognition, the individual higher education institution in the case of access to further studies, the employer, the professional association, to name but a few. The division of competences at the national level - but sometimes also within the same institution - is one of the aspects that makes data collection problematic[12]. A second element of complexity is the need to define the object of measurement and comparison in an unambiguous way, in order to be able to measure and compare it. The lack or non-use of a shared definition, which will be discussed in the following paragraph, represents a second element of complexity. The lack of benchmarks and uniform reporting challenges the effective exchange of information and the collection of comparable data, the detection of new trends and developments, and ultimately the capacity to prevent and combat such acts.

A third complexity is the ethical and social dimension. Many institutions and authorities are reluctant to talk about fraud in education, preferring to emphasise aspects of support for ethics and transparency. Disclosing data on fraud within an institution or country publicly carries with it the perception of risks related to image and reputation. Greater transparency in reporting data may be seen as a higher level of corruption than another organisation that is more reluctant to provide complete and accurate figures. On the other side of the spectrum, it is possible that those vocal and indignant organisations about integrity may be using this rhetoric as a shield for their unethical behaviour, in the phenomenon defined as the weaponisation of integrity[13]. This paradox creates a complex environment where discerning integrity is even more complex.

5. *Defining fraud in education: the case of diploma mills and fraudulent credentials*

Among the most recent scientific contributions to the definition and classification of fraud in higher education are two publications: *Fake Degrees and Fraudulent Credentials in Higher Education and Corruption in Higher Education*, which examine fraud in its broadest sense[14]. Eaton describes the fraud ecosystem through four dimensions: degree mills, admission fraud, contract cheating, and paper mills[15]. The publication notes that the fraud industry is actually made up of mega-corporations that offer multiple services in the academic fraud supply chain, from fake qualifications to scientific publications (and which are often linked to other areas of organised crime). From the point of view of qualification recognition, two types can be distinguished within the classification of "admission fraud": diploma mills and counterfeit qualifications.

[12] CIMEA, *Riconoscimento accademico dei titoli di studio: Procedure, dati e sfide nelle istituzioni della formazione superiore in Italia*, DOC CIMEA, n. 142, 2024. https://www.cimea.it/Upload/Documenti/DOC%20CIMEA_142_1.pdf. [last accessed 3 October 2025].
[13] Eaton, S. E., *Corruption in the post-plagiarism era: weaponizing reputation and morality in the name of integrity in higher education*, in Denisova-Schmidt, E., Altbach P. G., De Wit, H., (eds.), Handbook on Corruption in Higher Education, Edward Elgar Publishing Limited, 2025, pp.146-161.
[14] Eaton, S. E., Carmichael, J. J., Pethrick, H, *Fake Degrees and Fraudulent Credentials* ... cit. Denisova-Schmidt, E., Altbach, P. G., De Wit, H., *Handbook on Corruption*... cit.
[15] Eaton, S. E., Carmichael, J. J., Pethrick, H, *Fake Degrees and Fraudulent Credentials*... cit.

5.1 *Diploma mills*

There is no agreed-upon definition of diploma mills[16], even in terms of terminology, given that the terms "degree mill" and "diploma mill" are often used interchangeably in English.

The community of experts from centres in Europe and North America involved in the recognition of qualifications (ENIC-NARIC Networks[17]) has used the following definition: a diploma mill is

> «a private institution, posing as an educational institution, which is neither recognised by national competent authorities nor duly accredited, and that awards fraudulent qualifications with no academic value[18]».

Another definition in the same context is that

> "Diploma Mill" refers to a business posing as an educational institution, which sells bogus qualifications without any requirements for (serious) study, research or examination. Diploma mills operate without any recognition by national competent authorities or lawful accreditation, even though they may possess a licence to operate as a business[19].

Beyond the definition, there is consensus on some of the characteristics that can identify a diploma mill, including[20]:

- lack of legal authority to operate as higher education institutions and to award official degrees;
- credits and qualifications are offered based solely on life experience or CV review;
- degrees can be purchased and there is a strong emphasis on fees and payment options (for instance, with credit card logos on the website);
- courses may be very short in duration (e.g., a bachelor's degree in 5 days);
- little or no attendance and interaction with academic staff required;
- false or exaggerated claims of external quality review: a long list of accreditation agencies and affiliated bodies may be mentioned on the website;

[16] Ibid.
[17] The Networks of National Information Centres on recognition operating in 56 countries in the UNESCO Europe and North America region: ENIC-NARIC, *about the ENIC-NARIC networks*. https://www.enic-naric.net/. [last accessed 3 October 2025].
[18] CIMEA, *Guide on Diploma Mills and other dubious institutions*, 2018a. https://www.cimea.it/Upload/Documenti/Guidelines-on-Diploma-Mills.pdf. [last accessed 3 October 2025].
[19] NUFFIC, *EAR manual*, 2023, p.49. https://www.nuffic.nl/sites/default/files/2023-08/1.%20EAR%20Manual%202023_2nd%20edition.pdf. [last accessed 3 October 2025].
[20] Council for Higher Education Accreditation (CHEA), UNESCO, *Toward effective practice: discouraging degree mills in higher education*, 2009. CIMEA, *Guide on Diploma Mills*... cit. NUFFIC, EAR manual... cit.

- academic staff whose degrees were issued by degree mills or failure to provide verifiable lists of academic staff and their qualifications;
- no campus or business address is provided, e.g., relying solely on a post office box number;
- the name of the diploma mill is similar to a well-known reputable higher education institution.

On 3 June 2022, the Committee of Ministers of the Council of Europe adopted a recommendation on countering education fraud[21] that provides indications for four areas related to education fraud: prevention, prosecution, international cooperation, and monitoring. The Recommendation, according to the rule of the Council of Europe (Rule No. 1327 of 10 January 2011 on awareness and prevention of fraud and corruption[22]), describes education fraud as

> behaviour or action occurring in the field of education intended to deceive and obtain an unfair advantage. It includes: (i) the activities of diploma mills, accreditation mills, visa mills, essay mills and essay banks, as defined below; (ii) impersonation by undertaking in whole or in part any work or assessment required as part of a programme in the place of an enrolled learner; (iii) illegal or irregular use of authentic documents; (iv) plagiarism; (v) production or use of forged, plagiarised or counterfeit documents; and (vi) the offer of unrecognised or unaccredited qualifications with the intention of deceiving another[23].

The Council of Europe Recommendation marks a significant step forward, providing definitions that are relevant for all Council of Europe member states. In the Recommendation, a diploma mill (also known as a "degree mill") is defined as

> «an institution or organisation which is not recognised by national competent authorities or organisations as an institution accredited or authorised by the law of any member state to confer awards or qualifications, and which purports, by means of misrepresentation, to issue such awards or qualifications[24]».

Diploma mills do not work in isolation, but are part of the commercial fraud ecosystem, and are often accompanied by other mills, such as accreditation mills, credential evaluation mills, and visa mills[25]. Contribution to the definition of diploma mill is also contained in the Council of Europe publication *Glossary of terms related to ethics and integrity in education*, which also refers to the ENAI Glossary and the ETICO definition[26].

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[21] Council of Europe, *Recommendation CM/Rec(2022)18 on countering education fraud*, 2022.
[22] Council of Europe, *Recommendation CM/Rec(2019)9 of the Committee of Ministers to member States on fostering a culture of ethics in the teaching profession*, 2019.
[23] Council of Europe, *Recommendation CM/Rec*(2022)18, ivi, p.9.
[24] Ibid.
[25] CIMEA, *Guide on Diploma Mills*... cit. Council of Europe, *Countering education fraud. Recommendation CM/Rec(2022)18*... cit. Finocchietti, C., Hesselbäck, A., Lantero, L., *The role of ENIC-NARIC networks in countering diploma mills. In Means to counter education fraud. Legislation, practices, instruments*, Vol. 7, Council of Europe Publishing, 2023.
[26] Tauginienė, L., Foltýnek, T., *Glossary of Terms related to Ethics and Integrity in Education*, Vol. 8, Council of Europe Publishing, 2024.

5.2 *Fraudulent credentials*

Fraudulent degrees and qualifications are a related but distinct phenomenon. A distinction has been proposed between a fake degree, considered as coming from a university that does not exist, where both the degree and the university are fabrications; and a fraudulent degree, which appears to be from a legitimate university, but the person who holds the degree never actually completed their studies at that school[27]. According to key documents at European Union level and Council of Europe level, the concept encompasses several cases: authentic documents forged, for example, to inflate grades; completely "invented" qualifications that do not correspond to any existing ones; copies of documents similar to parchments from famous universities; but also authentic documents used illegally or irregularly, such as impersonation, i.e. using a genuine document that is not awarded to the person using it, or a genuine document obtained fraudulently[28].

According to the PRADO Glossary, we are faced with document fraud in the following situations:

- fraudulently obtained documents (authentic documents applied for on the basis of fraudulent source documents or fraudulently issued authentic documents);
- misused authentic documents (with an intention to commit fraud);
- use of expired authentic documents (with an intention to commit fraud);
- forgery;
- counterfeiting;
- pseudo documents;
- stolen and unlawfully personalised blanks[29].

While being two separate concepts, in the scope of this article both diploma mills and fraudulent qualifications are considered leading to non-authentic qualifications, in the sense of not being proxy of authentic knowledge. In its etymology, authenticity recalls the concept of authorship and of accomplishing something on one's own[30]. In other terms, it is possible to affirm that a qualification is authentic when the holder is the "author", i.e., the person who has completed the study path and really achieved the knowledge and competences certified by the qualification[31].

[27] Eaton, S. E., Carmichael, J. J., Pethrick, H., *Fake Degrees and Fraudulent Credentials*... cit.
[28] Council of Europe, Recommendation CM/Rec(2022)18...cit. Council of the European Union, *Public Register of Authentic Travel and Identity Documents Online, Prado Glossary*, 2022.
[29] Ibid.
[30] "From αὐτο- (auto-, "self") + *ἔντης (*héntēs "to prepare, work on, succeed"), Wiktionary, *Autenticity*, 2024. https://en.wiktionary.org/wiki/αὐθέντης. last accessed 3 October 2025].
[31] Finocchietti, C., Lantero, L., *Assessing the authenticity of Qualifications, Institutions and Identity*, in Bergan, S., Finocchietti, C., Kouwenaar, K., et al., (eds.), *Crossing Bridges between Education Systems, The History and Relevance of the Lisbon Recognition Convention*, "Universitas Quaderni", n.1, CIMEA, 2025.

6. *The extent of fraud in education*

6.1 *Providers*

According to the World Higher Education Database of the International Association of Universities (IAU WHED), there are approximately 21,000 accredited higher education institutions worldwide[32]. The number is 25,000 post-secondary universities, according to other estimates[33]. It is a highly diverse landscape of institutions in terms of type, size, location and specialisation. These figures refer to institutions recognized as official in their respective education systems. Still, many others do not fall into this classification, for example, because they are legitimate institutions that are not interested in official accreditation by the authorities of the system in which they operate. Alongside these, there is also a market of dubious or clearly fake institutions. In this logic, the space between official and unofficial institutions can be defined as a continuum

> from those that are undeniably fake to those that have various levels of acceptance (...). Each person, organisation, agency, decision maker and gatekeeper must decide where to draw a line on a continuum, saying in effect, those on one side meet my needs, and those on the other side do not[34].

There are currently 264 million students enrolled in tertiary education, more than double the number in 2000. The global number of internationally mobile students more than tripled during the last two decades, rising from 2.1 million in 2000 to nearly 6.9 million in 2022[35]. This increase in international mobility also led to growth in industries in this area (recruitment agents, credential evaluators, study advisors) that can also be targets of fraud.

If, purely speculatively, we were to hypothesise a percentage of fake institutions and dubious transactions in line with the general data for the counterfeit goods market reported at the beginning of the article, that estimate the volume of counterfeit industry as 2.3% of world trade (which, as mentioned, is probably underestimated), the figures would be worrying, to say the least.

While it is difficult to obtain objective data, what seems to emerge from the available data is that the industry of diploma mills and fraudulent credentials is growing. Several factors can contribute to creating opportunities for fraud in education: from the massification of higher education to the role of technology, competitiveness, the knowledge production system, and internationalisation[36]. This massification changed the landscape of higher education institutions. Combined with this, credentialism and the idea that achievement of an academic degree or qualification has, in most societies, become a prerequisite for high social value occupations and earning a high income, has stimulated corrupt means to obtain these qualifications[37].

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[32] IAU, WHED, *The world of higher education at your fingertips*, 2025, https://www.whed.net/home.php. [last accessed 3 October 2025].
[33] Altbach, P. G., De Wit, H., *Growing opportunities for corruption in Higher Education*, in Denisova-Schmidt, E., Altbach P. G., De Wit, H., (eds.), *Handbook on corruption in Higher Education*, Edward Elgar Publishing Limited, 2025, pp. 13-19.
[34] Cfr, Ezell, A., Bear, J., *Degree Mills: The Billion-Dollar Industry That Has Sold Over a Million Fake Diplomas*, Prometheus Books, 2012.
[35] UNESCO, *Higher education: Figures at a glance*, 2025. https://unesdoc.unesco.org/ark:/48223/pf0000394112. [last accessed 3 October 2025].
[36] Altbach, P. G., De Wit, H., *Growing opportunities for corruption*... cit.
[37] Ibid. Wheelahan, L., *Gavin Moodie, Revisiting credentialism – why qualifications matter: a theoretical exploration*, "British Journal of Sociology of Education", Vol.46, n.6, 2025, pp. 874-892. https://doi.org/10.1080/01425692.2025.2529814. Ruth A. Wienclaw, *Credentialism*, EBSCO Knowledge Advantage, 2021. https://www.ebsco.com/research-starters/social-sciences-and-humanities/credentialism. [last accessed 3 October 2025].

Despite the difficulty of obtaining reliable data and statistics, given the complexity and constantly evolving nature of the degree mill world[38], scholars, experts and international organisations have attempted to capture the scale of the phenomenon. In 1986, the Council of Europe published a first confidential list of institutions awarding qualifications that were not officially recognised in Europe, as an internal document, which encompassed 700 in 1986. The exercise was repeated in 1996 and the institutions monitored numbered 1,300. As a national example, from 1988 to 1994, the Italian Ministry of Education published three lists of unaccredited institutions, with more than 60 entries. In 2009, a study conducted by CIMEA listed 50 fake institutions operating on the Italian market[39]. In 2018, a consortium of ENIC-NARIC centres collected information on around 2,150 diploma mills[40].

A market that is growing in numbers, but which has also changed shape over the years, moving from what could be defined as small or medium-sized enterprises, or family businesses, to forms that resemble true multinationals, with a much greater volume of activity. One example is the University Degree Programme (UDP), an unaccredited consortium of diploma mills that began operating in 1998 and had at least 22 colleges and universities throughout Europe. The UDP established websites for each of its colleges and universities as well as for its own accrediting agencies and was estimated to have sold more than 30,000 fake online degrees, equating to proceeds totalling $50 million to $100 million or even more[41]. Another case study was Saint Regis University: it was one of more than 120 fictitious universities operated by a group that sold diplomas from 1999 until 2005, before it was shut down by the authorities. The government investigation concluded that during this period, their business sold 10,815 fake credentials to 9,612 people in 131 countries for a total of $7,369,907[42]. A most recent case, and probably the biggest, is the case of Axact, the "World's Largest Diploma Mill"[43] as the press has called it. Axact created 4,000+ websites over a period of 25 years. In addition to the university websites, the "education" side of Axact's business activities also includes a huge number of fake high schools, accrediting agencies, governmental (mainly US) agencies, companies performing background checks and fraudulent credential evaluation services. In total, Axact has sold more than 9 million fake degrees, which makes Axact the world's largest degree mill ever, by far. According to sources, Axact grossed US$70 billion between 2011 and 2022. While "education" is a good source of revenue, the main bulk of Axact's income comes from "upselling" – extortion, blackmail and threats. In 2022, the fake degree industry was estimated to have over 7 billion USD in global revenue. The price of a fake diploma can range from 199 to 25,000 USD[44].

[38] Draper, M., *Legal responses to education fraud, in Means to counter education fraud. Legislation, practices and instruments*, ETINED, Vol. 7, Council of Europe Publishing, 2023, pp.11-23. https://rm.coe.int/prems-023823-gbr-2512-etined-vol-7-16x24-web-4-/1680addf63. e[last access 3 October 2025]. Eaton, E. L., Carmichael, J., *Fake Degrees and Credential Fraud, Contract Cheating, and Paper Mills: Overview and Historical Perspectives*, In Eaton, E. L., Carmichael, J., Pethrick, H., (eds.), *Fake Degrees and Fraudulent Credentials in Higher Education*, Springer, 2023.

[39] Lantero, L., *Fabbriche di titoli: L'indagine di campo*, In Benedetto Coccia, Carlo Finocchietti (a cura di) *Fabbriche di titoli. Istituzioni universitarie non accreditate e irregolari Titoli accademici non riconosciuti Sistemi di accreditamento e politiche di contrasto*, "Quaderni Universitas" 23, CIMEA, 2009.

[40] Finocchietti, C., Lantero, L., *Assessing the authenticity of Qualifications*... cit, pp. 55-62.

[41] CIMEA, *Guide on Diploma Mills*... cit.

[42] Ibid.

[43] Ezell, A., *Academic Fraud and the World's Largest Diploma Mill*. "College and University", Vol. 94, n.4 2019, pp.39-46. https://www.aacrao.org/docs/default-source/webinar-documents/94-4-academic-fraud-and-the-worlds-largest-diploma-mill.pdf?sfvrsn=4b276f1f_2. [last accessed 3 October 2025].

[44] Eaton, S. E., Carmichael, J., *Fake Degrees and Credential Fraud*... cit. Ezell, A., *Yesterday, Today, and Tomorrow: A Tour of Axact, the "World's Largest Diploma Mill"*, in Eaton, S. E., Carmichael, J. J., Pethrick, H., (eds), *Fake Degrees and Fraudulent Credentials in Higher Education*, Springer, 2023, pp. 49-94. Finocchietti, C., Hesselbäck, A., Lantero, L., *The role of ENIC-NARIC*... cit.

In Italy, a recent case reported by the press concerned an institution operating between Bosnia and Herzegovina and Italy, the International University of Goradze, which offered qualifications in medicine, physiotherapy, nursing and osteopathy to more than 1,000 students, with each programme costing between € 6,500 and € 20,000[45]. According to the media, following this case, the Italian Ministry for Universities and Research reported six other non-accredited institutions to the judiciary for providing misleading information about the courses they offered: Harris University, Università Popolare degli Studi Sociali e del Turismo, Università Popolare Scienze della Nutrizione, Centro Studi Koinè Europa, Università degli Studi UnideMontaigne and Selinus University[46].

Looking at the data on falsified qualifications, CIMEA, as an ENIC-NARIC centre, receives less than 1% of false qualifications each year. It should be noted that this data only records qualifications defined in the credential evaluation as "confirmed falsified", i.e., those for which confirmation of non-authenticity has been received from the competent authority. In addition to these, there are a large number of qualifications for which there are reasonable doubts about authenticity, but which are not included in the "official" statistics on forgeries in the absence of official confirmation. Within this percentage, there are significant geographical differences, with some countries having a very high percentage of false qualifications and others where it is difficult, inappropriate or risky for the holder of the qualification to refer to the country's authorities for confirmation of authenticity (e.g. in countries where there is ongoing conflict, or in the case of refugees). Alongside false qualifications, there are also false certificates of comparability signed by CIMEA as ENIC-NARIC centre, a market in which the role of agents appears to be significant.

The CIMEA figures represent only a small proportion of the qualifications in circulation in Italy, where there are numerous authorities responsible for recognition. To date, there is no single method of data collection, even within the higher education sector. Looking at the international level, 422 fake qualifications were shared in the two-year period 2020-22 as part of the Erasmus+ FraudScan project by ENIC-NARIC centres in six countries (Italy, France, Germany, Ireland, the Netherlands and Sweden) as part of the Erasmus+ FraudScan project, with the aim create a reference database of recurring patterns of counterfeiting identified by ENIC-NARIC centre experts.

Alongside academic qualifications, there is a whole host of other fake certificates, which are not covered by this study but range from language certificates to letters of reference and CVs. To give an idea of the scale of the phenomenon, an analysis carried out in one country found that 44% of CVs had discrepancies in education claims, with 10% of those having false grades. Research by HEDD[47] found that only 20% of employers verify applicants' qualifications with the awarding body, relying instead on CVs or certificates and transcripts[48].

[45] Lo Porto, G., *Bosniagate, la truffa dell'università fantasma: Il sistema, l'organizzazione e tutti i protagonisti. Ecco cosa c'è da sapere*, "La Repubblica", March 19, 2024b. https://palermo.repubblica.it/cronaca/2024/03/19/news/bosniagate_jean_monnet_inchiesta_palermo-422337899/. [last accessed 3 October 2025].
[46] Lo Porto, G., *Non solo il Jean Monnet: Da Milano a Palermo passando per Napoli altri sei "atenei" online sospetti*, "La Repubblica", March 15, 2024a. https://palermo.repubblica.it/cronaca/2024/03/15/news/bosniagate_universita_sospette_milano_napoli_palermo-422313735/. [last accessed 3 October 2025].
[47] Higher Education Degree Datacheck (HEDD), *Advice and guidance on degree fraud. A toolkit for employers*, 2017. https://cdn.prospects.ac.uk/pdf/HEDD%20degree%20fraud.pdf. [last accessed 3 October 2025].
[48] Eaton, S. E., Carmichael, J., *Fake Degrees and Credential Fraud*... cit. Ezell, A., *Yesterday, Today, and Tomorrow*... cit. Finocchietti, C., Hesselbäck, A., Lantero, L., *The role of ENIC-NARIC*... cit.

With the aim of contributing to the full implementation of the 2022 Council of Europe Recommendation, and with a view to contributing to research and data collection in the sector, the proposal to establish a Centre to Prevent and Counter Education Fraud in Europe was born. In July 2025, the Council of Europe and the Italian Information Centre on Academic Mobility and Equivalence (CIMEA), acting under the mandate of the Italian Ministry for Universities and Research, signed a Memorandum of Understanding to establish the Centre in Italy[49].

6.2 *Customers*

While much research has been devoted to defining who the providers in the fraud industry are, an equally interesting topic is to outline the profile and understand who the customers are, or at least what the target categories of diploma mills are. According to experience in the recognition sector, there are at least seven categories of customers:

- Mid-career adult professionals, for whom a new academic qualification can represent access to a higher level position in their workplace. The "flexibility" of the learning path and the promised validation of prior learning can represent a significant lever of attraction.
- Young people with low-level academic qualifications or no qualifications at all, who, for professional purposes, need to obtain an academic qualification in a very short period of time.
- People holding technical qualifications, for whom the achievement of an academic qualification can lead to financial benefits and improvements in their external image.
- Craftsmen, tradesmen and small entrepreneurs: individuals who are already successful in their activity, but who feel the need to have a qualification to improve their reputation and image.
- Students who have failed entrance examinations for programmes with numerus clausus or candidates who have failed to obtain the licence for a regulated profession, who can look for alternative pathways to gain such credentials.
- People who practise emerging professions, which are normally neither recognised nor regulated.
- Qualification hunters", i.e. people who, out of personal ambition, collect academic qualifications from different institutions[50].

[49] Council of Europe, *Council of Europe and CIMEA Join Forces to Launch New Centre Tackling Education Fraud*, 25 June 20925. https://www.coe.int/en/web/ethics-transparency-integrity-in-education/-/council-of-europe-and-cimea-join-forces-to-launch-new-centre-tackling-education-fraud. [last accessed 3 October 2025].
[50] CIMEA, *Guide on Diploma Mills*... cit.

7. *Defence and prevention tools*

Among the tools for combating fraud is the role of legislation and its effective implementation, as outlined in the recommendation on combating fraud in art. 7[51]. A study on the role of legislation in combating fraud was conducted among the countries participating in the Council of Europe's ETINED platform, the results of which were analysed in Volume 7 of the ETINED series[52]. An example of possible regulatory action is the protection of education terminology, with particular attention to institutional and academic titles and nomenclature of awards, from misuse and misrepresentation within their education systems[53]. This is a simple but effective tool for identifying and reporting malpractice, as evidenced by the role of legislation in Denmark, Estonia[54] and Italy[55]. Other prevention methods include awareness raising and information, training, codes of ethics, use of digital solutions, research, international cooperation and data collection[56]. While there is renewed interest in research on the specific topic of diploma mills and fraudulent credentials, as has been noted, scientific contributions are not that numerous, and for this reason, study and research continue to play an essential role, especially in providing an overview[57]. Training and education have always been important for professionals, both in ENIC-NARIC Networks and in national and international networks of professional credential evaluators (e.g., The Association for International Credential Evaluation Professionals - TAICEP). In Italy, a reference practice for the standards of the credential evaluator profession has been defined as a basis and preparatory step for the establishment of APICE, the Italian Professional Association of Credential Evaluators. The mapping exercise identified 15 tasks, 44 categories of knowledge (K) and 51 skills (S), formalised in the UNI Reference Practice Number 120:2021[58]. Among the tasks, one refers to "Verify the institution and/or the programme", and a second one to "Verify the authenticity of the documentation".

Looking at skills and knowledge, below is one related to the domain of countering fraud.

K-knowledge:
K25: Be aware of the phenomenon of diploma mills and accreditation mills.
K29: Know the main methods of verifying the authenticity of a qualification (security features such as watermarks, stamps, etc.; databases for online verification, etc.) and the main standards of reference with respect to the format and characteristics in the various education and training systems.

S-Skills:
S29: Know how to identify a fake institution (so-called "diploma mills") and a fake accreditation agency (so-called "accreditation mills").

[51] Council of Europe, *Countering education fraud. Recommendation CM/Rec(2022)18 and explanatory memorandum*, 2022. https://rm.coe.int/ok-prems-137222-gbr-2512-cmrec-2022-18-et-expose-motifs-a5-web-1-/1680a96147. [last accessed 3 October 2025].
[52] Draper, M., *Legal responses to education fraud*... cit.
[53] Council of Europe, *Countering education fraud. Recommendation CM/Rec(2022)18*... cit.
[54] CIMEA, *Guide on Diploma Mills*... cit.
[55] Lantero, Finocchietti (a cura di), *Lauree 30 e frode*... cit.
[56] Council of Europe, *Countering education fraud. Recommendation CM/Rec(2022)18*... cit.
[57] Denisova-Schmidt, E., Altbach P. G., De Wit, *Handbook on Corruption in Higher Education*... cit. Eaton, S. E., Carmichael, J., *Fake Degrees and Credential Fraud*... cit.
[58] Ente Italiano di Normazione (UNI), CIMEA, Prassi di Riferimento. *UNI/PdR 120:2021, Non-regulated professional activities—Credential evaluator—Requirements for knowledge, skills, autonomy and responsibilities*, UNI, 2021. https://www.apice-italia.it/Upload/Documenti/PDR_en.pdf. [last accessed 3 October 2025].

S32: Know how to verify the authenticity of a qualification and its compliance with the standards of the system it comes from.
S33: Know how to identify and evaluate false and counterfeit documents, be able to identify anomalies or inconsistencies in documents that may be indicators of fraud, or that require a more convincing explanation during the evaluation phase.

8. *The authentication industry: the digital alternative and the possible role of Artificial Intelligence (AI)*

Over the years, the debate on combating fraud has increasingly emphasised the importance of digital alternatives, i.e., the need to build secure systems for the exchange of qualifications and credentials. This issue is addressed in international policies, for example among the 47 countries of the European Higher Education Area (EHEA), which in the last three communiqués signed by all ministries in charge of higher education have supported, on the one hand, the need for digital solutions to facilitate the secure, efficient and transparent exchange of student and institutional data to support recognition, quality assurance and mobility, in a logic of interoperability[59]. On the other hand, the EHEA ministers have expressed their commitment to countering diploma and accreditation mills, fraudulent qualifications and academic cheating services, made more accessible through developments in the digital field[60], with an awareness of the role of technology as a two-faced Janus. At the global level, the UNESCO Global Recognition Convention, which entered into force in 2023 and has currently been ratified by 38 states (data as of April 2025)[61], frames technology as a tool to combat fraud:

> «States Parties commit to adopting measures to eradicate all forms of fraudulent practices regarding higher education qualifications by encouraging the use of contemporary technologies and networking activities among States Parties (Article III.8)[62]».

The use of digital tools and the secure exchange of digital student data have been seen as a way to prevent and minimise areas of action for the circulation of fraudulent qualifications, while also being a powerful tool in the hands of fraudsters.

The role of digitalisation and secure digital exchange of student data, qualifications and credentials has been explored in several documents and articles[63]. The role of digitalisation, in particular, has been

[59] European Higher Education Area (EHEA), *Paris Communiqué*, 25 May 2018. https://ehea.info/Upload/document/ministerial_declarations/EHEAParis2018_Communique_final_952771.pdf. *Rome Ministerial Communiqué*, 19 November 2020 http://www.ehea.info/Upload/Rome_Ministerial_Communique.pdf. [last accessed 3 October 2025].
[60] European Higher Education Area (EHEA), *Tirana Communiqué*, 2024. https://ehea2024tirane.al/wp-content/uploads/2024/06/Tirana-Communique.pdf. [last accessed 3 October 2025].
[61] UNESCO, *Higher Education Global Covention*. https://www.unesco.org/en/higher-education/global-convention/states-parties?hub=70286. [last accessed 3 October 2025].
[62] UNESCO, *Global Convention on the Recognition of Qualifications concerning Higher Education*, 2019, Article III.8. https://www.unesco.org/en/legal-affairs/global-convention-recognition-qualifications-concerning-higher-education?hub=66535. [last accessed 3 October 2025].
[63] CIMEA, *Guide on Diploma Mills and other dubious institutions*, 2018a... cit. Chiara, C., Lantero, L., *Assessing the authenticity of Qualifications*...cit, Johansson, E., Finocchietti, C., *The digital alternative. In Means to counter education fraud. Legislation, practices, and instruments*, ETINED, Vol. 7, Council of Europe Publishing, 2023, pp. 67-79, https://rm.coe.int/prems-023823-gbr-2512-etined-vol-7-16x24-web-4-/1680addf63. [last accessed 3 October 2025]. NUFFIC, *Digital Student Data & Recognition*, A White Paper for the ENIC-NARIC Networks, April 2020. https://www.nuffic.nl/sites/default/files/2020-08/digital-student-data-and-recognition.pdf. [last accessed 3 October 2025].

seen as a relevant element in preventing fraud and supporting verification of authenticity. The model for verification of authenticity can be seen as "trust in verification", i.e., verification carried out through online digital portals or databases available at the national or institutional level. With advancing levels of digital maturity in qualifications, it is possible to use the model of "trust in delivery", in which "digitally native credentials" (credentials issued directly by institutions through channels such as blockchain or other online platforms) can be verified by accessing the credential itself[64].

In the last 30 years, the discourse on digitalisation in the community of recognition experts in the European context, in the framework of the ENIC and NARIC Networks, has evolved from the concept of support for transparent and accessible information provision to the idea of "digital transformation"[65], as a process involving all aspects of the work on recognition in a holistic perspective[66]. The recent development in the widespread use of poses new questions and perspectives on recognition policies and practices. While the regulatory framework at the national and international levels is taking shape in the European context and beyond, with specific relevance for recognition[67], the use of AI seems to present both risks and opportunities in the verification industry.

Verification can be done through a variety of means, depending also on the maturity of digital data and on the digital methods of verification available[68]. One line of use is to "automate" verification actions, such as filling in an online verification database with the data recorded in the qualifications. Another way is to compare and check relevant features of the documents to be analysed against an already available database, to spot inconsistencies and mistakes that can constitute a sign of fraud[69]. This can be done with natural language processing, but also with computer vision. Of course, the risks of bias in the system are real, such as the fact that fraudsters can use AI to replicate very sophisticated qualifications. Another dimension is the role of agentic AI, which is the current area of development. If, from a technological point of view, the recognition industry is in the testing and piloting phase, a few key elements are beginning to be outlined to drive sustainable and ethical innovation in the field: human-centred evaluation, which means human oversight of all phases of the evaluation; robust process and data governance; the central role of research and innovation, and cooperation within the Higher Education Sector and beyond; AI literacy and training, as skills remain central; and networking and cooperation among recognition professionals[70].

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